DISCLOSURE OF INSIDE INFORMATION WITHIN THE BELGIAN BIOTECH INDUSTRY: A QUANTITATIVE AND QUALITATIVE ANALYSIS

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LIST OF ABBREVIATIONS

ASX	Australian Securities Exchange.
CBFA	Banking, Finance and Insurance Commission.
CESR	Committee of European Securities Regulators.
CHMP	Committee for Medicinal Products for Human Use.
EIOPA	European Insurance and Occupational Pensions Authority.
EMA	European Medicines Agency.
ESMA	European Securities and Markets Authority.
FDA	United States Food and Drug Administration.
FSMA	Financial Services and Markets Authority.
FSMA Opinion	FSMA Opinion 2020/02 of 28/10/2020 on the considerations and good practices with respect to inside information disclosure by listed biotech companies.
GP	Good practice as identified in the FSMA Opinion.
MAR	Market Abuse Regulation; Regulation (EU) No 596/2014 of the European Parliament and of the Council of 16 April 2014 on market abuse and repealing Directive 2003/6/EC of the European Parliament and of the Council and Commission Directives 2003/124/EC, 2003/125/EC and 2004/72/EC.
METI	Japanese Ministry of Economy, Trade and Industry.
NBB	National Bank of Belgium.
NDA	New Drug Application.
SIX	Swiss Stock Exchange.

I. EXECUTIVE SUMMARY

As investing in biotech companies is subject to high risk and the information within this industry is often technical, it is important for investors that this information is disclosed in a comprehensible manner. This research investigates how the FSMA could improve the disclosure practices of inside information by Belgian biotech companies with respect to the FSMA Opinion, that sets out guidelines in this regard.[1] Therefore, press releases published by both Belgian and foreign biotech companies are analysed. This analysis is complemented by a study on US case law and regulatory insights from Japan and Australia. Last, data of Belgian press releases is analysed in order to map the Belgian biotech companies' labelling practices.

1. Compliance with the FSMA Opinion

A first insight focusses on the significant discrepancy in companies' compliance with the FSMA Opinion. Some companies show a high tendency to follow the FSMA guidelines whilst others show the complete opposite. An overview is included, ranking all Belgian listed biotech companies from best to worst.

Company	Compliance	Improvement
Sequana Medical	Best	Medium
Hyloris	Best	Small
UCB	Best	Medium
Galapagos	Best	Big
Mithra	Good	Medium
argenx	Good	Small
Bone Therapeutics	Good	Small
Biocartis	Good	
TheraVet	Good	
MDxHealth	Adequate	
Nyxoah	Adequate	
Oxurion	Adequate	Small
Acacia Pharma	Adequate	No
IBA	Failed	Medium
DMS Imaging	Failed	
Onward Medical	Failed	
Celyad	Failed	Small

A similar reasoning is true for the improvements caused by the FSMA Opinion. Significant differences *pre* and *post* the FSMA Opinion are noticed for some companies whilst other companies made small to no improvements. Again, an overview is provided. Where no indication is listed, the combination of a *pre* and *post* Opinion press release was not available for analysis.

On top, these improvements vary strongly dependent on which type of press release is looked at.

2. Focus enforcement on negative news

Overall, press releases covering negative news comply the least with the FSMA Opinion, *e.g.,* due to an unclear title, less data provided or poor explanation on the reason for an authority approval that is not granted. This observation was true regardless of which company published the press release. Accordingly, press releases covering negative news should be closely monitored in the future.

[1] FSMA (2020). Opinion_2020_02 of 28/10/2020, Considerations and good practices with respect to inside information disclosures by listed biotech companies.
https://www.fsma.be/sites/default/files/legacy/content/EN/opinion/20201029_opinion_biotech_en.pdf.

3. Suggestions for FSMA Opinion

A limited number of possible improvements for the FSMA Opinion could be identified. First, it is recommended to the FSMA to add a **new Good Practice** concerning **IP rights**. This would encourage companies to let investors in on their IP rights and their implications by providing information on this topic in the press releases.

Secondly, it is recommended to **expand** some GPs. This would allow companies to provide more details on those aspects that are currently underexposed in their press releases:

- **GP-09** demands companies to disclose a balanced mix of non-technical and technical information. → Expansion: include an explanation when a specific scoring system or index is used during a clinical trial to make this aspect of the press release less technical.
- **GP-13** instructs companies to include meaningful cautionary statements and explanations. → Expansion: add a risk disclosure section. This section would inform investors about all the risk related to the development process of a certain drug such as safety profiles, trial limitations, concerns of authorities, *etc*. Investors would be more aware of the inherent risk associated with the biotech sector.
- **GP-21** states that, when possible, biotech companies should disclose their next step and the expected timing of these steps. → Expansion: biotech companies could disclose more detailed information about how the presented news influences future plans in their next steps and discussions with authorities.

Thirdly some GPs were identified that are of great importance to investors but are not adhered to by many companies. These GPs should be **monitored** closely in the future so that the FSMA can intervene when necessary.

- **GP-19** includes that biotech companies should refer to documents on their own website for more information on a clinical trial. If companies refer to previous results, a link should be made available to the previous press release containing the complete results to provide full disclosure. This way investors can form their own judgement.
- **GP-19** - The FSMA should check that biotech companies clearly state the primary and secondary endpoints of a clinical trial. The notion "testing safety and efficacy' does not suffice.
- **GP-20** states that biotech companies should give a balanced view of favourable and less favourable findings. Companies often hold back or even hide negative news in their press release, however if less favourable news is included, they should indicate this from the start, *e.g.,* Galapagos bundled failed clinical trials with positive trials or most companies add a neutral heading to a negative press release.

4. Labelling practices

Biotech companies use three different labels on press releases: "Inside information", "Regulated information" and "Regulated and Inside information". Legally, only the last label is correct. The following table shows biotech companies and their labelling habits.

Constant use of correct label	Constant use of wrong label	(1 or 2) Label mistake(s)	Alternating labels
▪ argenx ▪ DMS Imaging ▪ Sequana Medical	▪ Galapagos ("Regulated information") ▪ Acacia Pharma ("Inside information") ▪ Onward Medical ("Inside information")	▪ IBA ▪ UCB ▪ Mithra ▪ Biocartis	▪ Celyad ▪ Nyxoah ▪ Hyloris ▪ MDxHealth ▪ Oxurion ▪ Bone Therapeutics

5. Accuracy of labelling

60% of all labelled press releases published by Belgian biotech companies had a significant effect on the stock of a company. The top 6 performing companies however are good at assessing which press releases will have a significant effect and publish labelled press releases of which 72% had a significant impact on the stock. Possible improvements are company specific and can be seen in the table below.

Best performing	Label more often	Label less often
▪ argenx ▪ Acacia Pharma ▪ Galapagos ▪ Mithra ▪ IBA ▪ Bone Therapeutics	▪ UCB ▪ Celyad ▪ Oxurion ▪ Biocartis	▪ Nyxoah

The overall accuracy of labelling of the industry can also improve by having a better understanding of the different categories of press releases and their impact on the stock price of a company. Indications of what the FSMA should undertake with every category of press release is provided in the following table.

Labelled accurately	More frequent labelling
▪ Authority approval not granted ▪ Authority approval delayed ▪ Topline results ▪ Post-hoc analysis ▪ Patient recruitment ▪ Acquisition ▪ Partnership update ▪ Acquisition info ▪ New product ▪ Schedule of conferences ▪ Commercialization update	▪ Authority approvals ▪ Authority communication ▪ Interim results ▪ Publication of results ▪ Trial termination ▪ Clinical trial start ▪ New R&D partnership ▪ New commercial partnership
Monitor evolution	**Less frequent labelling**
▪ Presentation of results ▪ General conference presentation	▪ New commercial contract

6. Conclusion

This research concludes that most press releases succeed in transmitting the essence to the investor. It is, however, apparent that a minority of these press releases fully comply with the requirements of the FSMA. The publication of the FSMA Opinion already brought about important improvements within certain companies. For most companies, improvements can nevertheless still be made. Although a few recommendations are formulated to enhance the FSMA Opinion even more, the domestic and international analysis showed that this publication already contains all key elements and is quite unique in the world.

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II. INTRODUCTION

A. Introduction to the company

The Financial Services and Markets Authority (FSMA) is the financial regulating authority in Belgium. As an autonomous public institution, its goal is to ensure the fair, honest and equitable treatment of all financial consumers as well as ensuring the integrity of the financial market. The public status of the FSMA was established by law and the institute carries its tasks out independently in service of the general interest. The most important functions of the institution are managed by four governing bodies, being the Management Committee, the Supervisory Board, the Audit Committee and the Sanctions Committee. The members of these bodies are appointed for six years by Royal Decree. The FSMA's predecessor was the Banking, Finance and Insurance Commission (CBFA). This institution was reformed in 2011 into its current form.[2]

Alongside the National Bank of Belgium (NBB), the FSMA supervises the Belgian financial sector. Its competences are divided in six categories, namely:

- Surveillance of financial markets and financial information provided by enterprises;
- Supervision on compliance with business conduct standards;
- Product supervision;
- Supervision of financial service providers and intermediaries;
- Supervision of supplementary pensions; and
- Contribution to improving financial education.[3]

Financial rules are increasingly being developed at the European or international level as the European single market and financial markets become more internationalized. International cooperation and supervisory collaboration have also grown in importance.

For this reason, the (FSMA) is a member of the European Securities and Markets Authority (ESMA) as well as the European Insurance and Occupational Pensions Authority (EIOPA). Each of these authorities contributes to uniform supervisory standards and consistent supervisory methods in its industry. The FSMA is also a member of a number of ESMA and EIOPA working groups that are entrusted with developing policy ideas.[4]

[2] https://www.fsma.be/en/what-fsma.
[3] https://www.fsma.be/nl/voorstellingsbrochure.
[4] https://www.fsma.be/en/fsmas-place-world.

B. Problem statement

BIOTECHNOLOGY: A COMPLEX AND HIGH-RISK INDUSTRY — The biotechnology industry (hereafter: biotech industry) is characterised by specific activities. Biotech companies produce drugs that are derived from living organisms and they often only have a limited pipeline of around four product candidates (Bratic, 2014). As they are engaged in earlier-stage drug discovery and development, these companies face great scientific risks (Salgado *et al.,* 2017): less than 5% of the compounds discovered in the first stage of the process will eventually receive approval from the authorities to be commercialized. In addition, the process takes on average 10 to 12 years to complete (Horvath *et al.,* 2018). During this entire stepwise process, there are many key moments. Examples include reaching endpoints in the different clinical phases, receiving marketing authorisation from different authorities, and entering research & development and commercial partnerships with other firms. Each of these snapshots has the potential to fail and thus constitute critical moments (Bratic, 2014). Looking at it from a wider economic perspective, all these elements explain why the performance of biotech companies is subject to, not only high systematic risk, but also to high idiosyncratic risk (Thakor, 2017).

From a financial point of view, most biotech companies are loss-making (Lee & Lee, 2019). As these development processes take up large amounts of cash and biotech companies often do not generate revenues, the sector relies heavily on external funding to finance the (pre)clinical trials (Brown, 2009). Biotech companies particularly rely on capital market financing (Thakor, 2017). Because of the abovementioned characteristics, investors cannot rely on the classic valuation methods to estimate the value of a biotech company (Bratic, 2014). Therefore, valuation of these biotech companies is almost solely based on the success of the drug development of a certain compound and the estimated revenue it will create in the future (Kang, 2018). Given this financial position and the limited product pipeline, a failure of a drug development could be detrimental for the company, adding heavy financial exposure to the already risky nature of the biotech sector.

OBLIGATION TO DISCLOSE INSIDE INFORMATION — Following the above, information published by biotech companies relating to one of these critical moments could be likely to have a significant effect on their stock price. For instance, if a biotech company with a limited pipeline makes public that a product will not be able to enter Phase III of a clinical trial, or does not get approved by the FDA, it is very likely that the stock price of this company will drop. If this kind of information is then also precise enough for an investor to decide on the stock of the biotech company he or she is holding, and this information has not been made public, it concerns *inside information* according to the Market Abuse Regulation. The objective of this Regulation is to ensure the integrity of European financial markets and enhance investor confidence, which could indeed be harmed by insider trading and the unlawful disclosure of inside information. Therefore, it is obliged for listed companies in Europe to disclose inside information as soon as possible to the public, in a manner which enables fast access, and complete, correct and timely assessment of the information. On top of this, companies should clearly identify that the information communicated contains inside information.[5]

DISCLOSURE OF INSIDE INFORMATION WITHIN BIOTECH INDUSTRY — Particularly within the biotech industry, and because of the riskiness of the investment, it is of the utmost

[5] See also recital 1 Commission Implementing Regulation 2016/1055: *"The protection of investors requires effective and timely public disclosure of inside information by issuers."*

importance for investors to be properly informed on inside information. This, however, is complicated by the fact that the nature of the given information is often highly technical, including multidimensional test results of clinical trials and statistical inference.[6] This type of information is inherently more difficult to comprehend for laymen-investors, often retail investors, who have less knowledge and experience in these scientific and clinical matters.

For this reason, the FSMA published its Opinion of October 28th, 2020, on considerations and good practices with respect to inside information disclosures by listed biotech companies (hereafter: FSMA Opinion).[7] The aim of the Opinion is to assist those companies, especially newly listed ones (with potentially limited experience), in respecting inside information disclosure requirements and preventing market abuse infringements. It may particularly be challenging for these companies to determine when and what to disclose.

RESEARCH QUESTIONS — Almost two years after the publication of the FSMA Opinion, the institute requested to review the impact and content of this document. After thorough deliberation with the FSMA, the scope of this project got broadened to provide also general recommendations for the FSMA with respect to disclosure of inside information within the biotech industry. With this in view, the following principal research question has arisen:

How could the FSMA improve the disclosure practices of inside information by Belgian biotech companies, in particular with respect to compliance with the FSMA Opinion and, in addition, with respect to the obligation to label inside information as such?

The term "Belgian biotech companies" encompasses Belgian[8] and foreign[9] biotech companies listed on Euronext Brussels, and one Belgian biotech company listed on Euronext Growth.[10]

This principal research question is *prescriptive* in nature, and is broken down into four sub questions:

i. ***Which press releases are labelled as inside information or could be considered inside information, and which conclusions can be drawn from the relation between these two?***

The first sub question is indispensable for answering the main research question. Indeed, in order to analyse whether the press releases containing inside information are compliant with the FSMA Opinion, one first needs to determine which press releases contain inside information. Therefore, the first part of this sub question must be answered. The second part of this question provides an answer to the last part of the main research question, *i.e.,* indicating possible improvements regarding the obligation to label inside information as such.

This sub question is dealt with completely in section V.A, which constitutes a quantitative analysis. For this sub question, a model is developed that detects all the press

[6] https://www.fsma.be/sites/default/files/legacy/content/EN/opinion/20201029_opinion_biotech_en.pdf.
[7] https://www.fsma.be/sites/default/files/legacy/content/EN/opinion/20201029_opinion_biotech_en.pdf.
[8] It concerns DMS Imaging, Biocartis, Bone Therapeutics, Celyad, Galapagos, Hyloris, IBA, MDxHealth, Mithra, Nyxoah, Oxurion, Sequana Medical and UCB.
[9] It concerns Acacia Pharma (UK), argenx (NL) and Onward Medical (NL).
[10] It concerns TheraVet.

releases with a significant effect on either the stock price or the volume traded. This selection of press releases is accompanied by an analysis of the data that results from applying the model.

ii. To what extent do Belgian biotech companies comply with the FSMA Opinion?

The second sub question is responded to in part V.B, with a qualitative analysis of the press releases containing inside information of Belgian biotech companies. In particular, the compliance of these press releases with the FSMA Opinion is checked.

iii. Which disclosure practices of inside information within the biotech industry can be observed in other countries?

The third sub question tries to gather inspiration for possible improvements abroad. Section V.C answers this question. Therefore, first, US case law and regulatory insights from the US, Japan and Australia are discussed, whereafter the disclosure practices of companies listed in the US, Sweden, the UK, France and Switzerland are analysed.

iv. Which recommendations could be given to the FSMA?

Finally, the fourth sub question, discussed in section V.D, aims to bring all the previously gained insights together, and, out of these insights, formulate recommendations and possible points of improvements for a potential rework of the FSMA Opinion and provide guidance in their monitoring practice.

Despite the first three sub questions being *descriptive* in nature, and only the last one being *prescriptive*, this research nevertheless does not opt to adhere too rigorously to this division. For the sake of readability and retaining the practical value of this research, a choice was made to already reflect upon possible improvements for the FSMA whilst answering these descriptive sub questions. This way, the main research question (prescriptive) is answered along the way. Accordingly, the reader of this research will come across practical recommendations in every section, even if the sub question answered is only descriptive by nature.

C. Relevance

PRACTICAL RELEVANCE — This research project first displays a significant practical relevance in many areas. The biotech sector has seen a tremendous growth in recent times (The economist, 2021; McKinsey, 2021). Whereas last year some decline was spotted in the sector's growth, the biotech industry remains the Walhalla for many investors searching for success stories like argenx (McKinsey, 2022).[11] This is especially true in times where adventurous investors are searching for alternatives to attract exponential returns, now that speculative cryptocurrencies like bitcoin have plummeted (Carchidi, 2022). During the Covid-19 crisis, more and more attention was guided towards biotech and its capabilities to produce vaccines and medicines in a short amount of time. The FDA and EMA (emergency) approval procedures were observed with considerable interest and astonishment. At the same time, more and more biotech firms gathered bad news concerning insider trading[12] and fraud.[13] Besides this, more and more cases concerning false inside information are hit the news as well.[14] Recently, also one of Belgian's biggest financial newspapers, "De Tijd" published an extensive article on inside information.[15] In this article, three of the Belgian biotech companies observed in this research were mentioned by name (Mithra, UCB and Galapagos) as companies which saw the highest number of registrations on insiders. The abovementioned elements clearly show the substantial relevance of this thesis subject.

The contradiction between the growing public interest in the sector and the notorious scandals surrounding it, needs to be solved. The steep rise in disclosure practice did not start by accident in the same period as in which the scandals started to come out. For example, the Market Disclosure Regulation came into effect in 2016, the same time the Theranos scandal became public.[16] Furthermore, a global trend was spotted in which regulators not only strengthen their compliance measures by altering disclosure laws (*e.g.,* the United States)[17], but also to provide clear and rigid guidelines on the most urgent topics, such as the FSMA Opinion. Moreover, a recent Belgian study on inside information concluded that regulation on corporate governance alone does not suffice to counter insider trading (De Wit, 2022). This conclusion only strengthens the need for clear foreclosure guidelines. A reason for the regulation to not suffice, is partly, and especially in Europe, due to the contents of the MAR remaining unclear for many (Franklin, 2020). The concept of inside information still seems to confuse a lot of people. Important to notice is that this trend of publishing clear and extensive guidelines was also spotted in Japan[18] and Australia.[19] Consequently, disclosure obligations are not solely a Belgian, but a global issue.

ACADEMIC RELEVANCE — Even though this subject is highly relevant, the academic literature remains surprisingly silent on the subject. A lot of studies have been conducted

[11] Or its American counterparts Amgen, Genentech, Genzyme, Gilead and Biogen. See Pisano, G.P. (2006) Science Business: The Promise, the Reality, and the Future of Biotechnology. (Harvad Business School Press, Boston, USA).
[12] See for example this article, where François Fernier from Mithra is accused of insider trading: https://www.brusselstimes.com/90919/mithra-boss-under-investigation-for-insider-trading-pharmaceutical-biotechnology-menopause-contraceptive; but also Elizabeth Holmes, the founder of Theranos: https://www.bbc.com/news/world-us-canada-59734254.
[13] See for example: https://www.ai-cio.com/news/sec-charges-biotech-co-founders-60-million-fraud/; See also: https://www.tijd.be/ondernemen/farma-biotech/bone-therapeutics-incasseert-nieuwe-opdoffer/10328724.html.
[14] Puma Biotech had to pay 54.2 million dollars to settle a class action: https://www.reuters.com/legal/government/puma-biotech-agrees-pay-investors-542-mln-fraud-case-2021-12-14/.
[15] https://www.tijd.be/markten-live/analyse/deze-toppers-uit-het-bedrijfsleven-verhandelen-miljoenen-op-de-beurs/10395061.html.
[16] https://www.fastcompany.com/3059230/the-theranos-scandal-is-just-the-beginning.
[17] https://www.sec.gov/news/press-release/2020-192.
[18] https://www.meti.go.jp/english/press/2021/0304_005.html.
[19] https://www.asx.com.au/documents/research/Code_of_Best_Practice_for_Reporting_by_Life_Science_Companies.pdf.

on insider *trading*, and the gains to be made by them (see *e.g.,* Deffou, 2007; Van Geyt, 2013), but the topic of inside information *disclosure* remains incredible under-exposed.[20] An analysis such as this one, which examines inside information in a quantitative and qualitative way, represents a minority.[21] In addition to its practical relevance, this research is therefore also academically relevant.

Last but not least, this research project is most important for the FSMA itself. Since Belgium is a global hub for biotech firms, its regulator is almost obliged to actively follow-up on this market as well. Better mapping of the disclosure practice is one of the key elements because of the specific characteristics of the sector.[22] We conclude that this research is both academically and practically highly relevant. We invite many colleagues to conduct more research on the disclosure practice in the future regarding the disclosure of inside information within the biotech industry in order to fill this lacune.

[20] There are however studies conducted on the gains to be made by inside information, but this is strongly linked with insider trading. See for instance Cohen *et al.,* 2012.

[21] We did find a study in which the main purpose was to analyze the association between insiders' trading and subsequent publication of news on their respective companies, and to assess the extent to which abnormal returns earned by insiders are due to (price changes arising from) subsequent disclosure of specific news as distinguished from information that trades by insiders had occurred (Givoly, 1985).

[22] See *infra.*

III. THEORY

A. Biotech industry

1. The biotech sector as such

WHAT DOES THE BIOTECH INDUSTRY ENTAIL — The biotechnology industry is a sector built on scientific biological and chemical research (Bratic *et al.,* 2014). The main goal of biotech companies is to develop, produce and commercialise products which rely on the use of living organisms (Said *et al.,* 2013). These living organisms can be bacteria, animals, yeasts, *etc.* and are in most cases either part of the final product or are used during the production process (*e.g.,* the modification of a certain compound through chemical reactions only to be found in yeasts). Biotech products are most often used for food production, production of biofuels or genomics. Besides these elements, the biotech industry is most known for its rising role within the broader healthcare industry (Schweitzer, 2007).

DIFFERENCES BETWEEN BIOTECH AND PHARMA — The main difference between biotech and pharmaceutical companies in the healthcare sector derives from the fact that pharmaceutical companies produce medicine which originate from a chemical basis, whilst medicine of biotech companies is derived from, as mentioned before, living organisms (Kagan, 2022). These kinds of medicines are often referred to as biologicals. In recent years, it became apparent that pharmaceutical companies have a growing recognition on the value of these biologicals and invest and develop these specific type drugs as well (Schweitzer, 2007).[23]

DEVELOPMENT OF NEW MEDICINE — In order to develop and commercialise a candidate product, both biotech and pharmaceutical companies need to successfully pass all necessary steps of the drug development process.[24] Unfortunately, drug development is a high-risk endeavour (Salgado, 2017). Less than 5% of the compounds discovered in the first stage of the process will eventually be granted approval from authorities. Likewise, only 5% eventually becomes a marketable drug. Besides the high failure rate, the drug development process also takes a long time to complete. On average, 10 to 12 years are spent before a product reaches marketability (Horvath *et al.,* 2018). Lastly, the cost of this process is not to be underestimates as well. The cost of developing a new drug averages around 500 million dollars (DiMasi & Grobowski, 2007).

[23] A class of medicines which are produced using large-scale cell cultures of bacteria or yeast, or plant or animal cells. Biologicals are a diverse group of medicines which includes vaccines, growth factors, immune modulators, monoclonal antibodies, *etc.* https://www.who.int/health-topics/biologicals#tab=tab_1.
[24] https://en.wikipedia.org/wiki/Phases_of_clinical_research.

2. Development process

OVERVIEW – The whole drug development process consists of 5 main steps before a drug can enter the market. The following drawing[25] provides an overview of this cycle.

Figure 1: ***Overview of the drug development process***

THE EARLY STAGES: BASIC RESEARCH — The earliest stage of the drug development process starts off with research to discover and develop pharmaceutical compounds. During this first step, researchers try to identify those compounds that have a beneficial effect in the treatment of one or multiple diseases. Different compounds are tested to see if they interact with a certain target. The targets are usually discovered in research which investigates diseases and their pathways withing the human body. Compounds interacting with the targets have the potential of disturbing the diseases' pathway. As a result, these interruptions might cure or reduce symptoms of that disease. The promising compounds with a high target affinity are then selected and further developed. The next step is to research the compounds characteristics (such as solvability, reactivity, stability, *etc.*). Besides this, researchers also have to develop a method to synthesise the compound, develop validation methods, gain knowledge about possible metabolites[26] which can be formed in the body, *etc*.[27]

PRE-CLINICAL TRIALS — The promising compounds are selected for further research as part of the second phase of the drug development process. The product now enters the non-clinical or pre-clinical trials. In this stage, the main goal is to measure the toxicity of the compounds. Researchers try to establish if a product causes harm to an organism and to what extent. There are two types of preclinical research: in vitro and in vivo studies.[28] An in vitro study refers to studies conducted outside of living organisms. The latter takes place in living organisms.

CLINICAL TRIALS — The start of the clinical trial constitutes the first time a human is exposed to a possible future drug compound. The clinical trial consists of three very distinct phases, each with its own set-up and goals. Before these studies can commence, a clear trial plan needs to be formed, stating the methods and objectives of each study. It is important that the selection criteria of patients and the duration of the trial are explained. Besides this, the number of patients that will be participating needs to be disclosed, the drug administration process needs to be explained and the endpoints must be included. The trial plan also needs to explain if the candidate-product will be compared with a control group.

DIFFERENT CLINICAL TRIAL PHASES — In the first phase (or Phase I) of the clinical trial, 20 to 100 healthy volunteers or patients with the same disease are exposed to the compound. In this phase of the clinical trial, the safety and right dosage of the drug are determined. During Phase II, a few hundred volunteers with the same disease are exposed to the drug. The patient group is too small to statistically determine if the drug has a

[25] The drawing was retrieved from https://www.seikagaku.co.jp/en/development/flow.html.
[26] A substance made or used when the body breaks down food, drugs or chemicals, or its own tissue (for example, fat or muscle tissue). This process, called metabolism, makes energy and the materials needed for growth, reproduction, and maintaining health. It also helps get rid of toxic substances. https://www.cancer.gov/publications/dictionaries/cancer-terms/def/metabolite.
[27] https://www.fda.gov/patients/drug-development-process/step-1-discovery-and-development.
[28] https://www.fda.gov/patients/drug-development-process/step-2-preclinical-research.

beneficial effect, but the study can already measure efficacy, safety, and side effects of the compound. This is not surprising the goal of the second clinical trial phase. Phase III studies involve hundreds to thousands of participants and often take place in different countries at the same time. Usually, the participants are divided in two groups. This allows the comparison of the efficacy of the potential new drug with a placebo group or with a current existing treatment. This phase lasts longer than the other phases and involves more patients. As a result, also less common side effects are detected during this phase.

MARKETING AUTHORISATION APPLICATION — If the previous research shows that a certain compound is safe and at the same time effective, the company will ask authorities for marketing authorisation. In the USA, companies need to file a New Drug Application (NDA) to the Food & Drug Administration (FDA). In the EU, there are 4 different pathways for a compound to get drug approval. The most frequently used option is the filing of an application at the European Medicines Agency (EMA). Companies can also opt to file a separate application to a national body within an EU member state.

APPROVAL — The review of an application is a lengthy process. A full FDA review lasts on average 322 days compared to an average of 366 days for a full review of an application filed at the EMA (Downing *et al*., 2012). Once a candidate-product is under review, the chances of market authorisation are rather high as the approval rate for both the FDA and EMA hovers around 83% (Hay *et al.,* 2014). The approval rate also stays relatively consistent over the years. (Van Norman, 2016) Applications that fail this initial review are often asked for a resubmission or re-examination. It also happens that applications are simply not approved.[29]

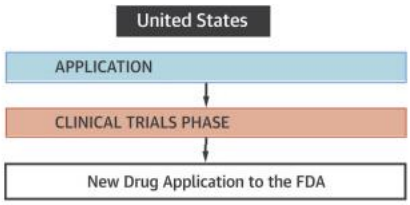


Figure 2: ***Regulatory approval US***

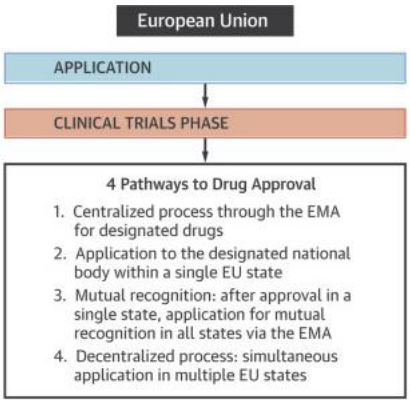


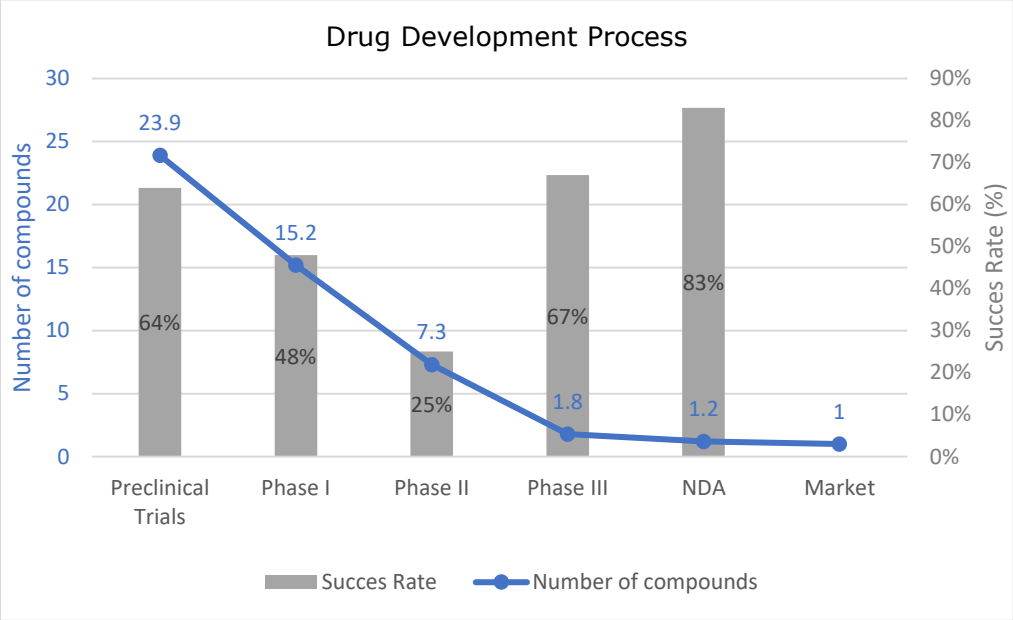
Figure 3: ***Regulatory approval EU***

3. Biotech specific issues

LOW SUCCESS RATE — A major issue of the whole drug development process is the success rate (Xiu, 2009). As the data in Graph 1 shows, Phase II is the key challenge of the whole clinical trial process. Only one out of four compounds that enters Phase II proceed to Phase III. Graph 1 is based on data from the 14 largest and most experienced pharmaceutical companies: Abbott, AstraZeneca, Bayer, Bristol-Myers Squibb (BMS), Boehringer-Ingelheim, Eli Lilly, GlaxoSmithKline, Johnson & Johnson, Merck, Novartis, Pfizer, Roche, Sanofi-Aventis, and Schering-Plough. The graph also shows that the success rate of a compound to become an approved drug selected after the discovery and development phase is smaller than 5% (Ku, 2015). Statistically, a company must identify 24 promising compounds during the discovery phase to develop one successful product

[29] The drawing was retrieved from: Van Norman, 2016

out of their pipeline. Only this one product out of 24 products can then be commercialised as an actual medicine.



Graph 1: ***Drug development process: success rate and number of compounds of each step***

INTELLECTUAL PROPERTY — A second facet which makes the whole drug development process complicated, is the intellectual property protection.[30] Companies must acquire patents to protect the different compounds identified during the discovery phase. A patent only grants market exclusivity for the next 20 years, starting from the filing of the application. In reality, most of these 20 years is taken up by the drug development process which, as been mentioned before, takes on average 10 to 12 years to complete (Horvath, *et al.*, 2018). After a candidate-product receives market authorisation, the company has market exclusivity resulting in considerable revenue for the company. This revenue is critical to not only recover the investment in the development of the medicine at hand, but also to compensate the development of all the failed compounds (Berger, 2017). In big pharmaceutical companies a substantial part of these revenues is in its turn also reinvested in R&D for future possible medicine (Pharmaceutical Research and Manufacturers of America, 2016).

GENERIC MEDICINE — After the patent and market exclusivity expires, other pharmaceutical companies can apply for approval at the FDA or EMA to produce similar medicine. When medication is produced by a company that is not the original inventor of that medicine, the medication is called generic medication. Approval can be acquired by proving to the authorities that the generic medication has the same efficacy as the original drug. If this can be demonstrated, no preclinical and clinical trials are needed (Berger). Consequently, companies that are able to develop generic drugs can sell it at a lower price than the original product since they do not need to recuperate the initial research and development costs of the product. For blockbuster drugs[31], this results in a revenue reduction of up to 80% (Khalil & Onyango, 2022). Accordingly, the timing of the drug development process is a key aspect in the biotech industry. Every process delay causes a significant impact on the possible revenue a drug can create in the future, something

[30] See for an extensive elaboration on the topic: Rimmer, 2008; Castle, 2011; Singh *et al.,* 2016.
[31] A blockbuster drug is an extremely popular drug that generates annual sales of at least $1 billion for the company that sells it.

that biotech firms wish to avoid at all costs. Unsurprisingly, biotech companies are also not keen on disclosing these delays to the general public.

4. Investing in biotech firms

RISING BIOTECH INTEREST — The interest of investors in biotech has risen tremendously in recent years. Figures of McKinsey show that in 2019 alone IPO's of biotech firms raised 28.7 billion dollars worldwide (McKinsey, 2021).

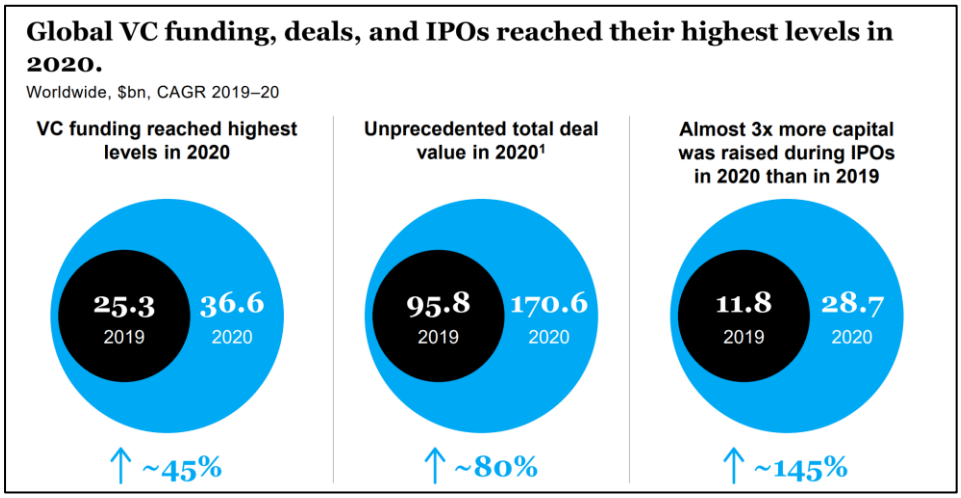


Figure 4: ***Global overview of biotech deals and IPOs***

In total, there are 891 biotech firms listed on the stock market. The majority (66%) are US biotech firms listed on 4 different US exchanges. The 229 European biotech companies are listed on 15 different stock exchanges, of which 90% are listed in their home country (McKinsey, 2021).

BIOTECH INDUSTRY IN BELGIUM — Specifically looking at the Belgian biotech industry, 14 stock traded biotech companies exist of which 13 are listed on Euronext Brussels and one on Euronext Growth. Next to these 14 Belgian companies, there are also three foreign companies listed on Euronext Brussels. It concerns Acacia Pharma (UK), argenx (NL) and Onward Medical (NL).

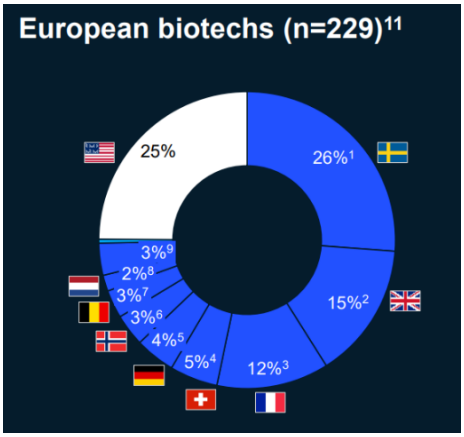


Figure 5: ***Number of biotech firms per country***

Euronext Brussels			
1.	Asic Biotech	9.	Mithra
2.	Biocartis	10.	Nyxoah
3.	Bone Therapeutics	11.	Oxurion
4.	Celyad	12.	Sequana Medical
5.	Galapagos	13.	UCB
6.	Hyloris	14.	Acacia Pharma (UK)
7.	IBA	15.	argenx (NL)
8.	MDxHealth	16.	Onward Medical (NL)
Euronext Growth			
17.	TheraVet		

Table 1: ***Overview of the Belgian biotech firms***

HIGH-RISK INDUSTRY — As already mentioned in the problem statement, the drug development process is a high-risk and capital-intensive endeavour. Biotech firms deal with high levels of uncertainty and complexity prevalent in knowledge-intensive technological industries (Shuwaikh & Dubocage, 2022). Drug development processes of big pharmaceutical companies bear the same risks, however, the latter show greater resilience to setbacks (James, 2010) because they have a diversified revenue stream as they collect income from many different medicines that have already been approved by authorities (Ledley, 2020) and have a wide pipeline, developing many possible drugs at the same time.[32] The opposite is true for biotech companies, that engage primarily in R&D and burn a lot of cash therewith, whilst at the same lacking real revue (Thakor *et al*., 2017). The pipeline of these biotech companies usually only contains a small number of possible drugs (Deloitte, 2020). On average, the pipeline of a Belgian biotech firm consists of 4 possible drugs (Appendix A). These are the reasons they rely heavily on investors and partnerships to be able to raise capital to fund the preclinical and clinical trials (Toth, 2013; Thakor *et al*., 2017). Hence, it does not surprise that biotech companies bear a much higher idiosyncratic risk than pharmaceutical companies (Thakor *et al*., 2017).

The average loss of Belgian biotech firms equals € -29.7 million in 2021 (Appendix A). In the same year, the average operational cash flow of these companies was equal to € -64,6 million (Appendix A). The valuation of these biotech companies is almost solely based on the success of the drug development of a certain compound and revenues it will create in the future (Kang, 2018). This makes the failure of the process detrimental for the stock price (Lee & Lee, 2019). For this reason, updates published by the company to inform investors about the progress of this process can have a significant effect on the stock price and the valuation of the company, both positively and negatively. Therefore, investors should be informed correctly, especially when these updates contain important information concerning the future of a possible new drug.

[32] By means of illustration: The 10 biggest pharmaceutical companies had on average 113 possible new drugs in the pipeline in 2019. https://www.pharmaceuticalprocessingworld.com/number-of-drugs-in-global-rd-pipeline-projected-to-reach-record-high-in-2019/.

B. Inside information

APPLICABLE LAW IN BELGIUM — The Belgian rules regarding insider trading are determined by the EU Market Abuse Regulation (MAR)[33] that came into force on July 3rd, 2016[34] (Lefèvre *et al.,* 2017; Mees & Stuyts, 2017).[35] The MAR rules on disclosure of inside information are applicable for issuers who have requested or approved admission of their financial instruments for trading on the regulated market of Euronext Brussels (Janssens & Geeroms, 2016). The Market Abuse framework's objective is to ensure the integrity of European financial markets and advance investor confidence (ESMA).

INSIDER TRADING UNDER BELGIAN LAW — According to article 7.1 (a) of the MAR, inside information comprises *"information of a precise nature, which has not been made public, relating, directly or indirectly, to one or more issuers or to one or more financial instruments, and which, if it were made public, would be likely to have a significant effect on the prices of those financial instruments or on the price of related derivative financial instruments."* This definition breaks down into four constitutive elements (Vandendriessche, 2013; Berlingin & De Pauw, 2017), which are discussed hereafter. In practice, the criteria of "precise nature" and "significant price" give rise to most difficulties (Janssens & Geeroms, 2016).[36] In this regard, the guidelines of the Committee of European Securities Regulators (CESR)[37] are of particular use, as they provide an interpretation of this article, which can serve as a starting point for further interpretation by *e.g.,* courts or authorities. The CESR emphasizes that these two criteria should not be looked at apart from each other, but rather be discussed together (CESR, 2007). The question whether information qualifies as inside information has to be assessed by a case-by-case analysis. However, the surrounding context, such as past communication of the issuer and market expectations, is considered as well in most cases (CESR, 2007; Janssens & Geeroms, 2016; Vandendriessche, 2013). It is up to the issuer to identify whether a piece of information constitutes inside information (FSMA Circular, 2012).

ASSESSMENT BASED ON *EX ANTE* INFORMATION — When assessing these conditions, it should be emphasised that *"the question whether, in making an investment decision, a reasonable investor would be likely to take into account a particular piece of information should be appraised on the basis of the ex ante available information"*[38]*,* which is also the key issue according to the CESR (CESR, 2007; Vandendriessche, 2013).[39] The Court of

[33] Regulation (EU) No 596/2014 of the European Parliament and of the Council of 16 April 2014 on market abuse (market abuse regulation) and repealing Directive 2003/6/EC of the European Parliament and of the Council and Commission Directives 2003/124/EC, 2003/125/EC and 2004/72/EC.

[34] Following this new regulation, the Belgian law of 2002 regarding the supervision of the financial sectors and financial services was revised by the law of 27 June 2016. The FSMA also issued two new circulars and updated its circular on the obligations of issuers listed on a regulated market (Mees & Stuyts, 2017). Other regulation containing obligations for listed companies are the Belgian Law of 21 November 2017 on the infrastructures for the markets in financial instruments and transposing Directive 2014/65/EU, the Commission Implementing Regulation 2016/55, the Royal Decree of 14 November 2007 on the obligations of issuers of financial instruments admitted to trading on a regulated market, and the Royal Decree of 21 August 2008 laying down detailed rules for certain multilateral trading facilities.

[35] The Mar replaced the previous Market Abuse Directive.

[36] Recital 18 of the MAR states: *"Legal certainty for market participants should be enhanced through a closer definition of two of the elements essential to the definition of inside information, namely the precise nature of that information and the significance of its potential effect on the prices of the financial instruments (…)"*

[37] On 1 January 2011 the Committee of European Securities Regulators (CESR) was officially replaced by the European Securities and Markets Authority (ESMA) (Herbert Smith Freehills LLP, 2011).

[38] Recital 14 of the MAR states that *"reasonable investors base their investment decisions on information already available to them, that is to say, on ex ante available information. Therefore, the question whether, in making an investment decision, a reasonable investor would be likely to take into account a particular piece of information should be appraised on the basis of the ex ante available information. Such an assessment has to take into consideration the anticipated impact of the information in light of the totality of the related issuer's activity, the reliability of the source of information and any other market variables likely to affect the financial instruments (…)."*

[39] Recital 14 states that *"reasonable investors base their investment decisions on information already available to them, that is to say, on ex ante available information. Therefore, the question whether, in making an investment decision, a reasonable investor would be likely to take into account a particular piece of information should be appraised on the basis of the ex ante*

Justice of the European Union sort of confirms this in the *Geltl* case, stating *"an assessment must be made on a case-by-case basis of the factors existing at the relevant time."* Thus, *ex post* information can be used to check that the *ex ante* information was price sensitive, but if a person drew reasonable conclusions from *ex ante* information available to him, no actions are possible.[40]

1. Information of precise nature

ARTICLE 7.2 MAR — Article 7.2 of the MAR clarifies that information is deemed to be precise if, first, *"it indicates a set of circumstances which exists or which may reasonably be expected to come into existence, or an event which has occurred, or which may reasonably be expected to occur."* Cumulatively (Janssens & Geeroms, 2016; Vandendriessche, 2013), the information must be *"specific enough to enable a conclusion to be drawn as to the possible effect of that set of circumstances or event on the prices of the financial instruments (…)."* The first part of the article is often referred to as the test of materiality whilst the latter is called the test of specificity (Berlingin & De Pauw, 2017). Only when both tests come back positive, information can be considered "*precise*".

PROTRACTED PROCESS — Relevant in particular for biotech firms, is that in the case of a protracted process, the intermediate steps of that process that result in the future event can constitute precise information (article 7.2 MAR; Berlingin & De Pauw, 2017; Mees & Stuyts, 2017; Vandendriessche, 2013).[41] Such an intermediate step should satisfy the criteria for insider trading by itself, in order to qualify as inside information (article 7.3 MAR).

1.1. Materiality test

LIKELY TO OCCUR IN THE NEAR FUTURE, BASED ON STABLE EVIDENCE — For information to be precise, it needs to have a certain degree of materiality. Materiality means that the information must be based on stable and objective evidence. Only when talking about future predictions, materiality becomes more complex and turns into "*a likeliness to occur in the near future without needing to be sure or fixed in the future."* (Feron & Fink, 2016). The CESR states that in general, in order to determine whether a set of circumstances exists, or an event has occurred, *"the key issue is whether there is firm and objective evidence for this as opposed to rumours or speculation, i.e., if it can be proved to have happened or to exist"* (CESR, 2007).

***GELTL* CASE: REALISTIC PROSPECT THAT THE EVENTS WILL OCCUR —** In the *Geltl* case, the Court clarifies that it would be contrary to the MARs objective[42] to interpret the wording "may reasonably be expected" as a requirement that the probability of the circumstances or events coming into existence or occurring is *high* (see also: Vandendriessche, 2013). Following the words of the Court, the information does not qualify as precise information if it refers to circumstances or events of which the occurrence is *implausible*, but it is

available information. Such an assessment has to take into consideration the anticipated impact of the information in light of the totality of the related issuer's activity, the reliability of the source of information and any other market variables likely to affect the financial instruments (…)." Recital 15 then says, *"ex post information can be used to check the presumption that the ex ante information was price sensitive, but should not be used to take action against persons who drew reasonable conclusions from ex ante information available to them."*

[40] Recital 15 states that *"ex post information can be used to check the presumption that the ex ante information was price sensitive, but should not be used to take action against persons who drew reasonable conclusions from ex ante information available to them."*

[41] Article 7.2 MAR, *in fine.* See also in this regard: *"if the information concerns a process which occurs in stages, each stage of the process as well as the overall process could be information of a precise nature."* (CESR, 2017) and recitals 16 and 17 MAR.

[42] *"In such a scenario, insiders would be able to derive undue benefit from certain information which, under such a restrictive interpretation, would be held not to be precise, to the detriment of others who are unaware of it."*

simply precise if there is a *realistic prospect* that these circumstances or events will come into existence or occur (see also: Mees & Stuyts, 2017). The MAR confirms this criterion in recital 16. Given that the preparatory works of the Directive and Belgian legal doctrine required a high degree of probability (Feron & Berlingin, 2017) or sufficient certainty (Geens & Wouters, 2004; Feron & De Chatelet, 2016; Sotiropoulou, 2012) before the *Geltl* judgment, this decision clearly enlarged the scope of the notion *inside information* (Lefèvre *et al.,* 2017). Legal doctrine points out the difficulty to determine *ex ante* whether there is a realistic prospect (Lefèvre *et al.,* 2017).

1.2. Specificity test[43]

SPECIFIC ENOUGH — The specificity test implies the information concerned should be sufficiently specific, clear and complete (Berlingin & De Pauw, 2017; De Cordt & Schaeken, 2008). The information does not need to be comprehensive in order to qualify as "precise" (CESR, 2007). The CESR provides two illustrative situations in which information is specific enough to enable a conclusion on the possible effect of the circumstances or event on the prices of the financial instruments. First, this is the case if the information would enable a reasonable investor to take an investment decision without, or at very low, financial risk. In other words, *"the investor would be able to assess with confidence how the information, once publicly known, would affect the price of the relevant financial instrument."* Second, information is considered sufficiently precise if investors would trade immediately on the basis the publishment of the information (see also: Vandendriessche, 2013).

***LAFONTA* CASE —** However, the CJEU ruled rather differently in the *Lafonta* case, where the Court held that, in order to qualify as precise, it is not required that the information makes it possible to determine the likely *direction* of a change in the prices of the financial instruments.[44] Together with *Geltl*, this court decision clearly extends the notion of "inside information" within the European case law (Berlingin & De Pauw, 2017; Mees & Stuyts, 2017). Some legal doctrine however criticises this judgment, because they believe that a reasonable investor, in order to trade without or at very low risk, necessarily considers the impact of the information on the direction of the stock price (Berlingin & De Pauw, 2017; Simonart, 2015).

2. Not public

INFORMATION GENERALLY AVAILABLE FOR INVESTORS — In absence of a legal explanation on the condition of not being public, one falls back on legal doctrine, jurisprudence and soft law. Legal doctrine requires that the information is generally available to the investors. Hence, if the information is solely made available to a limited audience (*e.g.,* website with limited access or newspaper with limited audience), it does not qualify as "public". On the other hand, it is accepted that investors do not actually have the information in their possession, but it suffices that they are able to access the information, with the means that can be expected from reasonable investors to collect that information (Janssens &

[43] This test of the *specificity* of the information should not be confused with the *sensibility* of the information, as assessed within the context of the fourth condition, namely whether the information is likely to have a significant effect on the stock price, regardless of the direction of that effect. The *specificity* and the *sensibility* are two distinct conditions for information to be qualified as inside information (Berlingin & De Pauw, 2017).

[44] The Court clarifies in nr. 31 that *"it must be held that, for the condition in question to be satisfied, it is enough that the information be sufficiently exact or specific to constitute a basis on which to assess whether the set of circumstances or the event in question is likely to have a significant effect on the price of the financial instruments to which it relates. Consequently, the only information excluded from the concept of "inside information" by virtue of that provision is information that is vague or general, from which it is impossible to draw a conclusion as regards its possible effect on the prices of the financial instruments concerned."* In nr. 38, the Court then states that *"in order for information to be regarded as being of a precise nature for the purposes of those provisions, it need not be possible to infer from that information, with a sufficient degree of probability, that, once it is made public, its potential effect on the prices of the financial instruments concerned will be in a particular direction."*

Geeroms, 2016; Mees & Stuyts, 2017). In its Market Abuse Rules, the Financial Conduct Authority has provided several indications that information has been made public, including, amongst others, *"whether the information is contained in records which are open to inspection by the public"* and *"whether the information is otherwise generally available, including through the Internet, or some other publication (including if it is only available on payment of a fee), or is derived from information which has been made public"* (FCA).

3. Relating, directly or indirectly, to issuer(s) or financial instrument(s)

OBLIGATION TO DISCLOSE INFORMATION DIRECTLY RELATING TO ISSUER — Contrary to information *indirectly* relating to the issuer (*e.g.,* data and statistics published by public institutions disseminating statistics, the coming publication of rating agencies' reports, research, *etc.* (CESR, 2007)),[45] there is an obligation for the issuer to disclose information *directly* relating to it (Janssens & Geeroms, 2016). The CESR sums up information that directly concerns the issuer. Relevant in particular for biotech firms, are amongst others the following: new licences, patents, registered trademarks; decrease in value of patents or rights or intangible assets due to market innovation; innovative products or processes; product liability; changes in expected earnings or losses; withdrawal from or entry into new core business areas. It should be noted that this is a non-exhaustive and purely indicative list.[46] In the end, the *materiality* of the event should be considered.

4. Likely to have a significant effect on the price

REASONABLE INVESTOR TEST — Article 7.4 MAR defines information that is likely to have a significant effect on the prices of financial instruments as *"information a reasonable investor would be likely to use as part of the basis of his or her investment decisions."* This test entails whether or not the information is likely to have a significant effect on price, and the effect on price, thus, does not constitute a separate test (CESR, 2007; Janssens & Geeroms, 2016). In other words, it is presumed that a reasonable investor will base his investment decisions on information that has a significant effect on price.

LIKELINESS AND SIGNIFICANT EFFECT — The word "likeliness" should be interpreted in such a way that the mere possibility of information having a significant price effect does not suffice in order for the information to qualify as inside information, but, on the other hand, a degree of probability close to certainty is not required (CESR, 2007; Hannam case; Janssens & Geeroms, 2016; Vandendriessche, 2013). A "significant effect" at least implies that the price would likely be influenced "more than marginally" or "have more than a trivial effect" (Janssens & Geeroms, 2016; Hannam case).

FACTORS TO CONSIDER WHEN ASSESSING WHAT INFORMATION A REASONABLE INVESTOR WOULD BASE HIS DECISION ON — How should it be assessed what information a reasonable investor would use to start trading? It is emphasised that basing the assessment merely on fixed thresholds of price movements or quantitative criteria, is not suitable to identify

[45] However, this kind of information is of importance with regard to the insider dealing prohibition, unlawful disclosure prohibition and the obligation to make an insider list (Janssens & Geeroms, 2016).
[46] If an event appears on the list, this thus does not automatically mean it qualifies as inside information (CESR, 2007; Janssens & Geeroms, 2016).

the significance.[47] One has to consider the *"anticipated impact of the information in light of the totality of the related issuer's activity, the reliability of the source of information and any other market variables likely to affect the financial instruments (…) in the given circumstances*" (recital 14 of the MAR[48]). These market variables could include prices, returns, volatilities, liquidity, price relationships among financial instruments, volume, supply, demand, *etc.* (CESR, 2007).

MORE INDICATIVE ELEMENTS — On top, several indicative elements, can play a role, such as: the fact that information was price sensitive in the past, pre-existing analysts research reports and opinions indicating that the type of information in question is price sensitive, and the fact that the company itself treated similar events as inside information in the past (CESR, 2007). However, these are only indicators, as one should always be aware of the case-by-case nature of this assessment: the significance of the information will depend on which issuer it relates to, the size of the issuer, recent developments and the market sentiment about that sector or issuer.

[47] *"For example, the volatility of "blue-chip" securities is typically less than that of smaller, less liquid stocks. Large absolute percentage rises in big company stocks are likely to be rare events and do not mean that smaller percentage share price changes should not be seen as significant"* (CESR, 2007).

[48] See also in this regard: *"that capacity to have a significant effect on prices must be assessed, a priori, in the light of the content of the information at issue and the context in which it occurs. It is thus not necessary, in order to determine whether information is inside information, to examine whether its disclosure actually had a significant effect on the price of the financial instruments to which it relates"* Court of Justice of the European Union (2009). Spector Photo Group NV and Chris Van Raemdonck v Commissie voor het Bank-, Financie- en Assurantiewezen (CBFA). Retrieved June 14, 2022, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62008CJ0045&from=EN.

C. Disclosure of inside information within the biotech industry

1. General disclosure obligations

PRINCIPAL DISCLOSURE RULE — The qualification as "inside information" triggers several obligations for the issuing company. The principal disclosure rule is mentioned under article 17 (1) MAR, stipulating that "*an issuer shall inform the public as soon as possible of inside information which directly concerns that issuer."* It is thus important that issuers inform the market as soon as possible upon deciding if certain information qualifies as inside information. This principle is limited as it only applies to information which *directly* concerns the company.[49] Article 17 (1) MAR clarifies that "*inside information is made public in a manner which enables fast access and complete, correct and timely assessment of the information by the public."* Besides this, the disclosure of inside information must be separated from other forms of communication (*e.g.,* marketing of activities).

BROAD DISCLOSURE — In article 2 of the Commission Implementing Regulation 2016/1055 it is clarified that issuers shall disclose inside information using technical means that ensure inside information is disseminated to (1) as wide a public as possible on a non-discriminatory basis; (2) free of charge; and (3) simultaneously throughout the Union. Furthermore, inside information must be communicated, directly or through a third party, to the media which are reasonably relied upon by the public to ensure its effective dissemination. That communication shall be transmitted using electronic means that ensure that the completeness, integrity and confidentiality of the information is maintained during the transmission.

FORMAL REQUIREMENTS — This communication of inside information shall clearly identify (1) that the information communicated is inside information; (2) the identity of the issuer (full legal name); (3) the identity of the person making the notification (name, surname, position within the issuer); (4) the subject matter of the inside information; and (5) the date and time of the communication to the media (article 2 Commission Implementing Regulation 2016/1055). The issuer must post and maintain on its website for a period of at least five years, all inside information it is required to disclose publicly (article 17(1) MAR). This website must (1) allow users to access the inside information posted on the website in a non-discriminatory basis and free of charge; (2) allow users to locate the inside information in an easily identifiable section of the website; and (3) ensure the disclosed inside information clearly indicates date and time of disclosure and that the information is organised in chronological order (article 3 Commission Implementing Regulation 2016/1055).

2. Specific disclosure guidelines for biotech companies: FSMA Opinion

LEGAL EFFECT OF THE OPINION — Whereas the rules explained above apply to listed companies in general, there also exist specific guidelines with regard to the disclosure of inside information within the biotech industry. As mentioned in the problem statement[50], on October 28th, 2020, the FSMA has published its Opinion on considerations and good

[49] This last addition cannot be underestimated. As has been mentioned above, there is a distinction between directly and indirectly linked to the issuer. Only the first type of information is regulated by the disclosure principle mentioned in article 17 (1) MAR. On the contrary, information which is not directly linked to the issuer does not have to be disclosed by the company. See the discussion of this condition *supra*.
[50] There, the objective of the Opinion is elaborated on.

practices with respect to inside information disclosures by listed biotech companies. One could wonder what the legal effect of such an Opinion is. This Opinion does not have the same legal effect as the aforementioned laws and regulations that prescribe what inside information is in general, and which disclosure obligations ensue from these. With the Opinion, the FSMA aims "*to contribute to greater predictability of its actions by informing the (biotech) sector of its interpretation of the legislation for which it is responsible for supervising compliance. In carrying out its supervisory tasks, the FSMA applies the opinions published under this heading, which may play a role in the measures it takes and the sanctions it imposes.*"[51] Hence, the Opinion does not have a binding effect, however it is still extremely relevant as the FSMA applies the Opinion in the execution of its competences. For those who are not familiar with this document, the most important elements, in the context of this research project, are listed hereafter.[52]

OBJECTIVE AND SCOPE — The aim of the Opinion is to assist those companies, especially newly listed ones (with potentially limited experience), in respecting inside information disclosure requirements and preventing market abuse infringements. The FSMA wants to provide useful insights that can help biotech companies analyse and decide on the appropriate timing and content of disclosure in their particular case, and prevent them from overlooking elements that might be important. With regards to the scope of the Opinion, it focuses on the disclosure of inside information *during the conduct of the clinical trials*. Disclosures regarding post-authorisation issues (such as inspections and reimbursement) are not covered.

CONTENT — The first part of the Opinion is about *qualification* of inside information. The second part discusses considerations and good practices related to the *timing* of the disclosure of inside information. The third part provides several good practices regarding the *content* of disclosure of inside information. It is this last part that is relevant for this research. First, several *general* good practices are elaborated on. These relate to the use of technical and non-technical information, hard and soft information, symmetry of information and internal review before public release. Next, different *specific* good practices are provided, which relate to specific types of information. It concerns efficacy and safety results, recruitment progress, decision to halt a clinical trial, marketing authorisation decisions and entering or ending a partnership.

3. Inside information as key concept for this research

IMPORTANCE OF CONCEPT "INSIDE INFORMATION" — By means of summary, legally, some information qualifies as "inside information". Biotech companies are subject to certain legal obligations and guidelines as regards the way of disclosing inside information and the content hereof. Press releases that do not contain inside information escape these rules and guidelines. Hence, the importance of the concept of "inside information" for the FSMA becomes clear: the authority is solely competent to control press publications that contain inside information (FSMA Circular, 2012). This is emphasised in the FSMA Opinion, where it is explicitly stated that all views expressed by the FSMA in the Opinion are based on the assumption that the disclosed information constitutes inside information. It is thereby

[51] FSMA (2022). *Opinions of the FSMA*. FSMA. Retrieved June 14, 2022, https://www.fsma.be/en/opinions-fsma.

[52] These elements are merely key parts extracted from the opinion. For a complete picture of the Opinion, one can read the complete Opinion by consulting the following link:
https://www.fsma.be/sites/default/files/legacy/content/EN/opinion/20201029_opinion_biotech_en.pdf.
A Dutch version of the Opinion can be viewed by consulting the following link:
https://www.fsma.be/sites/default/files/legacy/content/NL/standpunt/20201029_standpunt_biotech_nl.pdf.
A French version of the Opinion can be viewed by consulting the following link:
https://www.fsma.be/sites/default/files/legacy/content/FR/opinion/20201029_opinion_biotech_fr.pdf.

stressed that it is the sole responsibility of the biotech company to identify whether information qualifies as inside information. The importance of the concept inside information may thus be clear for this research. In order to be able to answer the main research question, it is a necessity to first detect all, and only those, press releases that contain inside information. As the other press releases escape the disclosure requirements and guidelines, these may not be analysed.

PRESS PUBLICATIONS CONTAINING INSIDE INFORMATION: LABELLED AS SUCH OR SIGNIFICANT EFFECT ON STOCK PRICE — There are two ways to determine whether a press release contains inside information. First, it is possible that the biotech firm itself labels the press publication as "inside information" (as is, *nota bene*, required by law when it concerns inside information). The first assessment with regards to the "inside" character of the publication indeed lies with the issuer. It is, however, also possible that the issuer fails to award this label, despite the price sensitive character of the published information. This negligence does not, of course, detract from the fact that it is indeed inside information. Identifying these publications is, however, somewhat more complex. For lack of label, one falls back on the substantive definition of inside information, being information that is *likely to have a significant effect on the prices of the financial instruments of the issuer.*[53] Together with the labelled press publications, the press publications having a significant effect on the stock price form our starting point for a first big selection of press publications containing inside information in order to be able to conduct our qualitative analysis afterwards.

[53] See *supra* III.B.4.

IV. METHODOLOGY

A. METHODOLOGY QUANTITATIVE ANALYSIS — ANALYSIS OF LABELLING PRACTICES

1. Model explanation

QUANTITATIVE MODEL — In order to identify press releases that have a significant effect on investors' behaviour, a quantitative model was developed. The model followed the methodology of Ryan and Taffler (2004) to identify significant price movements. This methodology follows the event study guidelines of Brown and Warner (1985). Whom's methods have also been used by numerous others.[54] The model consists of 3 different proxies that accordingly compare the stock to 3 different benchmarks. This model is applied to each individual biotech firm that is subject to further qualitative analysis.

ACTUAL RETURN — First, the model calculates the Actual Returns (AR) per day of each biotech firm by determining the percentual difference between the price at the closing of the stock market of the concerning day d and the price at the closing of the stock market of the previous day d - 1. By doing so, both the evolution of the stock price during regular trading hours and the evolution during after-hours trading is captured (Hillier, 2016). Furthermore, the model makes use of the *adjusted* closing prices. This value also factors in corporate actions including, but not limited to, dividends, rights offerings and stock splits. The adjusted closing price allows for a more accurate analysis of the historical returns of a firm (Ganti, 2020).

1.1. Proxy A: the Belgian market

ABNORMAL RETURN — The Abnormal Return is calculated by subtracting the Expected Return, based on the daily return, from the actual Return, as shown in the following formula (Chen, 2021):

$$AR_{x,\,m,\,d} = R_{x,\,d} - ER_{x,\,m,\,d}$$

Where:
$AR_{x,\,m,\,d}$ = the Abnormal Return of the stock of biotech firm x on day d based on the daily returns of the Belgian market simulated by the BEL All-Share index;
$R_{x,\,d}$ = the actual Return of the stock of biotech firm x on day d;
$ER_{x,\,m,\,d}$ = the Expected Return of biotech firm x on day d based on the daily returns of the Belgian market simulated by the BEL All-Share index.

EXPECTED RETURN — The Expected Return is determined by multiplying the Beta of the concerning company with the BEL All-Share index return of the same day. The index's daily return is calculated by implementing the same formula as is used to calculate the actual daily return of the biotech firm. By adding the BEL All-Share index to the model, the influence of macroeconomic events on the stock price of the biotech firm is neutralised (Li & Hu, 1998). The BEL All-Share index is chosen for two main reasons. First, a *Belgian* index is selected, as all the biotech companies that are analysed are listed on at least Euronext or Euronext Growth Brussels. Second, the BEL *All-Share* index is chosen as a

[54] For the sake of avoiding repetition, not all this research is elaborated on extensively: Baulkaran, 2019; Khanthavit, 2020; Harjoto, 2020; Maneenop; Hawn *et al.*, 2017**.** Also, the following link contains all the citations: httpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshttpshtt.

preferred index over the BEL20 index because the former contains 131[55] components whilst the latter is made up of merely 20[56] - nevertheless the biggest - Belgian components (Euronext, 2022). As mentioned before, the BEL All-Share index is also able to capture macroeconomic events. At the same time, the index's many components enable it to offset possible influence of drastic price changes of one company following company specific news. This is not always the case for the BEL20 index as this index only contains 20 components and detrimental company specific news can have a significant impact on the BEL20 index as a whole.

$ER_{x,\,m,\,d} = B_x * R_{m,\,d}$

Where:
B_x = the Beta of biotech firm x;
$R_{m,\,d}$ = the daily return of the BEL All-Share index on day d.

BETA COEFFICIENT — The Beta measures the volatility of a certain stock, as it indicates how much a stock changes in value compared to the broader market (Berk & DeMarzi, 2021). As the BEL All-Share index is used, a beta of each company is calculated using data of the daily return of the BEL All-Share index and of the biotech firm over the past 5 years (starting 05/05/2017) (Christoffersen, 1999).

$B_x = \text{Covariance}_{,\,t} / \text{Varience}_{x,\,t}$

Where:
$\text{Covariance}_{,\,t}$ = The covariance of the daily return of biotech firm x relative to the daily return of BEL All-Share index on the same day over a time period t of 5 years.
$\text{Variance}_{,\,t}$ = The variance of the daily return of the BEL All-Share index over a time period of 5 years.

SIGNIFICANT ABNORMAL RETURN — Significant abnormal returns for proxy A of the model are detected by comparing the Abnormal Return of the biotech firm on day d to the average Abnormal Return over the period t from d – 1 until d – 250 (there are approximately 250 trading days in a year) (Brown and Warner, 1985). An Abnormal Return for biotech firm x on day d is significant if $AR_{x,\,m,\,d}$ exceeds 1,645 standard deviations above or below the average of the Abnormal Returns over the 250-days pre-news publication period.
Both an abnormal positive and abnormal negative return are detected as the abnormal return can exceed the upper or lower limit. The formulas for, respectively, the lower range and upper range are as follows:

$UL_{x,\,m,\,d} = AV_{x,\,m,\,t} + 1{,}645 * SD_{x,\,m,\,t}$
$LL_{x,\,m,\,d} = AV_{x,\,m,\,t} + 1{,}645 * SD_{x,\,m,\,t}$

Where:
$UL_{x,\,m,\,d}$ = The upper limit of an unsignificant abnormal return for biotech firm x on day d based on the daily returns of the BEL All-Share index;
$LL_{x,\,m,\,d}$ = The lower limit of an unsignificant abnormal return for biotech firm x on day d based on the daily returns of the BEL All-Share index;
$AV_{x,\,m,\,t}$ = The average of $AR_{x,\,m,\,d}$ over period t on day d;

[55] https://live.euronext.com/sites/default/files/documentation/https://live.euronext.com/sites/default/files/documentation/https://live.euronext.c.
[56] https://live.euronext.com/sites/default/files/documentation/indexfactsheets/BEL_20_Factsheet_20220331.pdf.

$SD_{x,\ m,\ t}$ = Standard Deviation of $AR_{x,\ m,\ d}$ of period t on day d.

SIGNIFICANCE LEVEL — In previous research, price changes are identified as major if the abnormal return exceed the average by two standard deviations (Ryan and Taffler, 2004). Approximately 12 such observations are detected each year. As the identification of press publications with a significant effect on the stock price is only the first step of this research and a sufficient amount of data is needed for further analysis, it was decided to lower the significance level to 0.10 instead of 0.05. Hereby the abnormal return needs to exceed the average by 1,645 standard deviations instead of 2 standard deviations, following the Empirical Rule (Wackerly *et al.*, 2008).

1.2. Proxy B: the biotech market

ABNORMAL RETURN — The Abnormal Return is calculated by subtracting the Expected Return, based on the European biotech industries daily return, from the actual Return, as shown in the following formula:

$$AR_{x,\ b,\ d} = R_{x,\ b,\ d} - BR_{x,\ b,\ d}$$

Where:
$AR_{x,\ b,\ d}$ = the Abnormal Return of the stock of a biotech firm x on day d based on the daily return of the European biotech industry simulated by the STOXX Europe Total Market Biotechnology index (SETMB index);
$R_{x,\ b,\ d}$ = the actual Return of the stock of biotech firm x on day d;
$BR_{x,\ b,\ d}$ = the Return of the European Biotech industry simulated by the STOXX Europe Total Market Biotechnology index on day d.

EXPECTED RETURN — The expected return of the European biotech industry is estimated by following the STOXX Europe Total Market Biotechnology index. The index's daily return is calculated by implementing the same formula as is used to calculate the actual daily return of the biotech firm itself. This index is made up of 48 different European biotech companies. Hereby the index is not only able to capture macroeconomic events that influence the entire market but is also able to capture the influence of events that specifically impact the European biotech industry.

SIGNIFICANT ABNORMAL RETURN — Significant abnormal returns for proxy B of the model are detected by comparing the abnormal return of the biotech firm on day d to the average abnormal return over the period t from d – 1 until d – 250 while implementing the exact same calculations as were used for proxy A.

$$UL_{x,\ b,\ d} = AV_{x,\ b,\ d} + 1{,}645 * SD_{x,\ b,\ d}$$
$$LL_{x,\ b,\ d} = AV_{x,\ b,\ d} + 1{,}645 * SD_{x,\ b,\ d}$$

Where:
$UL_{x,\ m,\ d}$ = The upper limit of an unsignificant abnormal return for biotech firm x on day d based on the daily returns of the European biotech industry as simulated by the STOXX Europe Total Market Biotechnology index;
$LL_{x,\ m,\ d}$ = The lower limit of an unsignificant abnormal return for biotech firm x on day d based on the daily returns of the European biotech industry as simulated by the STOXX Europe Total Market Biotechnology index;
$AV_{x,\ m,\ d}$ = The average of $AR_{x,\ m,\ d}$ over period t on day d;

$SD_{x,\ m,\ d}$ = Standard Deviation of $AR_{x,\ b,\ d}$ of period t on day d.

1.3. Proxy C: trading volume

RELATIVE TRADING VOLUME — The Relative trading Volume (RV) is defined as the ratio of a biotech firm's trading volume on a particular day divided by the total trading volume of the BEL All-Share index on that same day. The latter is the sum of the trading volumes of all different components of the index on that day (Kudryavtsev, 2019).

$$RV_{x,\ d}\ (\%) = (V_{x,\ d} / TV_{m,\ d}) * 100$$

Where:
$RV_{x,\ d}$ = the Relative Volume of stock traded of biotech firm x on day d, based on the daily trading volume of the Belgian market as simulated by the BEL All-Share index;
$V_{x,\ d}$ = the trading volume of a stock of biotech firm x on day d;
$TV_{m,\ d}$ = the total trading volume of the Belgian market as simulated by the BEL All-Share index on day d.

By measuring the trading volume as a relative volume in comparison to total trading volume of the market, the model is able to exclude volume changes that are due to macroeconomic events and are not caused by company specific news (Long, 1994).

SIGNIFICANT CHANGE — In the model, the relative volume of the biotech firm on day d is compared to the average relative volume over a period t from d - 1 until d – 250 while implementing the exact same calculations as were used for proxy A and B (Kudryavtsev, 2019).

$$UL_{x,\ RV,\ d} = AV_{x,\ RV,\ d} + 1{,}645 * SD_{x,\ RV,\ d}$$

Where:
$UL_{x,\ RV,\ d}$ = The upper limit of an unsignificant relative volume for biotech firm x on day d based on the daily trading volume of the Belgian market as simulated by the BEL All-Share index;
$AV_{x,\ RV,\ d}$ = The average of $RV_{x,\ d}$ over period t on day d;
$SD_{x,\ RV,\ d}$ = Standard Deviation of $RV_{x,\ d}$ over period t on day d.

1.4. Strictness of model

PRUDENT APPROACH — The quantitative analysis is designed to indicate which press releases contain inside information, next to the already labelled press releases. Naturally, the goal is to attain a considerable sample size out of which the qualitative analysis commences. To certainly not miss out on any press release having the potential of containing inside information, a prudent approach was chosen. Hence only triggering one proxy, instead of triggering all three seemed most appropriate. Next to intuition, this reasoning is also logical. After all, including press releases which exceed all three proxies might miss press releases which did caused significant effects on the stock of a company but were countered by other trends.

TRIGGERING ONLY ONE PROXY — Situations are thinkable in which the proxy of the Belgian market is triggered but not the other two. An example might provide more insights.

Imagine a macroeconomic trend which strongly influences biotech firms in general. Of course, volatility goes up in this sector and causes the biotech proxy to fluctuate accordingly. This causes the proxy to not signal a significant effect. Nevertheless, in a situation where the company announces a press release on that day which contains inside information, the Belgian all-share index proxy will pick this up. The Belgian proxy will go off, signalling an abnormal return which is then included in the quantitative analysis. Furthermore, other situations are thinkable in which the proxy of the biotech sector is triggered but not the other two. An example is thinkable *mutatis mutandis* in which only the biotech sector is triggered. Lastly, also situations in which only the volume proxy is triggered seem plausible. Here a typical example deals with news which is not comprehensible for investors but remains significant since it causes many investors to trade but who are mutually cancelling each other's positive and negative effects out.

2. Selection of data

In total, 822 press releases were selected for further analysis.

TIMEFRAME — Timewise, press releases were selected in relation to the FSMA Opinion, published on October 28th, 2020. The aim was to capture a sufficient and similar amount of press releases from before and after the FSMA Opinion, which were at the same time still relevant (*e.g.,* press releases published far back in time are not as relevant as recent ones). On top of this, the manageability of this research had to be ensured, and after deliberation with the FSMA, the identified timeframe was limited to a total of four years (press releases were selected from May 5th, 2018, until May 5th, 2022, hence a timeframe of four years). This way, the focus of the research could be kept at the *current* disclosure practice of Belgian biotech companies and potential changes in publication style were kept to a minimum due to, for instance, changes in management. Unnecessary complications were avoided, so that it remained possible to draw sensible and proper conclusions from the sample size.

FINANCIAL INFORMATION PRESS RELEASES NOT INCLUDED — Press releases containing financial information were not included, *e.g.,* annual reports, half-year results, information related to equity funding, transparency notifications, information on the total number of voting rights, put option notices, capital increases, appointment of a new member in the Board of Directors, *etc*. These press releases were excluded because they fall outside the scope of this project, that focuses on press releases typical of the biotech industry.

CLASSIFICATION IN CATEGORIES — All the other press releases are divided over 1 of the following 24 categories depending on the content of the press release.

Acquisition	Intermediate results	Post-hoc analysis
Acquisition update	New commercial contract	Presentation of results
Authority approval	New commercial partnership	Publication of results
Authority approval delayed	New product	Schedule of conferences
Authority approval not granted	New R&D partnership	Topline results
Authority communication	Partnership end	Trial on hold
Clinical trial start (first patient)	Partnership update	Trial termination
Commercialisation update	Patient recruitment	
General conference presentation		

Table 2: ***Overview of identified categories of press releases***

Press releases are analysed to identify which press releases were labelled and if so, what label was used.

SIGNIFICANCE RATE — Further, the model identifies which press releases had a significant impact on the stock of biotech company. Because of this, the significance rate of each press release category can also be calculated.

$SR_c = TS_c / T_c$

Where:
SR_c = The significance rate of press release category c;
TS_c = The total amount of press releases in category c that had a significant impact on the stock of a biotech company;
T_c = The total amount of press releases in category c.

3. Restrictions

NO "AVERAGE" BENCHMARK FOR COMPANIES LISTED LESS THAN FIVE YEARS AGO — One recurring restriction of this research is the fact that some listed Belgian biotech firms were still maturing as public companies. This was due to some IPO's happening either post FSMA Opinion, or happening before the FSMA opinion, but not dating back the five years necessary to conduct the quantitative analysis. Both situations caused the quantitative analysis to be slightly altered.

Companies for which the quantitative analysis was adjusted, include:

- Onward Medical which had its IPO on 21/10/2021;
- Nyxoah which had its IPO on 18/09/2020;
- Hyloris which had its IPO on 29/06/2020;
- Sequana Medical which had its IPO on 11/02/2019; and
- Acacia Pharma which had its IPO on 05/03/2018.

TIMEFRAME ISSUES — In the model, the abnormal return is compared with proxies A, B and C. Significant abnormal returns for all proxies are detected by comparing the abnormal return of the biotech firm on day d to the average abnormal return over the period t from d – 1 until d – 250. The above-mentioned situation made clear it was impossible to

generate an average based on the last 250 days for these five companies as we did for the other firms.

ALTERATIONS TO THE MODEL — For this reason, alternations were made to the model. For all these companies, a day was identified from which the model could not calculate the average abnormal return from the 250 previous days anymore since the IPO took place in this time interval. As a result, and to approximate the previous situation as close as possible, the daily variances of the stock were compared to the average and standard deviation for the different proxies of the 250 first days after the IPO. In other words, the model used the average of the first year as a reference for days 0 until 249 after the IPO. The other calculations were not altered.

THERAVET — Within the model, as described above, abnormal returns (in relation to the Belgian and biotech market, as well as in relation to the volume) are identified by comparing the abnormal return/volume on a specific day to the average abnormal return/volume over a period of the 250 trading days preceding this day. As a result hereof, a quantitative analysis of the press releases of TheraVet was not possible, as this company is only listed on Euronext Growth since June 16th, 2021, and an average of 250 trading days could not be taken. Hence, 10 press releases of TheraVet are not included in this quantitative analysis.

INSIDE INFORMATION — Only press releases that are indicated by the company as "inside information" or are identified by the quantitative model, constitute "inside information" for the sake of this research. Of course, other press releases might qualify as inside information according to judicial rules or by judgment of the FSMA. Judging every press release on its inside information nature however falls beyond the scope of this research. It is not possible to capture the specificities and circumstances around each individual press release, as however is required according to jurisprudence and legal doctrine[57], within the timeframe of this project. Therefore, it could be the case that some press releases did escape the identification by the model as inside information or, *vice versa,* some selected press releases in reality did not constitute inside information.

[57] See *supra* III.B.

B. METHODOLOGY QUALITATIVE ANALYSIS

1. Analysis of Belgian press releases

SAMPLE CHOICE — The quantitative model identified certain non-labelled press releases as containing inside information. Along with the press releases labelled as inside information by the companies themselves, both categories combined constitute the sample to conduct the qualitative analysis on. The total sample pool for the analysis of the Belgian press releases can be found in Appendix E.

IDENTIFIED TIMEFRAME — The scope of the qualitative analysis was limited to four years. This is in line with the explanation on the timeframe for the qualitative analysis. For this reason, and to avoid repetition, a refence is made to the section on the selection of data for the quantitative analysis.

SELECTION OF PRESS RELEASES — For each company, a selection of press releases was made for the qualitative analysis. The first-choice press releases had both been labelled as inside information by the companies and were identified by the quantitative model. In case the first-choice press releases did not suffice to identify press releases for every category, those press releases were added which were only labelled as such by the companies. When certain categories were still missing a candidate press release for a qualitative analysis, press releases were chosen which were only identified by the quantitative analyses. It was attempted to select as many press releases labelled as possible. Sometimes, however, some categories of press releases were not identified.

OBJECTIVE OF THE QUALITATIVE ANALYSIS — The objective of the quantitative analysis is to identify to what extent the Belgian biotech firms adhere to the requirements put forward in the FSMA Opinion. In the Opinion, many so called "good practices" are identified. These good practices provide the biotech sector with guidance on their disclosure activities. Every press release is analysed with the relevant GPs in mind. This provides for an analysis with a high quality, a high nuance rate and a complete overview of all relevant aspects.

CLUSTERING OF PRESS RELEASES — The FSMA Opinion describes many GPs, some of which are applicable to all press releases and some of which are only applicable in certain scenarios depending on the content of the press release. For this reason, different GPs were identified for different clusters of press releases. Every cluster contains multiple press release categories.

- Clinical trial results:
  - Intermediate results
  - Topline results
  - Post-hoc analysis
  - Presentation of results
  - Publication of results
- Clinical trial updates:
  - Clinical trial start
  - Patient recruitment update
  - Trial on hold
  - Trial termination

- Authority communication:
  - Authority approval
  - Authority approval delayed
  - Authority approval not granted
  - Authority communication
- Partnership:
  - New R&D partnership
  - New Commercial partnership
  - Partnership update
  - Partnership end

Some categories were not part of the qualitative analysis (*e.g.,* press releases disclosing a new commercial contact). The reason for this be that these press releases fall out of the scope of the FSMA Opinion.

SELECTION OF GOOD PRACTICES — For each cluster different GPs are identified to which the press releases need to adhere. For some categories within a cluster, additional GPs are selected if this is required in specific situations. For instance, within the cluster of clinical trial updates, there are additional requirements for press releases that announce a premature termination of a trial. The GPs of the different clusters can be found in the evaluation sheets in Appendix B. More information of each GP can be found in the FSMA Opinion.

EVALUATION CRITERIA CLINICAL TRIAL RESULTS — The Good Practices for the publication of press releases covering the results of clinical trials are quite extensive. The GPs cover many aspects which are essential for this category. Overall, the principle of the good practices and the inside information regulations deals with the comprehensibility and understandability of the press releases. Likewise, the content of the press release should inform an investor unambiguously about the results and consequences of a clinical trial. Accordingly, the press releases should contain all necessary elements so that an investor can make an informed decision on the underlying value of the company and the influence of the press release on this value. Determining what these most crucial aspects are, is not an easy task. In agreement with the FSMA, this research nevertheless indicates certain aspects as having a more detrimental effect on the sentiment of investors.

The first thing that comes to mind is providing investors with the main takeaways from the clinical trial. Here, it is important that a clear and well-structured discussion of the main results (whether primary and secondary endpoints are met) and conclusions is provided for. The press release should form a balanced view of favourable and less favourable findings in which soft information is based on reasonable grounds. Besides this, also the main features of the clinical trial need to be disclosed. These include the clinical phase, objective, and design of the clinical trial (such as the research question, blinding, control group, randomization, target population, sample size and endpoints). Of course, not all these aspects need to be included to qualify as good enough. On top, an objective and unambiguous discussion of the results should be provided for with sufficient quantitative information to support the main conclusions, giving insight into the clinical and, when relevant, statistical strength (typically indicated via p values).

Due to the high technical nature of the clinical trials, it is easy to disclosure clinical trial results to the market which are too technical to draw insightful conclusions from. For this reason, it should be explained what type of results are published as well as the novelty of

these results. Next to the facts and figures on the clinical trial, it is also important that these results are provided for with an explanation so that an average investor understands what is been written. In order to do so, a balanced mix of non-technical and (supporting) technical information should be included, allowing investors with different levels of knowledge and experience in scientific and clinical matters to make an informed investment decision. At least those explanations and details that are necessary to ensure investors are not misled, should be included. These explanations include disclosure on how the issuer reached and presented its results (for example the analysis sample and subgroup analyses; not pre-specified (post-hoc) analyses, the p values, and associated analysis method. Companies should also ensure that the technical information does not obscure the main, non-technical, messages and that those main messages are always easy to find and understand. This is also the reason why including a clear heading and summary is important. Additionally, it is advised to mention the next material step and, to the extent possible, the expected timing.

Other elements which have a decisive impact include mentioning of important caveats such as study limitations and or referral to relevant contextual information about, for example: the indication of interest (*i.e.,* a medical condition that a medicine is used for[58]) and target market (size and trends); the competitive landscape with existing treatments and their risk-benefit profile; the product candidate (and active comparator if used as control group); and how the issuer believes it can fill a gap, improving the risk-benefit profile versus other treatments.

EVALUATION CRITERIA CLINICAL TRIAL UPDATES — The evaluation criteria for press releases disclosing clinical trial updates are similar to those of the clinical trial results. All the same GPs need to be adhered to, except for those regarding the actual publication of the results of the trial. GPs concerning the explanation of the trial, the technical nature of the press release and the contextual information remain relevant.

EVALUATION CRITERIA AUTHORITY COMMUNICATIONS — For the evaluation of press releases about authority communications, it is first and foremost checked that the press release explains the scope and any limitations or restrictions of the authority decision, and that the next material step and, to the extent possible, the expected timing is mentioned. Next, it is assessed whether the press release balances well between technical and non-technical information and the technical information conceals the essence of the message or not. Furthermore, the analysis looked at the main features of the clinical trial and if these are discussed when this is relevant given the content of the press release. Last, the presence of contextual information is looked at, such as the indication, competition or product candidate, as described in the evaluation criteria for results.

EVALUATION CRITERIA PARTNERSHIPS — An analysis is made by looking at the essential elements for an investor to base its investment decisions on. After deliberation with the supervisory authority, six items came out being mandatory. These mandatory requirements are identified as the deal structure-payment terms, material clauses with important rights and obligations, a description of the partner, the objective and advantage of the partnership, providing a clear heading and, where applicable, the candidate product about which the partnership revolves. Other, more optional and often contextual requirements include a clear summary, an indication of interest and target market, references to research and external sources, including the next material step under the

[58] https://www.ema.europa.eu/en/glossary/indication#:~:text=A%20medical%20condition%20that%20a,and%20diagnosis%20of%20a%20disease.

new partnership, and provide investors with a timing as to when the next steps would be fulfilled. Going into even more detail, providing investors with future plans and collaboration between companies, and a view on the competitive landscape could make for the icing on the cake.

EVALUATION SHEETS — In Appendix B, the evaluation sheets can be found which were used during the qualitative analysis of the press releases. Each evaluation sheets lists the GPs to which press releases of a certain category should comply.

2. Analysis of foreign companies

SELECTION OF MARKETS — First, a selection of countries and stock exchanges that fit the purpose of this analysis must be made. The first country chosen to dive deeper into, is the United States. In general, the United States is considered a major biotech hub worldwide. Its share of the total global biotech value stood at nearly 59 percent in 2021 (Statista, 2021). This makes it the largest market for biotech firms worldwide by a significant amount. On top, the choice for the United States complements our analysis of SEC decisions.[59]

- **United States —** Within the United States, 85% of biotech firms are listed on Nasdaq (McKinsey, 2021), which is why this stock market was looked at for selecting biotech companies.

Besides the United States, Europe is interesting to investigate for several reasons. First, the same rules regarding the disclosure of inside information are applicable to other companies listed in the European Union as for companies listed on Euronext Brussels. Next, the same harmonized procedures apply to all 28 Member States regarding the authorization of medicines and the supervision of the safety of medicines, with an important role for, amongst others, the European Commission and European Medicines Agency (EMA, 2016). This, too, makes European markets apt for comparison with the Belgian market. Last, it is relevant to compare the Belgian market with other European markets simply because of the minor economic and cultural differences, and geographic proximity.

In order to select the European markets subject to further analysis, several criteria were considered, such as the number of biotech firms listed in a specific country, the total market capitalization of biotech firms within a country, the percentage that biotech firms' capitalizations take within the total market capitalization in a country, percentage that biotech firms' capitalizations take in the combined market capitalization in the total *European* market, *etc.* Eventually, the main criterion considered is the percentage of biotech firms in a given country compared to the total number of European biotech firms, *e.g.,* 26% of European biotech firms are listed on Swedish stock exchanges, hence Sweden is selected as this is the biggest percentage. This criterion displays several advantages over the criteria related to market capitalization. First, the number of biotech firms is an absolute number, granting no room for a distortive view, which is indeed the case for criteria considering market capitalization: it can happen that a few major players with a huge market cap in a particular market lead to a high position of that country, without potentially being a large biotech hub. Second, a large number of biotech firms within a country ensures a wide and variable choice of companies to analyse, including both small

[59] See *infra* section C.1.

and large companies. This resembles the Belgian biotech environment in the best possible way, as there are biotech companies listed on Euronext Brussels with very small market caps as well as large market caps. Hence, the number of biotech firms within a particular country came out as the most appropriate criterion.

According to this criterion and based on a McKinsey report of 2021, the following countries were selected for further analysis. Apart from the numbers mentioned hereafter, these countries recur in various sources as *"main hotspots"* (Biotech Radar, 2022).[60]

- **Sweden —** Approximately 26% of European biotech firms are listed on Swedish stock exchanges, Nasdaq Stockholm[61] and Spotlight Stock Market. As Nasdaq Stockholm is the largest regulated market in Sweden (Baker McKenzie, 2019), biotech firms from this market were selected.
- **United Kingdom —** Approximately 15% of European biotech firms are listed on the London Stock Exchange (LSE).
- **France —** Approximately 12% of European biotech firms are listed on Euronext Paris.
- **Switzerland —** Approximately 5% of European biotech firms are listed on SIX Swiss Exchange.

SELECTION OF COMPANIES — For the selection of companies within the chosen markets, various criteria were used. First, companies admitted to the relevant stock exchange in 2020, 2021 and 2022 were ignored: this way, it was assured that companies with a small number of press releases were not included, in order to end up with a sufficient amount of data to analyze. Next, only companies incorporated in respectively the United States, Sweden, the United Kingdom, France and Switzerland were considered, in order to capture the foreign corporate (disclosure) culture in the best possible way. For instance, there is a real chance that the way of disclosing inside information of a company incorporated in the US, but listed both on Nasdaq and Euronext Brussels, looks more American than European, whilst it is intended to capture as many "cultures" as possible within the limited scope of this project.

Ultimately, a selection of three companies per stock exchange was made, based on market caps comparable to the Euronext (Growth[62]) Brussels biotech environment.[63] A detailed view on the Belgian biotech environment can be found in Appendix C. On June 7th, 2022, the smallest market cap was 6.0 million euros (Bone Therapeutics). The largest market cap was 16.2 billion euros (argenx). If heavyweights Galapagos and argenx are left out, then the largest market cap was 410.7 million euros (Hyloris). The average market cap was 1.75 billion euros, or, again ignoring Galapagos and argenx, 133.6 million euros. The MedTech[64] and Big Pharma[65] companies were not considered in this analysis, as the main focus of this project lies on the pure biotech sector. Based on these market caps, companies in other stock exchanges were selected around the average market cap of the Belgian companies (without Galapagos and argenx), and in between the lowest and highest market cap. By picking companies with a market cap that approximately falls

[60] See also, for instance: *"As shown on Figure 1, Sweden is the largest provider of biotech companies in our universe, before France and the UK at the same level. Germany is only ranked fourth. Switzerland, the home of 2 European Big Pharma, arrives in fifth. (…) In accordance with Figure 1, we find again the 3 main clusters -Sweden, France, UK- when looking at the main stock exchanges (Figure 2)"* (Delsuc, 2019).
[61] Often referred to as the "Stockholm Stock Exchange" or the "Main Market".
[62] It solely concerns TheraVet.
[63] All the data regarding the market caps is retrieved from Yahoo Finance (https://finance.yahoo.com/). For market caps expressed in foreign currencies, such as the Dollars, Swedish Krona, Swiss Franc or Pounds, these are all transmitted to euros in order to be able to make a sound comparison.
[64] It concerns Nyxoah, IBA, Onward Medical and Sequana Medical.
[65] It concerns UCB.

within this range, an attempt is made to somehow approach a comparable and representative group of foreign companies. It must be admitted that there is a considerable methodological limitation here as this small sample of companies does not guarantee a representative group. However, within the limited scope of this project, this selection will be able to at least provide for some inspiration from abroad.

Following all these criteria, the final selection of companies, per stock exchange, subject to further analysis, looks as follows:

- **Nasdaq —** For Nasdaq, the following three companies were selected:
  - **Soleno Therapeutics —** Market cap of 18.3 million euros;
  - **Poseida Therapeutics —** Market cap of 156 million euros; and
  - **BioXcel Therapeutics —** Market cap of 301.5 million euros.

- **Nasdaq Stockholm —** For Nasdaq Stockholm, the following three companies were selected:
  - **Immunicum —** Market cap of 39.9 million euros;
  - **BioInvent —** Market cap of 223 million euros; and
  - **Calliditas Therapeutics —** Market cap of 486.3 million euros.

- **London Stock Exchange —** For the London Stock Exchange, the following three companies were selected:
  - **Scancells Holdings —** Market cap of 114.3 million euros;
  - **Allergy Therapeutics —** Market cap of 166.7 million euros; and
  - **Avacta —** Market cap of 381.4 million euros.

- **Euronext Paris —** For Euronext Paris, the following three companies were selected:
  - **Abionyx Pharma —** Market cap of 50.8 million euros;
  - **DBV Technologies —** Market cap of 185.3 million euros; and
  - **Transgene —** Market cap of 234.7 million euros.

- **SIX Swiss Exchange —** For the SIX Swiss Exchange, the following four companies were selected:[66]
  - **Newron Pharma —** Market cap of 26.6 million euros;
  - **Obseva —** Market cap of 168.1 million euros; and
  - **Molecular Partners —** Market cap of 220.4 million euros.

[66] Based on: https://www.six-group.com/dam/download/the-swiss-stock-exchange/listing/equity/ipo/biotech-report-2021-pages-36-37.pdf.

SELECTION OF PRESS RELEASES — For each company, two to five press releases were selected for the following categories: partnerships, clinical trial updates, intermediate and topline results, and authority communications. In total, 133 press releases were analysed. The review period goes back to the start of 2018. It is attempted to select as many press releases labelled as "inside information" as possible. Sometimes, however, this was not feasible.[67]

CONDUCTING THE ANALYSIS — The analysis consists of two parts. First, the labelling practices of the foreign companies are discussed. Next, the press releases were analysed thoroughly, and the most notable differences with Belgian disclosure practices are described hereafter. Contrary to the in-depth analysis of Belgian press releases, which remains the main part of this project, this analysis did not involve scorecards.

3. Restrictions

ANNUAL AND QUARTERLY REPORTS NOT INCLUDED — Annual reports and quarterly reports were not included in the qualitative analysis. These reports fall under a different and more stringent set of regulations. The scope of the FSMA Opinion does also not include these reports. Besides the different set of rules, information included in these reports should contain exclusively news that previously already was disclosed. Consequently, the choice was made to exclude them. Despite this should not be the case, it could happen that companies nevertheless disclose information of price sensitive nature in these reports, which is then not captured by the conducted analysis.

TIME CONSTRAINT — The qualitative analysis only includes a time frame of four years, *i.e.,* from May 5th, 2018, until May 5th, 2022. Since the FSMA Opinion was written less than two years ago, only a limited time frame was available to compare with. Choosing a time frame that goes further back than May 5th, 2018, would not significantly contribute to the relevance of this analysis. This time constraint, however, restricted the qualitative analysis to a certain extent. An attempt was made to compare two similar press releases published before and after the Opinion of the FSMA, which was not always possible. For instance, it could be that before or after October 28th, 2020, no results were available, no authority approval was granted, no partnership was entered into, *etc.* At the beginning of the discussion of each category, it is listed for which companies press releases were available and whether a comparison between *pre* and *post* Opinion is possible.

SUBJECTIVITY — The qualitative analysis of press releases is an inherent subjective approach. Although precautions were made to objectify this process as much as possible, it was impossible to completely eliminate every subjective aspect. Accordingly, some press releases might be classified and analysed in a different way if this research was conducted by different individuals. The analysis only tries to provide an indication and cannot provide a fully fletched and fail-safe objective analysis. However, one measure that ensures objectivity to a certain extent, is the fact that the four different categories (results, result updates, authority communications and partnerships) were analysed by three different researchers. Hence, if there would be any form of subjectivity on the part of one of these researchers, this will be only limited to one or maximum two categories.

[67] See more on foreign labelling practices, *infra* Section C.2.1.

V. RESULTS

A. LABELLING PRACTICES — QUANTITATIVE ANALYSIS

INTRODUCTION — This first section of the results provides an answer to the first sub question, *i.e.*, *"which press releases are labelled as inside information or could be considered inside information, and which conclusions can be drawn from the relation between these two?"* It is indeed necessary, in order to come up with useful recommendations for the FSMA related to its Opinion, to first select all the press releases containing inside information. Beyond this mere selection of price sensitive press releases by the model, this section investigates the different relationships between the labels used by biotech companies and the press releases qualified by the model as inside information.

Therefore, first, the model is validated. Next, it is analysed to what extent companies use legally correct labels and its relationship with the significance of press releases. Third, the labelling accuracy, *i.e.,* did the company predict accurately whether or not the press release would have a significant effect, is looked at. Last, the effect of different types of news on the trading behaviour of investors is analysed.

1. Model validation

1.1. Introduction

INTRODUCTION TO THE GATHERED DATA — The implemented model identified 298 press releases as having a significant effect on investors' behaviour, either by causing a significant increase or decrease of the value of the stock (in comparison with the BEL All-Share Index and/or the SETM-BT Index) and/or by causing an abnormally significant increase in volume traded. Therefore, 36,3% of a total of 822 press releases were identified as having a significant effect on investors' behaviour. In the table below, you can see an overview of these results grouped per analysed biotech firm. #P.R. stands for the total amount of Press Releases identified in the four-year period (including both significant and not significant press releases). # Sign. P.R. provides an overview of the press releases with a significant effect as explained before. The % Sign. P.R. gives the percentage of the significant press releases in relation to the total amount of press releases per company.

Company	# P.R.	# Sign. P.R.	% Sign. P.R.
Bone Therapeutics	34	20	59%
DMS Imaging	18	10	56%
Acacia pharma	30	16	53%
Hyloris	17	8	47%
Biocartis	51	22	43%
UCB	110	41	37%
Mithra	105	37	35%
Celyad	71	25	35%
MDxHealth	23	8	35%
Galapagos	84	29	35%
Oxurion	58	20	34%
argenx	62	20	32%
Onward Medical	10	3	30%
Sequana Medical	37	11	30%
IBA	92	24	26%
Nyxoah	20	4	20%
Grand Total	**822**	**298**	**36%**

Table 3: ***Number of significant press releases identified by the model in relation to the total amount of press releases, per company***

DISSIMILARITIES — This data already shows some general dissimilarities between the different companies making up the Belgian biotech industry. One can observe that some companies publish a considerable larger amount of press releases than others. Eye-catching outliers are UCB, Galapagos and IBA, but this is not surprising given the size and/or product portfolios of these companies. Mithra and Celyad, too, publish quite a large amount of press releases, however with each only having three products in the pipeline, this is more notable.

Furthermore, table 3 shows that companies with a high % Sign. P.R., *e.g.,* Bone Therapeutics, publish less information that does not have a significant impact than companies at the bottom of the table. At first sight, one could believe that the latter publish *less relevant* information for investors, as the big majority of their press releases is not reacted upon by investors. However, it is too early to draw such a conclusion, as it could perfectly be the case that a lot of announcements of *e.g.,* Nyxoah (only 20% Sign. P.R.) were simply expected by the market, and thus did not trigger a significant change in stock price. This would not take away that these announcements are still *relevant* for the investors.

1.2. Analysis of proxies triggered

ANALYSIS OF PROXIES TRIGGERED — To validate and test the implemented model, an analysis was made of the proxies used in the model (*i.e.,* Belgian market, biotech market or volume traded) that were triggered to identify significant press releases. The distribution of which proxies were triggered during the identification of all 298 significant press releases, can be found in Figure 6.

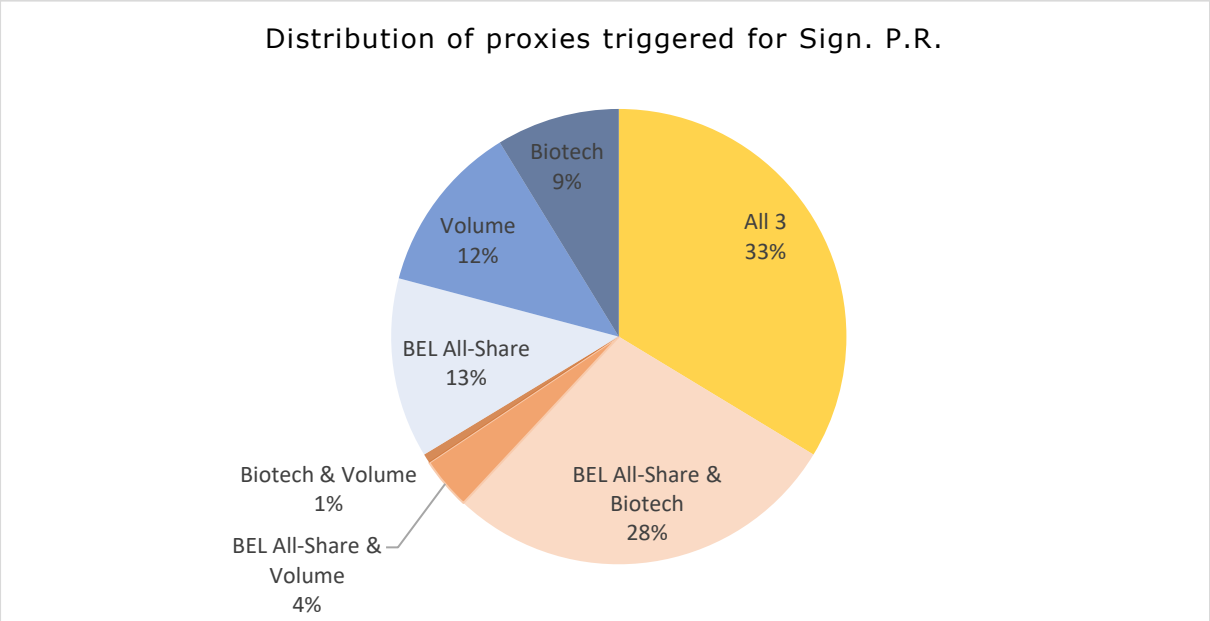


Figure 6: ***Distribution of proxies triggered for the identification of the significant press releases***

PRESS RELEASES TRIGGERING 3 PROXIES — Figure 6 shows that one third of the significant press releases triggered all 3 proxies. This means that 33% of the significant press releases caused a significant increase/decrease of the value of the stock compared to the *BEL All-Share Index* and compared to the *SETM-BT Index*, whilst at the same time also causing an abnormal trading *volume*. From these results, one can conclude that these press releases had an impact on investors' sentiment and caused investors to trade.

PRESS RELEASES TRIGGERING (AT LEAST) 2 PROXIES — The amount of press releases discussed above, combined with the press releases triggering only 2 proxies, provides for another interesting insight: 66% of all significant press releases were identified because at least 2 proxies were triggered. The biggest sections include the 33% mentioned before (triggering 3 parameters) and the portion where both the Bell All-Share index and the SETM-BT index are triggered (28%). This last category implies that while 28% of the significant press releases did trigger the 2 index proxies, no abnormal volume was traded. It is thus likely that these press releases did not really cause *more* trading, but did solely cause trading behaviour *in one direction*, exceeding the upper or lower price limits of the Belgian and biotech market. In case both index parameters are triggered by the same press release, one can conclude with relative certainty that the significant change in stock value is caused by company specific news. The press releases identified by both an index parameter and the volume parameter can also be attributed to company specific news as a significant volume increase is a company specific metric.

PRESS RELEASES TRIGGERING ONLY 1 PROXY — However, for the significant press releases that were identified by only triggering one parameter, there is no absolute certainty that this signal was solely caused by company specific news: an increase of the stock value compared to the BEL All-Share Index but not the SETM-BT Index could be caused by a macroeconomic trend impacting the whole biotech industry but not the Belgian economy. An example of this might be a publication of the EMA in relation to stricter or less strict conditions of approval (think of the recent Covid-19 emergency procedures). A similar reasoning can be construed – *mutatis mutandis* – for the Belgian industry in relation to the biotech sector. Press releases causing an increase/decrease in the value of a stock that is only significant in comparison to one of the two indexes make up 22% of all significant press releases. Many explanations could be found for why one index was

triggered, and the other was not, but this would require an in-depth analysis of both macroeconomic evolutions and company evolutions over the past four years in order to determine which stock price changes were and which ones were not caused by company specific news. As the identification of press releases with a significant effect on the stock price is only the first step of this extensive research, it was decided that all these press releases, nevertheless, are included for further analysis. In absolute numbers this means that an average of 4 press releases per company over a span of 4 years might have been classified wrongly.

An explanation for triggering only the *volume* index, however, is possible. It might be that a press release is not clear as to whether investors interpret the news either positive or negative, eventually resulting in similar amounts of investors buying/selling stock which in turn results in the stock price staying the same.

1.3. Consistency of the model regarding positive and negative news

NO PREFERENCE POSITIVE/NEGATIVE NEWS — The model does not have a preference for news that either has a positive or negative effect on the value of a company. To verify this premise, the model should identify both positive and negative significant press releases in the same way. Additionally, it should not trigger other parameters than when it is run on only positive or negative press releases. If the hypothesis holds, this important characteristic will strengthen the validity of the model.

Positive press releases are identified as having caused a significant increase in the value of a company's stock in comparison to the BEL All-Share Index or the SETM-BT Index. Additionally, negative press releases are identified as having caused a significant decrease in value of a company's stock in comparison to the BEL All-Share Index or the SETM-BT Index. By this metric, the significant press releases that were only identified by a significant increase in volume traded are excluded. This is reasonable as it cannot be tracked for these press releases whether the stock price change of that day was actually a significant increase or decrease caused by positive or negative news.

In total, 178 positive significant press releases were identified. At the same time, 83 negative significant press releases were identified. The two figures below each show the frequency of which proxies were triggered. The difference between the two figures however is that the left one (Figure 7) concerns press releases that caused a positive sentiment whilst the right one (Figure 8) relates to press releases that caused a negative sentiment.

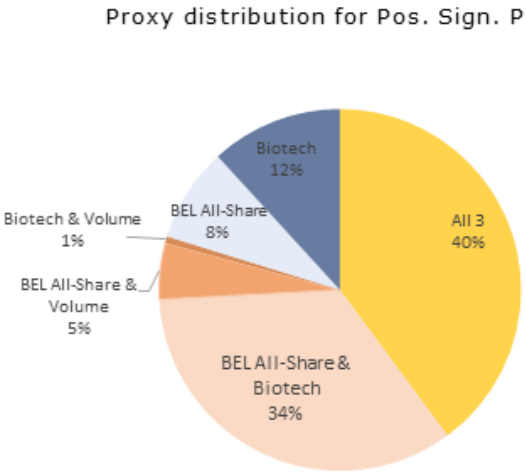


Figure 7: ***Proxy distribution for positive sign. press releases***

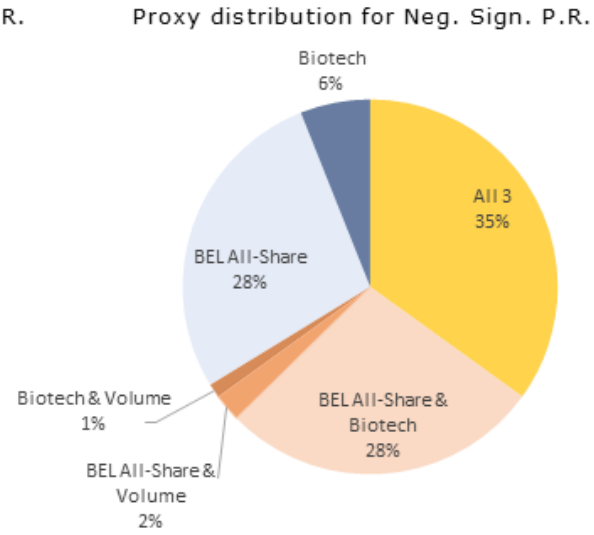


Figure 8: ***Proxy distribution for negative sign. press releases***

CONCLUSION — Even though there are small differences between the two figures, an overall similar parameter distribution can be observed: both positive and negative press releases triggered for the most part all three proxies, the second most prevalent portion is the triggering of the two indexes, the portions of press releases identified by an index and the volume proxy are a lot smaller in both figures, *etc.* It is clear that the model does not only identify negative press releases by, for instance, triggering only one parameter. The model reacts in the same way to both positive and negative press releases. This analysis demonstrates the resilience and validity of the model for both negative and positive news.

2. Correctness of labelling

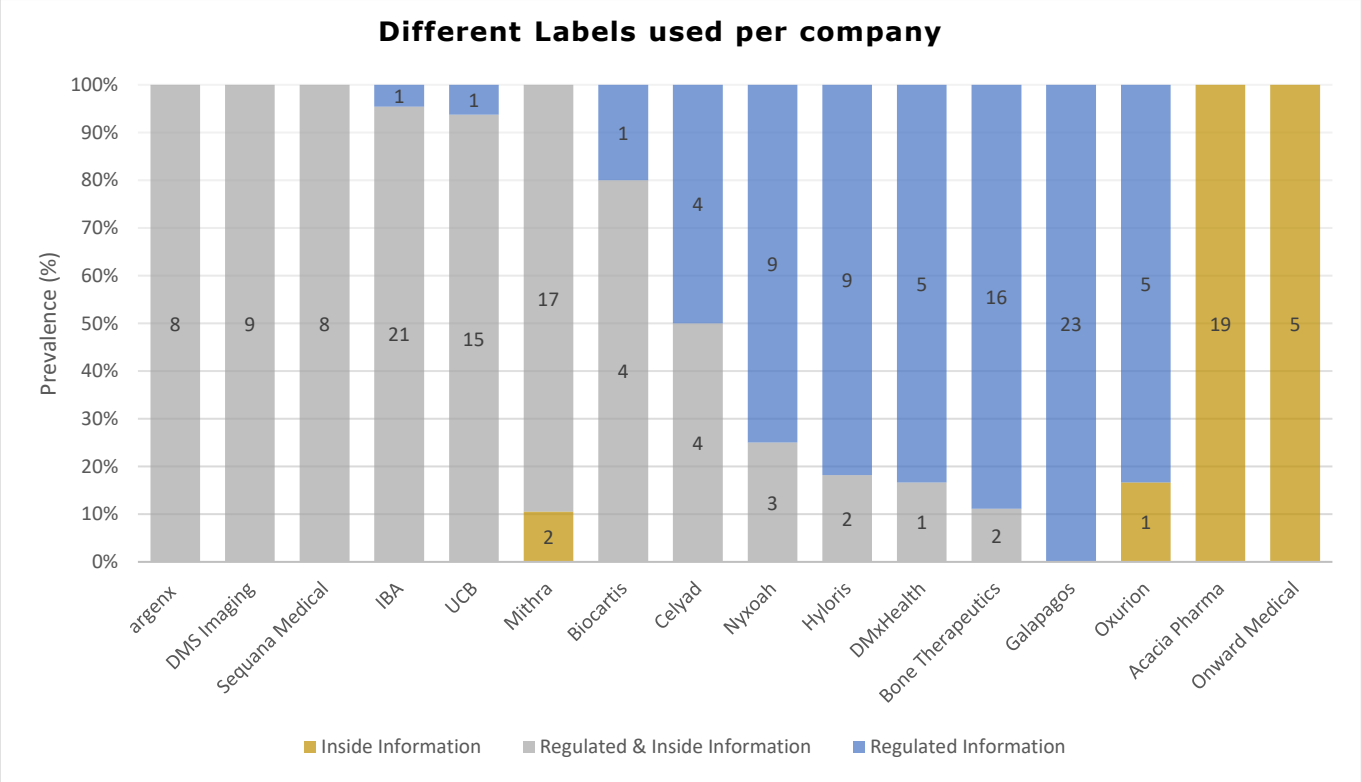
2.1. Which label should companies use?

CORRECT LABEL: "REGULATED AND INSIDE INFORMATION" — According to the Royal Decree of November 14th, 2017[68], "regulated information" includes, amongst others, the annual report, the yearly financial results, quarterly reports, information to shareholders, *etc.* but also "inside information" as meant in article 7 of the Market Abuse Regulation. Inside information can thus be considered as a subcategory of regulated information. Article 36, §3 of the Royal Decree of November 14th, 2017, prescribes that issuers must disclose *regulated* information to the media in such a way that it is made clear that it concerns regulated information.[69] Next to this provision, article 2 (b) of the Commission Implementing Regulation (EU) 2016/1055 states that the communication of *inside* information to the media *"shall clearly identify: (i) that the information communicated is inside information."* There are thus two provisions: one obligates to clearly mention *regulated* information, the other obligates to clearly mention *inside* information. Read together, it is thus mandatory for listed companies to use both labels.[70]

[68] See article 2, §1, 9° of the Royal Decree of November 14th, 2017.
[69] In Dutch, one of the original languages of the Royal Decree, the article goes as follows: *"De emittenten delen gereglementeerde informatie op zodanige wijze aan de media mee dat: 1° duidelijk wordt dat het om gereglementeerde informatie gaat; (…)"*
[70] This interpretation of the co-existence of these two legal provisions that "regulated" as well as "inside" information should be mentioned, finds support in a Circular of the FSMA of January 11th, 2012 (updated May 26th, 2020). This Circular states that issuers shall disclose regulated information to the media in such a way that it is made clear that it concerns regulated information ***and***, if it concerns inside information, that it concerns inside information. (FSMA Circula, 2012). In Dutch, one of the original languages of the Circular, the text goes as follows: *"De emittenten delen gereglementeerde informatie op zodanige wijze aan de media mee dat: 1° duidelijk wordt dat het om gereglementeerde informatie gaat,* ***en****, als het om voorwetenschap gaat, dat het om voorwetenschap gaat. (…)".*

WRONG LABELS: "REGULATED INFORMATION" OR "INSIDE INFORMATION" — The sole use of "Regulated" or "Inside" information thus constitutes a malpractice. One should however nuance between the two. The latter is less problematic, as the label "Inside information" clearly indicates the press release contains price sensitive information, as opposed to the label "Regulated information". "Regulated information" could indeed mean several things, *e.g.,* quarterly reports, but these often do not carry the same "weight" for investors as price sensitive inside information. If a company publishes inside information under the mere label "Regulated information", it can be that an investor misjudges how important the press release in reality is. Therefore, using only "Regulated information" is way more problematic than using only "Inside information", the latter still making clear the most important part for investors. On top of this logic reasoning, inside information can be viewed as a subcategory of "Regulated information". One could even argue that, following the legal principle according to which "specific" laws precede "general" laws[71], it suffices to only mention "Inside information".

2.2. Label used per company



*Graph 3: **Labels used per company.** This graph shows what type of label is used by the different biotech companies.*

COMPANIES USING "REGULATED AND INSIDE INFORMATION" — Graph 3 shows that only three companies correctly use the "Regulated and inside information" label each time a press release had a significant effect. These three companies are argenx, DMS Imaging and Sequana Medical.

IBA, UCB, Mithra and Biocartis used a different label once (or twice in the case of Mithra), indicating a small labelling mistake by these companies for the following press releases:

[71] *"Lex specialis derogat legi generali."*

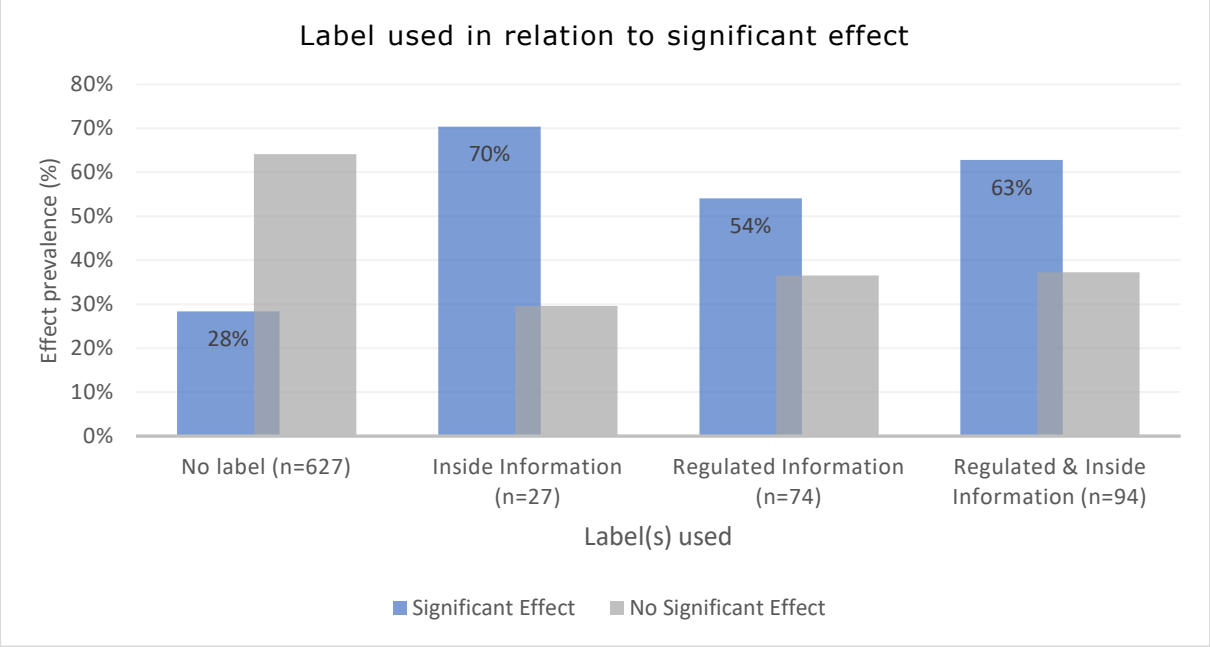
- **IBA**: 5/05/2022 Commercialisation update (other labelled commercialization updates had a "Regulated and inside information" label).
- **UCB**: 25/06/2021 Authority communication (one other authority communication had a "Regulated and inside information" label).
- **Mithra**:
  - 30/07/2018 New R&D partnership (no other press releases).
  - 30/05/2018 Post-hoc analysis (no other press releases).
- **Biocartis:** 26/03/2020 New commercial partnership (one other new commercial partnership had the "Regulated and inside information" label).

It is not clear why these five press releases were labelled incorrectly. One can only assume that it is the result of a non-intentional human error. There is a high probability these mistakes will not happen again in the future.

COMPANIES ONLY USING "INSIDE INFORMATION" OR "REGULATED INFORMATION" — Graph 3 shows that two companies, Acacia Pharma and Onward Medical, consistently use the label "Inside information". However, these companies could improve by adding "Regulated information", this mistake is not that problematic: as explained above, it is clear for investors that it concerns price sensitive information. Galapagos, on the other hand, displays a more problematic labelling practice, *i.e.,* only using "Regulated information". This way, Galapagos ignores the Market Abuse Regulation and it is not clear at all for investors that it concerns inside information, as "regulated information" covers many categories. Constructive communication between the FSMA and these 3 companies, however, should resolve these issues quite swiftly.

COMPANIES LABELLING INCONSISTENTLY — Celyad, Nyxoah, Hyloris, MDxHealth and Bone Therapeutics use the correct label on some occasions but use a wrong label more often. A more in-depth analysis of the label use for different types of press releases does not show a clear pattern of why sometimes one or the other label is used. Clear communication from the FSMA about the guidelines, together with monitoring future label use, should resolve this problem as well.

2.3. Label used in relation to significant effect



Graph 2: ***Label used in relation to significant effect***

PRESS RELEASES WITHOUT LABEL — Graph 2 shows that 72% of all press releases that were not labelled also did not have a significant effect on the stock price of the company. Although further analysis will show that improvements can be made, overall, this is not a bad statistic. In this regard, it should be reminded that it is up to the issuer to determine *in advance* whether the information in the press release constitutes inside information or not.[72] It is indeed rather difficult to *predict* how investors will react to certain news. There are many examples, such as a press release disclosing topline results that can be quite promising for the future of a company, but if these results are in line with investors' expectations, then the press release will not cause any significant effect on the stock price. Therefore, it can be quite hard for the company to know what investors are expecting, to determine what the reaction of the investors will be and whether or not they need to label certain press releases.

LABELLED PRESS RELEASES — On average, 60% of the labelled press releases had a significant effect on the stock of a company. Improvements can be made in this area as well. As mentioned above, the companies should use the label "Regulated and Inside information" when publishing a press release of which they consider it likely that it will have a significant effect on the stock.

RELATION BETWEEN LABEL USED AND INVESTORS' BEHAVIOUR — This analysis did not research the train of thought of investors while reading and interpreting these press releases. Therefore, a claim about how investors could have possibly perceived these labelled press releases cannot be made with absolute certainty. This graph, however, could indicate that the choice of label used (inside, regulated or both) had an effect on investors' behaviour, as demonstrated by the following reasoning.

As mentioned above, "**Regulated and inside information**" is the label that should be used on all press releases containing inside information. Graph 2 shows that 63% of these press releases caused a significant effect on the stock of a company. On the other hand,

[72] See *supra II.C.*

press releases that were labelled as "**Regulated information**" only caused a significant effect in 54% of the cases. The reason for this could lie in the fact that the label "Regulated information" is much more prevalent in press releases overall, as it is mandatory to use when publishing quarterly reports, transparency notifications, investor meetings, *etc*. Some of these press releases often do not have an impact on the performance of the company. Therefore, it is possible that investors perceived these press releases as less important in comparison to the press releases labelled "Regulated and inside information". Press releases using the label "**Inside information**" caused a significant effect 70% of the time, which confirms and reinforces the reasoning above: possibly, investors interpreted press releases with this much less frequently used label as extra important, which caused the high prevalence of a significant effect.

Once again, it should be stressed that there was no analysis done investigating the reasoning of investors nor the content of these press releases in this quantitative part of the analysis. Merely by analysing the significance rate of the press releases with different labels, a hypothesis was formed as how and why investors reacted to the labels differently and hereby caused different significance rates.

3. Labelling accuracy

3.1. When is a press release labelled accurately?

PRESS RELEASES LABELLED ACCURATELY: LABELLED AND SIGNIFICANT EFFECT / NOT LABELLED AND NO SIGNIFICANT EFFECT — In the next part of this quantitative analysis, it is analysed to what extent the use of a label corresponds to a significant effect on the stock. From this point onwards, no distinction is made between the different labels used by the biotech companies: in this section, a labelled press release refers to a press release that either contains the "Regulated Information", "Inside Information" or "Regulated Information and Inside Information" label. This is justified, as for the purpose of researching the relation between the fact that a press release is labelled and the significant effect of this press release, the "legal correctness" of the label does not matter. Only the right classification of a press release by the company is important in this regard (inside information or not, regardless of whether the company labels it this as "Regulated" or "Inside" information). Hence, for this section, a press release that is "labelled accurately" does not mean it is legally correct, but a press release is considered labelled accurately in the following two situations:

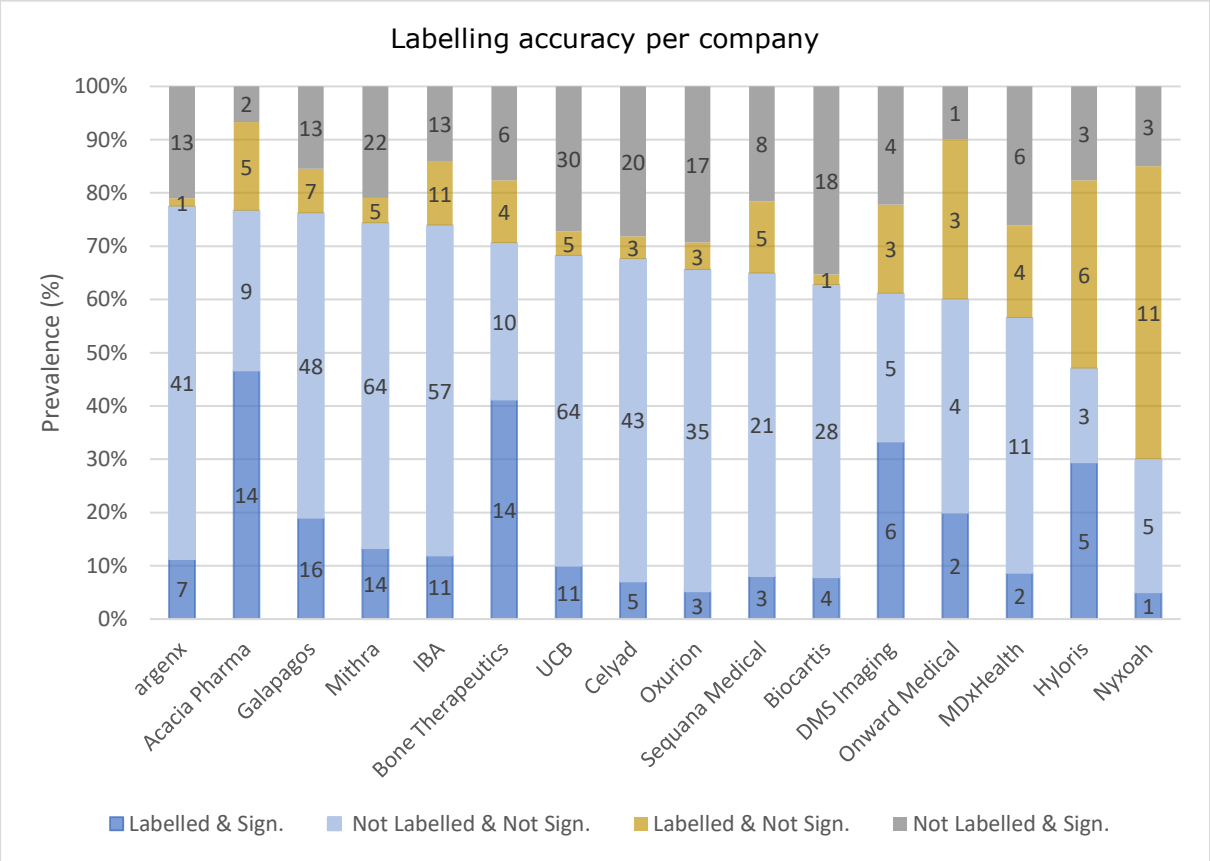
1. A press release which did have a *significant effect* on the stock price as identified by the model, was *labelled*.
2. A press release which after publishing did *not* have a *significant* effect on the stock price as identified by the model, was *not labelled*.

These two situations are coloured in different shades of blue in Graph 4 to clearly distinguish them from the inaccurately labelled press releases.

PRESS RELEASES LABELLED INACCURATELY: LABELLED BUT NO SIGNIFICANT EFFECT — A press release can also be labelled without having a significant effect on the stock of a company. This, in itself is not a problem as companies might sometimes wrongly predict the impact of a press release and expect a bigger reaction from investors, either positively or negatively. A problem does present itself when a pattern arises in which a company consistently labels insignificant press releases as important, possibly as a way to boost the importance of own news and this way, trying to increase the value of the stock.

PRESS RELEASES LABELLED INACCURATELY: NOT LABELLED BUT SIGNIFICANT EFFECT — Another problem presents itself when a press release is not labelled but has a significant effect on the stock of the company. The prevalence of this happening should be minimized, and companies should try to make the distinction between inside information and non-significant news as accurately as possible (even though, as mentioned before, this prediction exercise is not an easy one). Labelling significant news is of the upmost importance for (possible) investors. After all, labelled press releases need to adhere to certain disclosure standards.[73] This is especially true for press releases published by biotech companies (FSMA Opinion, 2020).

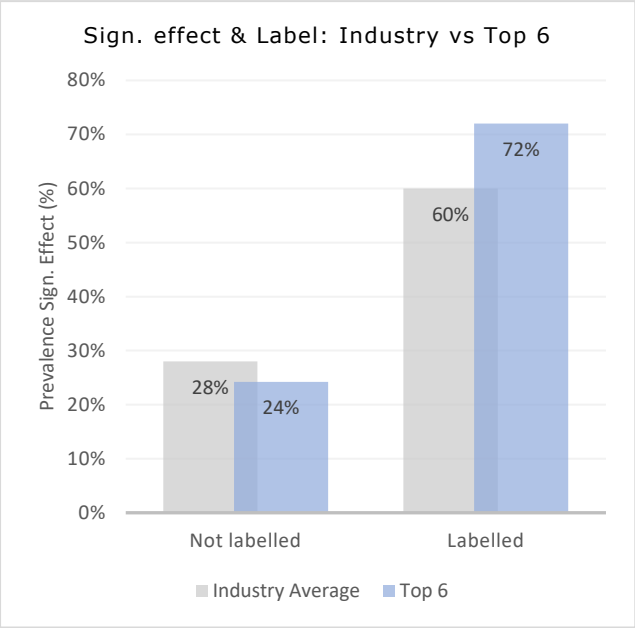
3.2. Labelling accuracy per company



*Graph 4: **Accuracy of labelling per company**. This graph shows the prevalence of each of the four possible combinations for a press release, being a combination between labelled or not labelled and having a significant effect or not, for all analysed biotech companies. The dark and light blue bars represent accurately labelled press releases.*

COMPANIES LABELLING ACCURATELY IN MOST CASES — Graph 4 shows that argenx, Acacia Pharma, Galapagos, Mithra, IBA and Bone Therapeutics are all able to accurately label their press releases in at least 70% of the cases. Further calculations show what other statistics these six best performing companies are able to produce (see Graph 5).

[73] See *supra* III.C.



The top performing companies are better at predicting whether a press release will have a significant impact. When we use this as a benchmark for the industry average (same numbers as shown in Graph 2), it is clear that there is quite some room for improvement for other companies (Graph 5). 72% of all press releases labelled by the top performing companies do indeed have a significant effect on the stock, compared to the 60% of the industry average. If every company would perform at the same level as these top six companies, the prevalence of unlabelled press releases that did cause a significant effect would also go down by 4%.

*Graph 5: **Sign. effect & Label: Industry vs Top 6**. This graph shows the prevalence of press releases with a sign. effect for both the unlabelled and labelled press releases. Furthermore, it makes the comparison between the industry average and the top 6 best performing companies.*

INACCURATE LABELLING: LABELLED BUT NO SIGNIFICANT EFFECT — Graph 4 makes clear that a trade-off needs to be made within the company each time when deciding to label a press release or not. Companies that label their press releases often, and hereby have a higher chance of labelling press releases that cause a significant effect, at the same time expose themselves to the risk of labelling more press releases that eventually do not end up having a significant effect. Clear examples of this are Acacia Pharma, Bone Therapeutics and DMS Imaging (and Hyloris, but this assumption is harder to make because of the small sample size). If this means that more press releases are released that need to adhere to the requirements of FSMA and hereby provide clearer and more complete information to investors, then this is not a huge problem. Indeed, when in doubt, a company should preferably choose to *label* a press release.

On the other hand, one must be careful with the frequency by which a label is used. In this regard, it is remarkable that Nyxoah and, to a lesser extent, Onward Medical and Hyloris, label relatively many press releases that did not have any impact on the company stock. One of the reasons might be that these companies intentionally misuse the label in order to create more hype around the company, which eventually results in a higher stock price, thereby misleading the investors. Another more likely explanation might be that a few estimation errors were made regarding the reaction of investors. Since the datasets of these companies are rather small, it is, unfortunately, not possible to draw conclusions with certainty. Nevertheless, a recommendation might be to closely monitor these companies to see what the future holds.

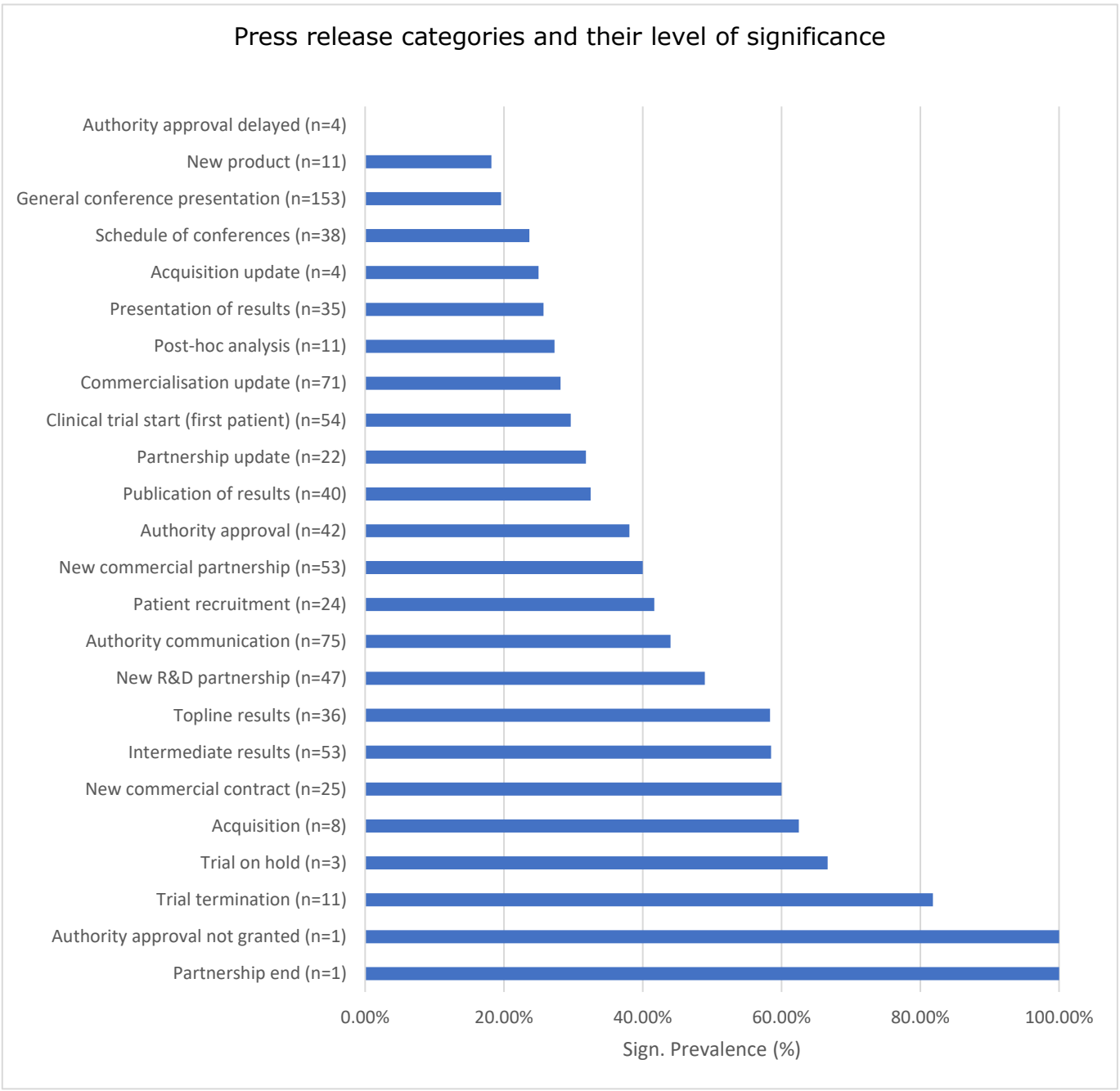
INACCURATE LABELLING: NOT LABELLED BUT SIGNIFICANT EFFECT — A larger problem presents itself when the reversed situation occurs: press releases with a significant impact on the stock are not labelled. This opens up the opportunity for companies to publish news without the same care and quality standard as a labelled press release would require. Companies like UCB, Celyad, Oxurion and Biocartis only label a very small portion of all their press releases (less than 15%). As a positive effect, it can be observed that only a small part of the press releases are labelled without having a significant effect. The downside, however, is that on average, 29.3% of the press releases of these companies

have a significant effect but are not labelled. A large portion of press releases both escape the applicable disclosure rules *and* do not inform investors about their price sensitive character. Hence, these companies should try to think more critically about which press releases will significantly impact investors' behaviour and use a label more often when appropriate. FSMA could monitor these 5 companies more closely in the future.

4. Effect of different types of news on trading behaviour

4.1. Introduction

In the next part of this quantitative analysis, the significance of different types of news will be analysed. This will provide the FSMA with better insights in which press releases are important for investors, which in turn indicates which press releases the FSMA should pay close attention to.



Graph 6: ***The different press release categories and their level of significance***

Furthermore, an analysis is made of how companies label the different categories of press releases. To make the graphs on the following pages easier to interpret, the different categories will be presented in different clusters.

It is reminded that a press release can be considered "labelled accurately" (1) when a press release is labelled and also had a significant effect on the stock price, and (2) when a press release is not labelled and had no significant effect on the stock price.

4.2. Authority related news

EXPLANATION CATEGORIES — Biotech companies publish press releases providing information to investors about their interactions with authorities. This cluster consists of the following four categories:

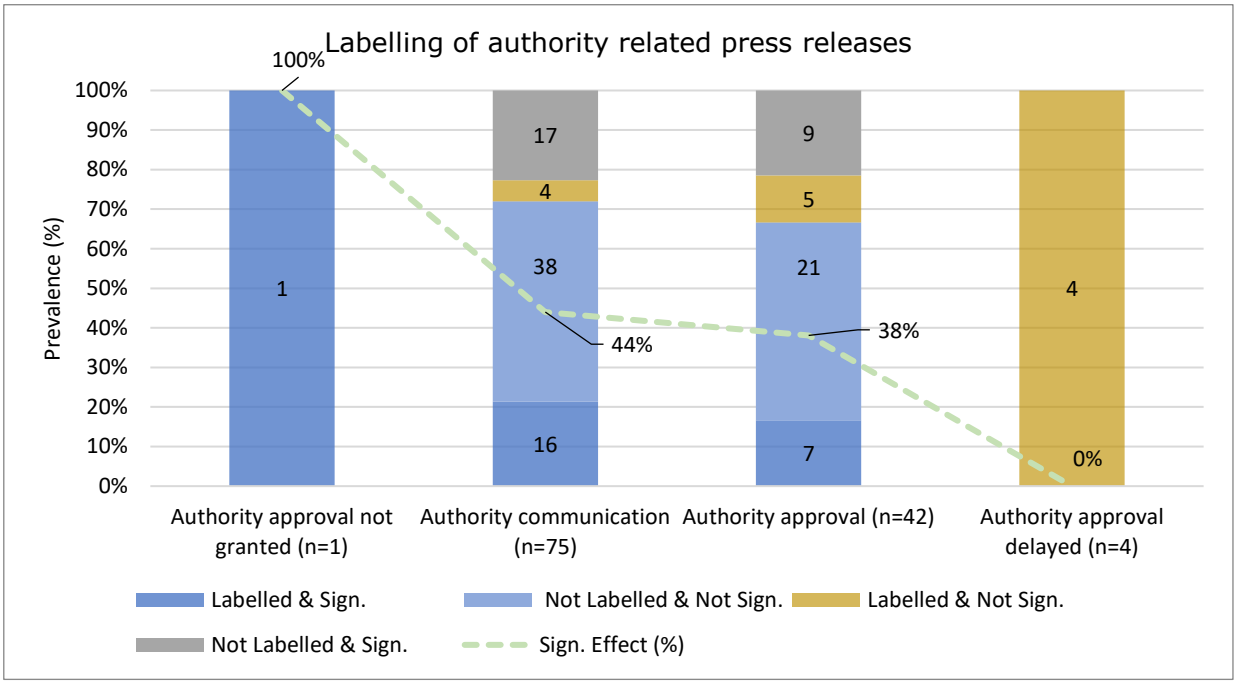
- **AUTHORITY APPROVAL —** This category includes all the press releases communicating an authority approval for a certain medicine.
- **AUTHORITY COMMUNICATION —** This category operates as a residual category, capturing all the press releases that do not belong in the other three categories. This category includes, amongst others, complete response letters[74], CHMP opinions[75], acceptance of marketing authorisation applications, *etc.*
- **AUTHORITY APPROVAL NOT GRANTED —** This category includes only one press release where the authorities did not grant an approval for a medicine after all the clinical trials were completed.[76]
- **AUTHORITY APPROVAL DELAYED —** This category includes four press releases where it is announced that the approval is delayed by the authority. The reason that "approval not granted" and "approval delayed" are in separate categories, is that these events are quite serious and impactful for the company, which in our view justifies this division.

[74] A complete response letter is sent by the FDA to indicate that the review cycle for an application is complete, but this application is not ready for approval. The letter sets out the reasons why the submission is considered insufficient and often includes recommendations on how these shortcomings could be overcome. https://www.fda.gov/drugs/laws-acts-and-rules/complete-response-letter-final-rule.

[75] The Committee for Medicinal Products for Human Use (CHMP) is the European Medicines Agency's (EMA) committee responsible for human medicines. In the centralised procedure, the CHMP is responsible for, amongst others, conducting the initial assessment of EU-wide marketing authorisation applications. Therefore, the CHMP scientifically evaluates marketing authorisation applications, and after this evaluation, the CHMP issues a scientific opinion on whether the medicine may be authorised or not. EMA sends this opinion to the European Commission, which issues the marketing authorisation. https://www.ema.europa.eu/en/committees/committee-medicinal-products-human-use-chmp ; https://www.ema.europa.eu/en/human-regulatory/marketing-authorisation/obtaining-eu-marketing-authorisation-step-step#submission-of-the-application-section.

[76] It also happens that an authority terminates further development of a drug because, for instance, the primary endpoints were not met. Press releases related to this kind of situations, where the authority communication comes *during a clinical trial* (and not in the end), are categorized as "trial termination", and discussed *infra*.

Graph 7 shows the four categories, ranked by level of significance (following the green dotted line). It can be observed that companies are rather successful in accurately labelling press releases covering news about authorities' interactions.



*Graph 7: **Labelling of authority communication related press releases***

AUTHORITY APPROVAL AND COMMUNICATION — Within the categories "authority approval" and "authority communication", most press releases are labelled in an accurate way. Unfortunately, there is still room for improvement. More than 20% of these press releases have a significant impact but are not labelled. Although these stats are not terrible, we do believe companies could be more critical and label more press releases when necessary. As explained above, it is preferred, both from the perspective of the company and of the investors, to *label* press releases whenever they are in doubt towards the impact of content of the press release.

AUTHORITY APPROVAL DELAYED — The four press releases publishing an approval delay are all labelled even though none of these press releases had a significant impact. Companies however should keep labelling these press releases as they contain important information, even though the data seems to show that it does not have a significant impact on investors. Investors are possibly very hesitant to react in this situation as they are unsure if the delay will eventually impact the successful outcome of the drug development.

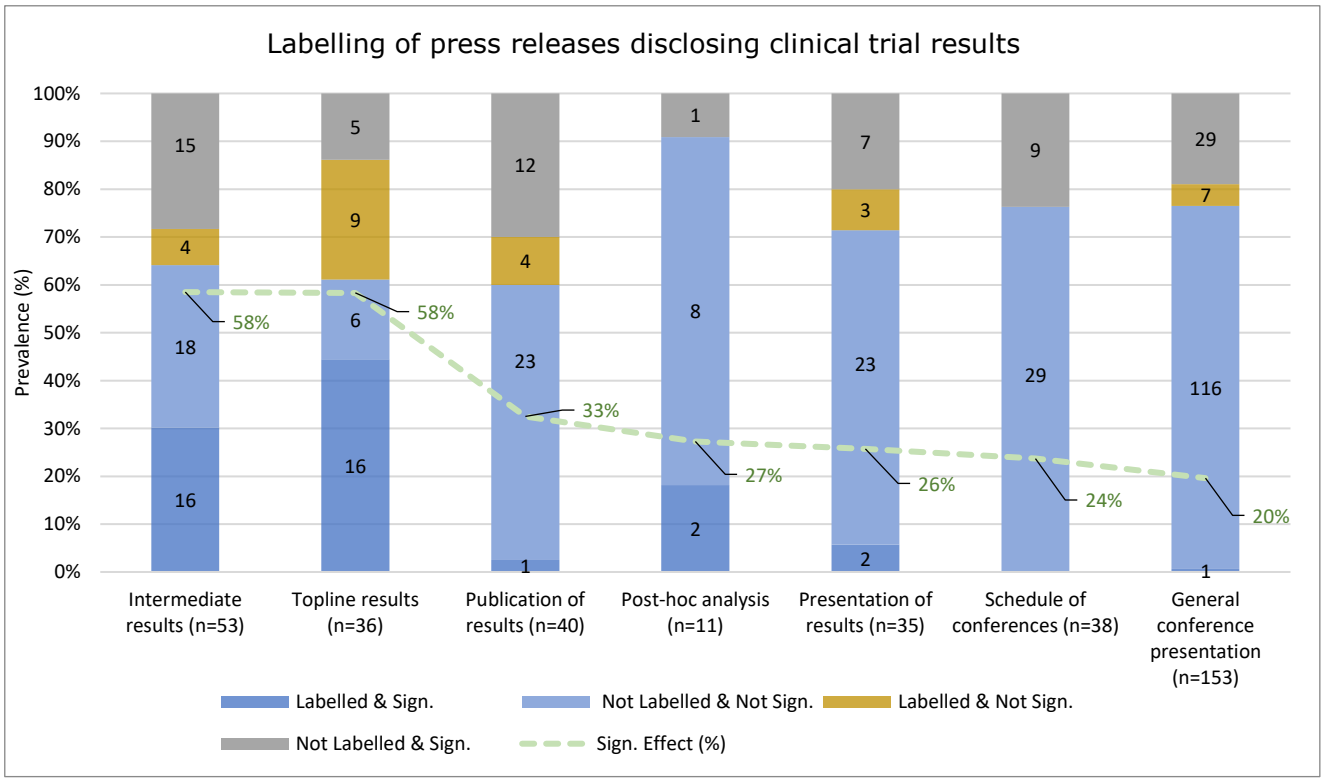
4.3. Clinical trial results

EXPLANATION CATEGORIES — Results of clinical trials are communicated to the public in a variety of ways. This large cluster consists of the following categories:

- **Interim/topline results —** Interim and topline results are usually the first results from a clinical trial an investor will receive.
- **Post-hoc analysis/publication of results —** Afterwards, further analysis of the data will be done by the biotech companies where new insights might be discovered. These new findings could be shared in press releases of a post-hoc analysis or can be found in publications of the trial in scientific magazines. If no new ground-breaking clinical information is found, these press releases announcing

a publication or post-hoc analysis will not contain new relevant information for investors and will usually not have a significant impact. This explains the low significant effect rate of these categories.

- **Presentation of results/general conference presentation/schedule of conferences —** Biotech companies will also attend many conferences where they will present clinical trial results or give a general presentation about the company and their drug development pipeline. If companies attend a lot of conferences in the foreseeable future, they also tend to publish a press release containing a schedule of all future conferences. If a company shared interim and/or topline results during and/or at the end of a clinical trial, these conference presentations usually do not contain any new insights or results. Unfortunately, in some cases, conferences demand unreleased results to be shared at their event. Some companies, *e.g.,* Celyad, only publish new results on conference presentations instead of presenting them separately in a press release as a topline result after a trial completion. This results in the fact that some press releases regarding a presentation of results are very important, while others are just a repetition of previously shared data. This is supported by Graph 8.



Graph 8: ***Labelling of press releases disclosing clinical trial results***

INTERMEDIATE AND TOPLINE RESULTS — A large amount of interim and topline results are labelled. As this is the first-time investors receive actual data of a trial, it is logical that these press releases have a high significance rate. Labelling these press releases and trying to predict whether investors would react to this news, is quite hard for companies as it depends on what investors are expecting the results to be. Overall, biotech companies are successful in labelling press releases that share topline results. One out of four press releases disclosing topline results were labelled but did not have a significant effect. As explained before, this is not a huge problem. Companies could, however, pay more attention to interim results, as these 28% of press releases were significant but did not receive a label from the biotech companies. The data thus shows that investors find these press releases more important than companies believe they will be.

PUBLICATION OF RESULTS — The same conclusion can be made for press releases covering the publication of results. Only one significant press release was labelled, whilst 12 others were not. From this result, one can conclude that companies should differentiate more between the knowledge and insights gathered from topline results and those presented in a published paper. If new discoveries have been made, or the paper offers a much more in-depth view on the trial, then these press releases should be labelled.

POST-HOC ANALYSIS — Even though the data sample of post-hoc analysis press releases is rather small, the companies seem to perform better at identifying when a post-hoc analysis found important news. This conclusion can be drawn from the fact that the companies labelled 2 out of 3 significant press releases.

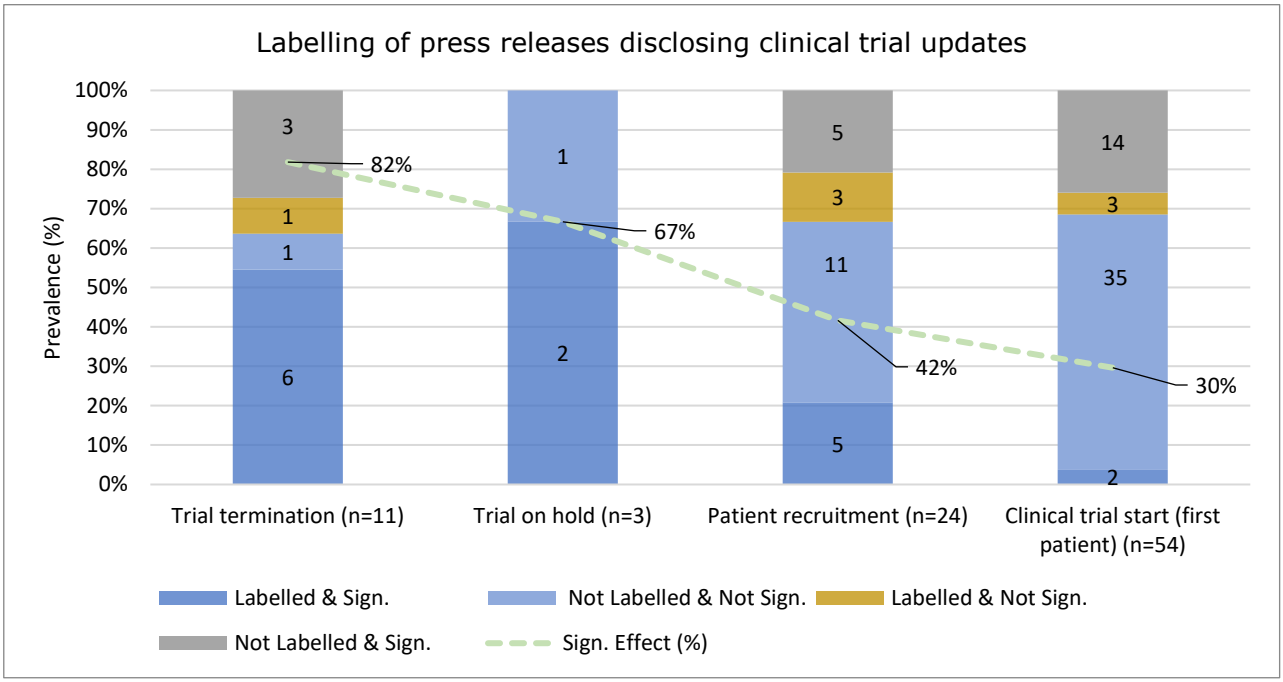
PRESENTATION OF RESULTS/GENERAL CONFERENCE PRESENTATION/SCHEDULE OF CONFERENCES — Presentation of results, general conference presentations and schedules of conferences all have a very low significance rate. Most of the time, companies label these press releases accurately. In some cases, however, companies did not label significant press releases. Because of the low significance rate and the fact that these press releases usually do not contain, or should not contain, price sensitive information[77], we cannot blame the biotech companies for these wrongly labelled press releases. Only when results are shared that were not previously shared as topline results, companies should think critically about labelling the press release.

4.4. Clinical trial updates

EXPLANATION CATEGORIES — Biotech companies regularly publish press releases to update investors on the progress of current clinical trials. This cluster contains the following categories:

- **Clinical trial start —** This category includes press releases communicating the start of a new clinical trial.
- **Patient recruitment —** This category includes press releases communicating updates on the recruitment when patient recruitment happens as planned, or when recruitment is delayed.
- **Trial on hold/trial termination —** These categories include press releases communicating negative news, such as the fact that a clinical trial is put on hold or is even terminated, either by decision of the company itself or by order of the authorities.

[77] One should of course always keep in mind that the model does not define press releases containing inside information with a waterproof accuracy.



Graph 9:2 ***Labelling of results disclosing clinical trial updates***

TRIAL ON HOLD/TRIAL TERMINATION — Trial terminations and trials put on hold are impactful negative events, which explains the high significance rate for these press releases. For this reason, it is also worrying that four press releases regarding trial terminations were not labelled:

- UCB: 22/04/2021;
- Oxurion: 25/06/2021;
- Mithra: 29/09/2021;
- Galapagos: 15/10/2020.

No major problem regarding the labelling of press releases was identified for any of these companies during a previous analysis (see *supra,* Graph 4). Therefore, it is strange that these companies are unable to accurately label a press release announcing a trial termination. One could wonder whether the non-labelling of these press releases was intentional or accidental. This is something the FSMA could monitor in the future.[78]

PATIENT RECRUITMENT — Press releases publishing updates on patient recruitment have a smaller impact on the stock of a company. These press releases will generally only have an impact when updates are not in line with the expectations of investors, *e.g.,* when patient recruitment progresses faster or slower than originally planned. It seems like biotech companies are successful at labelling these press releases.

CLINICAL TRIAL START — On the other hand, the labelling of the "clinical trial start" press releases could be improved upon. The significance rate of these press releases is indeed low, but reactions of investors strongly vary depending on the situation. If news about intensions of starting a clinical trial was shared beforehand, a press release announcing the actual start will not come as a great surprise to investors. If this however is the first time investors get a detailed explanation about a new clinical trial, a biotech company could indeed expect a significant impact on its stock price. Graph 9 shows that companies only labelled two press releases that turned out to have a significant effect, whilst 14 significant press releases were not labelled. Biotech companies should try and think more

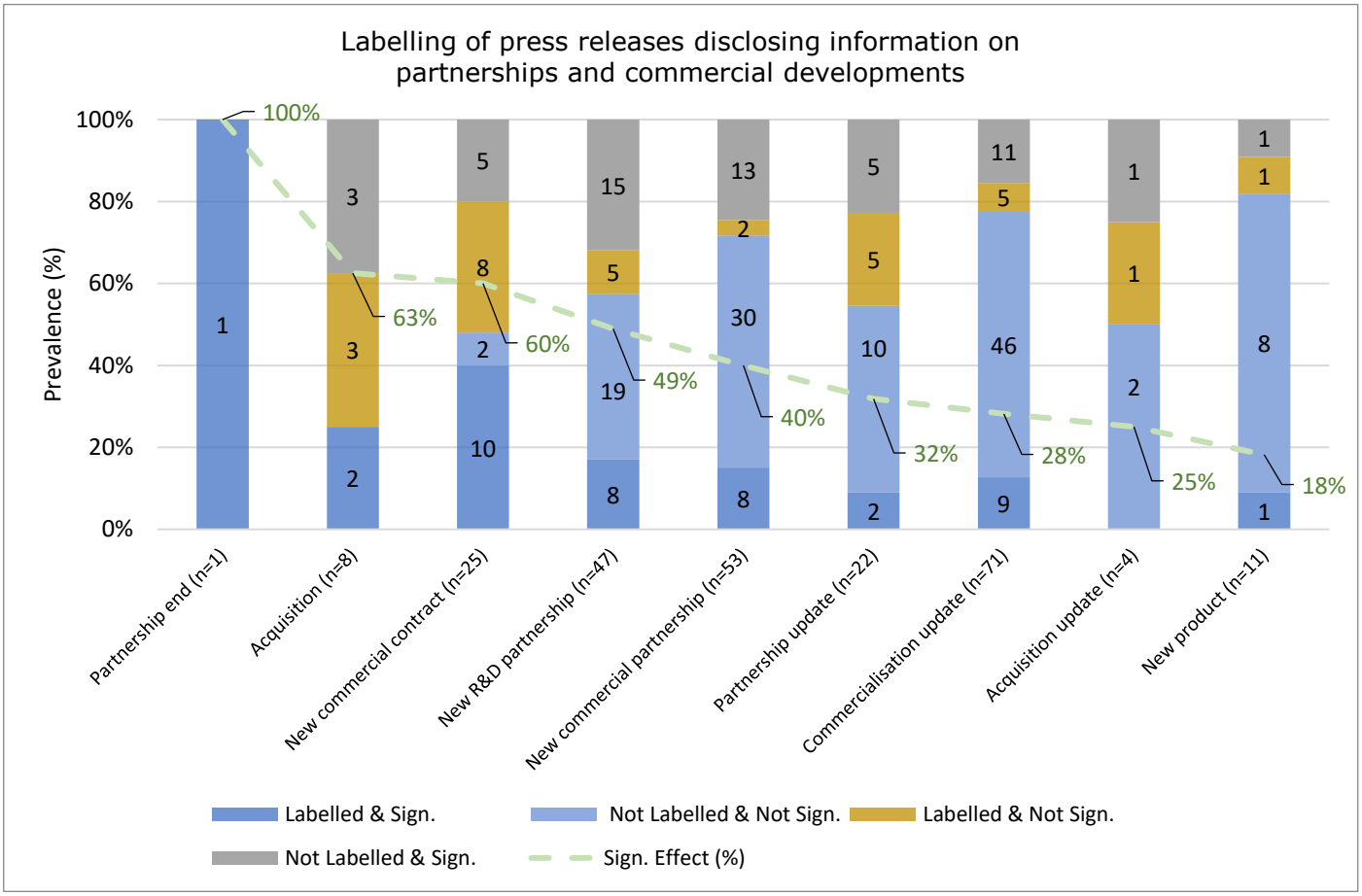
[78] In the qualitative analysis of press releases, extensive attention is paid to the disclosure of negative press releases, see *infra.*

carefully about when clinical trials announcements are expected to be price sensitive, in order to label them accordingly.

4.5. Partnerships and commercial news

EXPLANATION CATEGORIES — The last cluster contains a lot of categories, all related to the development and commercialisation of drugs and/or drugs in development.

- **Partnerships/acquisitions —** For both development and distribution, a biotech company can form partnerships with or acquire an external company. Biotech companies also provide updates on these partnerships and acquisitions, for instance when the conditions of the agreement have changed.
- **Commercialisation updates —** Furthermore, biotech companies provide commercialisation updates, under which a wide variety of press releases are brought, *e.g.,* receiving a milestone payment, updates on distribution methods, a new production facility, *etc.*
- **New commercial contract —** One type of a commercial update that was published quite frequently was news about a new commercial contract. These contracts entailed the commitment of a buyer to buy a large number of products from a MedTech company.
- **New product —** A last category is the new product category where companies announce the start of an investigation towards possibilities for a new drug or for the development of a new MedTech product.



Graph 10: ***Labelling of press releases disclosing information on partnerships and commercial developments***

ACQUISITION/NEW COMMERCIAL CONTRACT/PARTNERSHIP UPDATE — A large portion of these press releases are labelled but did not have a significant impact on the stock of a company. As mentioned before, this is not a problem as long as the label is not misused. The labelling of the commercial contracts could be a way of trying to boost the company's stock. 24 out of these 25 press releases were published by IBA, of which a large part was indeed labelled without causing a significant effect. IBA should try to be more critical when deciding to use this label in the future.

NEW PARTNERSHIP/NEW COMMERCIAL PARTNERSHIP — Two categories, *i.e.,* new partnerships and new commercial partnerships, contain a large portion of press releases that have a significant effect. However, only a small portion of these press releases are labelled. Companies should try and improve the labelling of these two categories.

COMMERCIALISATION UPDATE/ACQUISITION INFO/NEW PRODUCT — Press releases covering commercialisation updates, acquisition info and new products have a low significance rate and are also not often labelled. The labelling of these two categories is done accurately by biotech companies.

5. Recommendations

5.1. Label use

From an in-depth analysis of the gathered data, it seems that the kind of label used on a press release ("Regulated information", "Inside information" or "Regulated information and inside information") could have an effect on how investors interpret labelled press releases.

Argenx, DMS Imaging and Sequana Medical use the right label, *i.e.,* "Regulated and inside information". IBA, UCB, Mithra and Biocartis used the wrong label once (or twice in the case of Mithra), but further analysis shows that this is probably due to a non-intentional mistake.

Acacia Pharma and Onward Medical consistently use a wrong label ("Inside information"), which can be improved. Galapagos, too, uses a wrong label ("Regulated information"), which constitutes a bigger problem as in this case, investors are not aware of the sensitive character of the press releases. These companies thus should be informed of this, however, in our view, clear communication between the FSMA and the companies should resolve this issue quickly.

Constant use of correct label	Constant use of wrong label	(1 or 2) Label mistake(s)	Alternating labels
• argenx • DMS Imaging • Sequana Medical	• Galapagos ("Regulated information") • Acacia Pharma ("Inside information") • Onward Medical ("Inside information")	• IBA • UCB • Mithra • Biocartis	• Celyad • Nyxoah • Hyloris • MDxHealth • Oxurion • Bone Therapeutics

Table 4: ***Overview of label use per company***

The other companies (Celyad, Nyxoah, Hyloris, MDxHealth and Oxurion) alternately use both the wrong label and the right label, without a clear pattern explaining why. The FSMA should inform these companies of the legal requirements and monitor their labelling behaviour in the future.

Argenx, Acacia Pharma, Galapagos, Mithra, IBA and Bone Therapeutics are predicting very well whether a certain press release will have a significant impact on investors' sentiment and label their press releases accordingly. UCB, Celyad, Oxurion and Biocartis label only a small amount of their press releases and therefore publish a lot of press releases with a significant effect but without a label. These companies should try to label press releases more often when a significant effect can be expected.

Nyxoah, on the other hand, tends to label an overload of press releases, which should be monitored by the FSMA to ensure they do not misuse the labelling of press releases to try and increase the importance of their press releases to boost the company's value.

Best performing	Label more often	Label less often
• argenx • Acacia Pharma • Galapagos • Mithra • IBA • Bone Therapeutics	• UCB • Celyad • Oxurion • Biocartis	• Nyxoah

Table 5: ***Overview of best performing labelling companies in terms of frequency***

5.2. Accuracy of labelling different types of press releases

Following an in-depth, data-driven analysis of the different types of press releases and how they are labelled by the biotech companies, a quadrant system, as can be seen below, was designed to show how and where the FSMA should focus its attention.

The first quadrant shows the categories that are labelled accurately and where no action of the FSMA is required.

The second quadrant shows the press release categories the FSMA should monitor closely in the future. At this point in time, no problems were identified for these categories. In very specific cases however, these press releases need to be labelled and it is important that the FSMA monitors that when impactful information is shared, it is done in a correct way.

The third category contains press releases which can have an impact on the sentiment of investors in certain situations and of which biotech companies should think more critically when labelling. These categories had a relative larger portion of press releases that caused a significant effect on the stock without having been labelled by the biotech company. Especially the 4 companies announcing trial terminations without labelling their press releases should be monitored closely in the future when publishing negative news.

The fourth quadrant consists of one category which contains press releases that are possibly labelled to boost the importance of the company and to make the press release seem more important.

Labelled correctly ▪ Authority approval not granted ▪ Authority approval delayed ▪ Topline results ▪ Post-hoc analysis ▪ Patient recruitment ▪ Acquisition ▪ Partnership update ▪ Acquisition info ▪ New product ▪ Schedule of conferences ▪ Commercialization update	**More frequent labelling** ▪ Authority approvals ▪ Authority communication ▪ Interim results ▪ Publication of results ▪ Trial termination ▪ Clinical trial start ▪ New R&D partnership ▪ New commercial partnership
Monitor evolution ▪ Presentation of results ▪ General conference presentation	**Less frequent labelling** ▪ New commercial contract

Table 6. ***Overview of labelling practices for different press release categories***

B. COMPLIANCE BELGIAN BIOTECH COMPANIES WITH FSMA OPINION — QUALITATIVE ANALYSIS

INTRODUCTION — In this section, it is analysed to what extent Belgian biotech companies comply with the FSMA Opinion, *i.e.,* the second sub question. An analysis is made for the following categories of press releases respectively: clinical trial results, clinical trial updates, authority communications and partnership. As set out in the methodology, the evaluation sheets (see Appendices B), that include the relevant good practices for each category, served as evaluation framework. It should be reminded that only press releases that are considered inside information are analysed hereafter. It thus concerns press releases that are labelled as inside information by the company itself, and/or had a significant effect on the stock price or trading volume, totalling up 298 press releases.

For the sake of readability, a distinction is made between businesses with near-perfect press releases (*best in class*) and companies whose inside information disclosure could be improved on multiple points (*definitely good enough*). It should be noted that the latter generally passes the quality test, but there are a number of (small) shortcomings that can be improved. Finally, we disclose the companies that, in our opinion, did not disclose information appropriately (*failed the class*). Occasionally, negative news or some specific categories are discussed separately, however this is explained at the beginning of the relevant section.

1. Clinical trial results

INTRODUCTION — This category includes all press releases disclosing interim or topline results of clinical trials. On top of these, the category also captures press releases that announce the publication of results in a scientific journal, a presentation of results at a conference and a post-hoc analysis, however these press releases are discussed in a separate section.

Press releases were identified for following companies:

- **Interim and topline results**
  - Mithra, UCB, argenx, Sequana Medical and Galapagos (*pre* and *post* the FSMA Opinion);
  - Oxurion and Bone Therapeutics (*pre*); and
  - Nyxoah, Acacia Pharma and TheraVet (*post*).

- **Post-hoc analysis**
  - Mithra and Galapagos (*pre*)

- **Presentation and publication results**
  - Celyad (*pre* and *post*);
  - argenx, Oxurion and MDxHealth (*pre*); and
  - UCB, Biocartis, Galapagos and Nyxoah (*post*).

1.1. Interim and topline results

a. Best in class — argenx, Sequana Medical, Mithra, TheraVet and Bone Therapeutics

GOOD PRACTICES — The first company that is classified as *best in class,* is argenx. Argenx published press releases covering topline results and intermediate results both before and after the FSMA Opinion. The latter starts with a clear headline and summary in which is discussed whether primary and secondary endpoints were met. Throughout the press release, comprehensible language is used that paints a clear picture for the investors. Quantitative data such as measurements, averages and p-values are used to strengthen and back up the conclusions argenx could draw from the clinical trials. The experiment is explained clearly and is on par with the description of the clinical trial given by the companies classified as *best in class* for the clinical trial updates (see *infra*). All FSMA's requirements for this part of the press release are met. Additionally, argenx discusses future steps and when they expect them to be achieved.

Both positive and negative results of the clinical trial are presented in the same manner and hereby paint a clear and nuanced image for the investors. For instance, even though there was a difference in averages between the tested and placebo group, argenx clearly states that the difference was not statistically significant.

A lot of contextual information is presented, both in the press release itself and in the "about" section. Investors receive information about the drug, its working mechanism and the disease that is being treated. The existing therapies are also explained (however briefly) and are followed up by a very short explanation on how argenx's new medicine could fill a lacune here.

Throughout the whole press release, the language used is careful and nuanced when describing the medicine, the results and the outlook for the future. Referring to the drug in development as "*a new potential approach"* shows that the drug has not been approved yet and that one cannot be absolutely certain of the outcome, which is in sharp contrast to some of the other companies.

Mithra, TheraVet, Bone Therapeutics and MedTech company Sequana Medical are also classified as *best in class*. Their press releases covering trial results display the same great practices as those of argenx. What separates these companies from the others, is that they excel at the key requirements for disclosing clinical trial results. Only these 5 companies are able to report the results with a sufficient amount of technical data, clearly discussing all endpoints and informing the investors about both positive and negative news in the same manner. As will be discussed later, some companies that are not classified as *best in class* might outperform these 5 companies on less important aspects, such as disclosing contextual information, but are unable to provide sufficient information of the results of the clinical trial itself, which is what matters most.

POINTS OF IMPROVEMENT — A first improvement point was however identified for argenx and Sequana Medical. When a certain scoring system or index is used, *e.g.,* to measure efficacy of a certain drug, this should be explained more thoroughly. For instance, in one trial, argenx uses a "Quantitative Myasthenia Gravis (QMG) score" and "Myasthenia Gravis Activities of Daily Living (MG-ADL) score". Although investors can roughly estimate what these scores would entail, it is very hard to judge how impactful, for instance, a "*two-point*

improvement on the MG-ADL score for at least four consecutive weeks" is for the quality of life of a patient. This point of improvement will return in the analysis of the press releases covering clinical trial updates. On the other hand, TheraVet, Mithra and Bone Therapeutics do include explanations of indexes in some press releases and hereby make the results more comprehensible for investors.

A second point of improvement for argenx is to give more contextual information about the market size and to add references to previous trials and external reports. This is something Sequana Medical, Mithra and TheraVet do very well. Bone therapeutics also provides an abundance of contextual information but does not refer to external sources. These companies do however incorporate links to press releases of previous trials when necessary. A sidenote in this regard is that TheraVet gives an outstanding amount of contextual information in one press release but provides zero contextual information in a second press release.

Mithra's language used however in the press releases is much less careful and nuanced. Although they do mention both the positive and negative results of a trial, the remainder of the press release is very positive. The language used in the press releases makes it seem like it is almost a 100% certainty that the medicine will be approved and will be commercialized.

Bone therapeutics provides a very short explanation on the safety profile of the drug in development in every press release, but we do believe that this aspect and especially possible negative aspects of the safety profile could be discussed more thoroughly.

One improvement point for all companies relates to the discussion of the (primary and secondary) endpoints. According to GP-22, it should be explicitly mentioned in the summary whether these are met, and following GP-23, the results should be discussed in relation to the endpoints. Doing so consistently correct seems to a struggle for the vast majority of companies.

COMPARISON — A comparison between *pre* and *post* the FSMA Opinion was possible for argenx, Mithra and Sequana Medical.

Argenx's press releases published post FSMA Opinion seem to follow the same structure as those published before. However, there are some small changes that can have a big impact on how investors analyse these press releases. Before the FSMA opinion, p-values would only be shared if the result was statistically significant. The result discussed in the second bullet point, as can be seen below, is most likely not statistically significant, however this is not mentioned. Because of this, an investor might interpret this as a positive result, while without further explanation or data, a reader cannot be certain whether there even is a significant difference.

Before (2 citations out of the same press release, covering the same trial):[79]

- "*67.7% of AChR-Ab+ patients treated with efgartigimod achieved the primary endpoint compared with 29.7% on placebo (p<0.0001).*"
- *"40.0% of efgartigimod-treated AChR-Ab+ patients achieved minimal symptom expression defined as MG-ADL scores of 0 (symptom free) or 1, compared to 11.1% treated with placebo."*

[79] https://www.argenx.com/news/argenx-announces-positive-topline-phase-3-adapt-trial-results.

After:[80]

- "*Numerically fewer WHO classified bleeding events occurred in treated patients throughout the trial but the difference from placebo was not statistically significant.*"

Even though argenx could have disclosed in the *post* press release that the average amount of bleeding events was lower in the treated group, they decided not to do so and instead inform investors that the difference between both groups was not statistically significant, which investors will correctly interpret as negative news.

A second remarkable difference since the FSMA Opinion is that negative news is explained as clearly as positive news, as can be observed below. This presents a much more complete image to investors. Before the Opinion, negative news was shared as well, but the explanation was very short and shallow. The older press release mentions that mild adverse events occurred and that most were unrelated to the drug. Unfortunately, no explanation is given about what these side-effects were, and which ones were possibly related to the drug.

Before:[81]

- "*Efgartigimod was reported to be well-tolerated in all patients, with <u>most</u> adverse events (AEs) characterized as mild and deemed unrelated to the study drug. One serious adverse event was reported in the primary study and was deemed unrelated to the study drug.*"

After:[82]

- "*SC efgartigimod demonstrated a safety profile consistent with the Phase 3 ADAPT study. It was generally well-tolerated; the most frequent adverse event being injection site reactions (ISRs), commonly observed with biologics administered subcutaneously. All ISRs were mild to moderate and resolved over time*."

This small adaptation since the FSMA Opinion gives the investor a much clearer image. Less information is withheld from the investor so now he/she is able to make his/her own interpretation of the results and needs to rely less on what only the company thinks is important enough to share. This way, an investor also does not need to rely exclusively on a potential premade choice by the company on what aspects to disclose.

For Mithra and Sequana Medical, the difference before and after the FSMA Opinion is less apparent as press releases were already quite good. One of the main improvements for both companies is the disclosure of both positive and negative results in a clear manner. Before the Opinion, only the positive results of the trial were shared. This caused investors to be ill-informed about the full scope of the trial results.

A second major improvement for Mithra is the addition of an "about" section covering all the important information related to the clinical trial. Before, key characteristics of the trial were not always fully disclosed. Some of Mithra's older press releases could be quite technical and hard to understand, which also improved since the FSMA Opinion. The last two improvements were not necessary for Sequana Medical as the company already met these requirements before the FSMA Opinion.

[80] https://www.argenx.com/news/argenx-announces-positive-phase-3-data-advance-trial-vyvgartr-efgartigimod-alfa-fcab-adults.
[81] https://www.argenx.com/news/argenx-reports-positive-topline-results-phase-2-proof-concept-trial-efgartigimod-primary.
[82] https://www.argenx.com/news/argenx-announces-positive-topline-phase-3-data-adapt-sc-study-evaluating-subcutaneous.

b. Definitely good enough – UCB and Galapagos

UCB — UCB's press releases are of very high quality, and except for one key element, they are on par or might even outperform the press releases of the *best in class* category. They tick most of the same boxes as the *best in class* category (not all elements will be discussed again to prevent repetition) and the press releases even fulfil some of the improvement points that were mentioned in the previous part. For instance, UCB provides links to previous press releases when discussing results of a previous trial. Furthermore, they do also sometimes offer an explanation for an index, and they always mention in the summary whether primary and secondary endpoints were met.

Unfortunately, there is one key element which lacks. This is the reason why UCB cannot be classified as *best in class*. They do not share any actual data of their trial. UCB does mention when a certain endpoint was met and whether there was a significant difference compared to the placebo group. However, no actual data of measurements for this endpoint or p-values were shared. This is true for all 6 press releases covering topline and interim results since the FSMA publication.

Although UCB uses the same prudent language as the companies of the *best in class* category, it is impossible to give the same nuanced review of a trial if a company does not include numbers. Without quantitative data, investors are not able to determine how effective the drug in development is or how significant the difference is compared to the placebo group. Without quantitative data, it is also impossible to interpret how significant certain side effects or other negative news is.

A possible explanation for this is that UCB seems to retain this quantitative information until this can be presented at a conference. In the press release, there is usually a clear explanation discussing when this conference will be and when the data will be shared. After the conference, the quantitative data is disclosed in the press release and remains part of future press releases discussing this medicine. Below, 2 citations are shown in which UCB explains that a primary endpoint was reached. The first one is taken out of a press release covering topline results. The second one is taken out of a press release announcing the publication of results of a trial that was completed months before.

- *"Bimekizumab demonstrated a statistically significant and clinically meaningful improvement over placebo in the proportion of patients who achieved the Assessment of SpondyloArthritis International Society 40 percent (ASAS40) response at week 16, the primary endpoint of the study."* [83]
- *"The study met its primary endpoint, with significantly more patients treated with bimekizumab achieving complete skin clearance, as measured by a 100 percent improvement from baseline in the Psoriasis Area and Severity Index (PASI 100) at week 16, compared to those treated with secukinumab (61.7 percent versus 48.9 percent, respectively; p<0.001)."* [84]

Investors thus need to wait until UCB presents or publishes results before they receive the quantitative results of a clinical trial. UCB does not provide a complete image when publishing topline results if they deliberately do not share any quantitative information with investors. This is their only major point of improvement.

[83] https://www.ucb.com/stories-media/Press-Releases/article/Positive-Top-Line-Results-for-BIMZELXRVbimekizumab-in-Phase-3-Non-Radiographic-Axial-Spondyloarthritis-Study.
[84] https://www.ucb.com/stories-media/Press-Releases/article/The-New-England-Journal-of-Medicine-Publishes-Results-from-Two-Bimekizumab-Phase-3-Studies-in-Moderate-to-Severe-Plaque-Psoriasis.

GALAPAGOS — The second company in the *good enough* category is Galapagos. Galapagos published press releases covering both interim and topline result and although these press releases are of high quality, there are some key elements missing in these press releases. Good practices of Galapagos include the fact that they provide a very clear explanation of the trial and its results, and that in footnote, the company even adds an explanation of the scoring indexes used.

However, the company only discloses quantitative information for the important endpoints. They are also unable to disclose adequate amounts of information when discussing the more specific details of a clinical trial. For instance, Galapagos mentions that "Efficacy signal were also observed for other endpoint" without explaining what these endpoints were and without sharing quantitative data of these endpoints. The descripting of negative results are rather vague and are not explained as thoroughly as the positive results.

A second problem for Galapagos is the fact that they seem to bundle the results of different trials when some of the trials do not have a positive outcome. One press release was identified where topline results of three trials were shared. Of these, one had a positive outcome, but the two others were unable to reach their primary endpoint. This raises the question: did Galapagos deliberately wait to present the negative results together with positive results, or did the topline results of these three different studies really all came in at the same time? This question could unfortunately not be answered by solely analysing press releases. Galapagos should however disclose this information as soon as these results were known, especially when the clinical trial failed.

A third, but less important improvement point for Galapagos, is that the company only shares information about the medicine itself and the indication. No information is shared discussing other treatments, the market size, *etc.* Galapagos also does not make any references to external reports or to reports of previous trials.

To conclude, both UCB and Galapagos publish press releases of high quality and are able to inform their investors about the key takeaways of the clinical trial. However, they fail to present the complete image: both companies should share all necessary data and discuss both the positive and negative aspect equally if they want to be identified as *best in class*.

COMPARISON — The FSMA Opinion seems to have had quite some impact on the press releases of Galapagos. The press releases used to be a lot more technical and therefore much harder to understand for investors. They would include a table with data in their press release without any further explanation. Sometimes, the medicines simply were referred to as a code, *e.g.,* "GLPG2737", without any explanation about this medicine or its working mechanism. Apart from the indication, no further contextual information would be given. We see great improvements in the press releases after the FSMA Opinion, using comprehensive language, disclosing both technical and non-technical information and also providing the investors with more contextual information.

The difference between publications of UCB before and after the FSMA Opinion is less evident. The older press releases were a bit more technical: a subtle shift in the language used since the FSMA Opinion makes the press releases more understandable for laymen-

investors. However, unfortunately, the problems that were identified for UCB's press releases, were already present before the FSMA Opinion and did not improve over time.

c. Failed the class – Nyxoah, Acacia Pharma and Oxurion

NYXOAH — Nyxoah failed the class as it is unable to provide investors with sufficient information. The press release mentions that the primary efficacy and safety endpoints are reached and that a significant reduction was measured on the Apnea Hypopnea Index, which served as primary endpoint. All the other endpoints are left undiscussed, and no information is given about other efficacy and safety results. Furthermore, no data is shared and no quantitative data can be found in the press release, even not for the significant reduction of the Apnea Hypopnea Index. The press release is also very one-sided and does not mention anything about possible side effects or other negative aspects. The contextual information is rather minimal and not very informative. The explanation of the trial itself on the other hand is complete and is much better compared to the explanation of the trial given when announcing the start of the trial.

ACACIA PHARMA — The press release of Acacia Pharma, just like Nyxoah, misses some key elements which are of upmost importance when disclosing trial results. Acacia Pharma, too, does not clarify what the primary and secondary endpoints are, does not include any negative information, and does not share any data. This all makes it almost impossible for investors to make an informed assessment of the success of the trial.

OXURION — Oxurion failed the class for the same reasons as discussed for Nyxoah and Acacia Pharma. As such, the press release contains an amount of information that is far from sufficient. Although Oxurion offers a bit of quantitative data and explains the positive outcome for two efficacy metrics, they fail to mention other crucial information about the trial. Again, no negative information has been provided. Oxurion also does not disclose how many patients are enrolled in the trial. Further research of other press releases about the same trial uncovered a presentation in which is mentioned that only 12 patients participated in this trial, of which three experienced drug related adverse effects. This information should definitely have been included in the press release. This press release of Oxurion predates the FSMA Opinion, and therefore it is possible that a new press release could be of a higher quality as we saw some great improvements for other companies as well.

Nyxoah, Acacia Pharma and Oxurion failed the class because they were unable to disclose a sufficient amount of information about the results of the trial, which makes it impossible for investors to form a complete and accurate picture of the clinical trial at hand. Failing both to disclose enough quantitative information and to discuss negative aspects of the clinical trial results, is a major point of improvement for these companies. Moreover, they also failed to provide the investor with sufficient information about the main features of the trial itself and provided little to no contextual information.

1.2. Presentation and publication results

DISTINCTION BETWEEN KNOWN AND UNKNOWN RESULTS — An important distinction needs to be made when analysing the press releases announcing the publication or presentation of results. There are two situations that occur. First, a company might already have published topline results of a clinical trial before and in this case, the announcement of the publication or presentation involves results that are already known to investors. The

requirements for these press releases are very different from those for the second situation. There, the press releases announcing the presentation or publication contain results that were never disclosed before. The later are press releases that disclose both a presentation or publication and topline results of a clinical trial at the same time.

PRESENTATION/PUBLICATION OF KNOWN RESULTS — For UCB, argenx, Galapagos, Oxurion and Nyxoah, press releases were identified that announced a presentation or publication of results that have previously been disclosed to investors. The key requirements for these press releases are the following: a short explanation informing the investors what data, results, *etc.* will be shared in the presentation or publication, and a link to the presentation or publication.

The press releases of the first four companies were all able to adhere to these requirements. When results of a previous trial are presented or published, the companies disclose these results in the same manner as they did in the previous press release of the topline results, or they provide a shortened version of the previous press release. Therefore, these press releases have the same strengths and improvement points as the topline results press releases of those companies. UCB however includes a lot more data when announcing a presentation or publication, the reason for which was explained above.

Nyxoah on the other hand does not disclose any information about what will be shared during the presentation.

Two improvement points for these press releases were identified during the analysis. The first one is to provide a link to the previous press release covering the topline results. If companies only provide a shortened version of these results, a link will enable investors to easily go back and examine the complete previously disclosed topline results. A second improvement would be to add a part in the press release that discusses new insights or new information. If the presentation or publication contains important information that was not yet made public, companies should disclose this information in the press release or at least give a clear indication to investors of where this information can be found. If they do not do this, investors need to go through a whole presentation or scientific publication to see whether new information is being shared, which does not add to the clarity of the information. Although these two improvement points are no absolute necessity for the press releases, they would add a lot of value for the investors.

PRESENTATION/PUBLICATION OF UNKNOWN RESULTS — Celyad, Biocartis and MDxHealth disclose their topline results only when a presentation or publication takes place. These press releases need to adhere to both the requirements for a publication of topline results and the requirements of an announcement of a publication or presentation.

The trials of these MedTech companies are quite different compared to a normal clinical trial investigating efficacy and safety of a possible new drug. Therefore, the GPs cannot be applied as strictly as for the other companies. For these MedTech companies, press releases are assessed on an individual basis, whilst keeping the general requirements of the FSMA Opinion in mind.

Biocartis' press releases and those of MDxHealth are of high quality. All key elements are disclosed, such as a short explanation of the trial together with an explanation of the results, backed up by quantitative data. No real negative information is presented in the press release, but as both companies are developing a diagnostic test and not a drug, it

might be possible that no adverse effects were present. The contextual information given by Biocartis and MDxHealth is also very complete and covers all elements discussed in the GPs. Furthermore, Biocartis makes references to external reports which enables investors to verify information such as the market size and indication information. This is something MDxHealth does not do. Last, both companies provide links to the publications or presentations.

Celyad failed one of both aspects. The disclosure of results of the clinical trial is worse than the ones of Nyxoah and Acacia Pharma. The only information that is given about the progress of the trial are some key takeaways concerning the efficacy of the drug. The language used, however, is very technical and hard to understand. On top, no quantitative data is shared in the press release, nor is there any information given about the trial itself or about the indication or other contextual information. Celyad does provide a link to the presentation. The press releases published by Celyad before the FSMA Opinion contain the same issues and no clear improvements were made.

1.3. Post-hoc Analysis

Press releases disclosing a post-hoc analysis published before the FSMA Opinion of Mithra and Galapagos were selected. The results are presented in the same manner as their topline results and therefore have the same characteristics and points of improvement. The most important aspect of these press releases is to clearly state what new developments or insights were acquired in the post-hoc analysis. This is done very well by both companies. An improvement for these press releases however could be to add a reference to a previous press release in which the topline results were shared. This improvement point has already been identified before.

1.4. Conclusion

There are huge differences between the press releases disclosing topline and intermediate results of the different biotech companies. Argenx, Sequana Medical, Mithra, TheraVet and Bone Therapeutics are the 5 companies selected as *best in class* as they were the only ones able to provide a complete and clear image of the trial results and covered both the positive and negative aspects of the trial.

UCB and Galapagos were classified as *good enough* because they were able to correctly inform investors of the main results of their clinical trial. However, these companies could provide a more in-depth and complete analysis of their results.

Nyxoah, Acacia Pharma and Oxurion *failed the class* as they were unable to provide adequate information on multiple key elements of the press release. Celyad, that discloses its topline results only when a presentation is announcement, failed for the same reason. Biocartis and MDxHealth, on the other hand, publish their topline results together with a presentation and do this very well.

During the analysis, multiple points of improvement were identified. Three major ones are already mentioned in the FSMA Opinion. The first one is to clearly state what the primary and secondary endpoints are and (in the summary) whether they were met or not. A lot of companies seem to be unable to do so. The second one is that companies should disclose both positive and negative aspects of the trial in the same way. Except for

the *best in class* companies, all companies failed to do so. The third one is to make a reference to a previous press release when discussing results of a previous trial.
An additional point of improvement would be to provide an explanation when a certain index or scoring system is used.

One extra improvement point was identified for the press releases announcing a publication or presentation of results. In the post-hoc analysis press releases, it is always clearly stated what new insights were required. We believe that if a publication or presentation contains new information or new insights, this should also be clearly disclosed in the press release itself.

This press release category has probably been influenced the most by the FSMA Opinion. Even though the Opinion did not have a significant impact on all companies, some companies nevertheless made some great improvements. Companies that were already publishing press releases of high quality performed slightly better after the press release, such as Sequana Medical and Mithra. However, companies such as argenx and Galapagos, that did not publish press releases of very high quality before, seem to have paid close attention to the FSMA Opinion and accordingly have made great strides. The three aspects on which the FSMA Opinion had the biggest impact, are the use of comprehensive language, the disclosure of both positive and negative aspects of the clinical trial and contextual information. It is, unfortunately, also clear that some companies, such as Acacia Pharma and Celyad, adhere to FSMA's requirements to a very subordinate degree.

2. Clinical trial updates

INTRODUCTION — The category clinical trial updates include all press releases covering trial updates such as the beginning of a trial, when a first patient is treated, updates on patient recruitment, the completion of the recruitment process, *etc*. A distinction is made between these press releases and the press releases covering negative news, such as when a trial is put on hold, the termination of a trial and a trial delay, given their different nature and accordingly different ways to be disclosed.

Press releases were identified for the following companies:

- **Clinical trial updates**
  - Galapagos, Bone Therapeutics, Mithra, Celyad and Oxurion (*pre* and *post* FSMA Opinion);
  - DMS Imaging (*pre*); and
  - Hyloris, Sequana Medical, Onward Medical and TheraVet (*post*).

- **Clinical trials on hold/delayed/terminated —** This category is discussed separately under the section "Negative news".
  - Galapagos and Bone Therapeutics (*pre* and *post*);
  - UCB (*pre*); and
  - Oxurion (*post*).

2.1. Clinical trial updates — general

a. Best in class — Galapagos, Hyloris & Sequana Medical

GALAPAGOS — Galapagos' press releases providing clinical trial updates on both the start of clinical trials and of patient recruitment, are of very high quality and meet all mandatory requirements. Every press release starts off with a clear title and summary, the latter provided when a press release exceeds a one-page threshold. This is then followed by a comprehensible explanation of the study in which more technical and scientific terms are explained. One example of this is the following. Other biotech companies will test "safety and efficacy" without a clear explanation of what exactly will be measured and how efficacy or safety will be determined. Galapagos on the other hand provides a clear explanation of everything that is included in their safety analysis:

"*Secondary and exploratory objectives include effectiveness, evaluation of the effect of filgotinib on patient reported outcomes (PROs) including on pain, fatigue and work productivity, rate of adverse events (AEs) and serious adverse events (SAEs) as well as adverse events of interest, including serious and opportunistic infections (including herpes zoster), major adverse cardiovascular events (MACE), venous thromboembolism (VTE), hyperlipidaemia, malignancies, non-melanoma skin cancer (NMSC), and gastrointestinal (GI) perforation.*"[85]

These explanations make the press releases understandable for investors both with and without scientific knowledge. Moreover, the press release explains the clinical trial very clearly. To provide an investor with even more detail, a link is included to ClinicalTrials.gov where an official report of the trial can be examined and where more in-depth information can be found.

As a bonus, Galapagos provides contextual information of high quality. There is an "about" section included about the medicine itself explaining its working mechanism, the current approval for another indication and its advantages compared to other treatments. This section is followed by an "about" section on the indication, the study and the company. All these sections provide a lot of relevant information and are backed up by sources which are also referenced in the press release. This adds a lot of credibility to the press release and allows the investor to conduct further research.

While providing this much information, Galapagos is still able to remain nuanced and always mentioning the following in their press releases: "*GLPG1972/S201086 is an investigational drug candidate and its safety and efficacy have not yet been established*"[86]. This reminds (possible) investors that the drug is still in its development stage and that its success is not 100% guaranteed.

HYLORIS — A second company that is classified as *best in class* is Hyloris. Only one press release since the FSMA Opinion met our quantitative criteria, but this press release has all the characteristics that were just mentioned for Galapagos.

SEQUANA MEDICAL — The third and final company in the *best in class* category is the MedTech company Sequana Medical. The company also provides a clear explanation about the clinical trial disclosing all mandatory characteristics and can be held to the same standards as Hyloris and Galapagos. Sequana Medical however can improve the offering

[85] https://www.glpg.com/press-release/2094/galapagos-announces-first-patient-enrolled-in-filosophy-study-to-advance-understanding-of-jyseleca-filgotinib-effectiveness-and-safety-in-a-real-world-setting.
[86] https://servier.com/wp-content/uploads/2018/06/PR_Servier_Galapagos_Roccela-2018-6-26.pdf.

of contextual information, but as this is not the most important part of a clinical trial update, Sequana Medical is still considered *best in class*.

To conclude what makes these companies different from the others, is a perfect explanation of the trial, explaining the scientific terms and, in the case of Galapagos and Hyloris, offering detailed, relevant contextual information based on outside sources.

POINTS OF IMPROVEMENT — One improvement that could still be made by these three companies is referring to previous trials performed by the biotech companies themselves. In these press releases there is often a sentence comparable to: "Efficacy was proven during a previous trial where a certain index improved with 2 points". Without explanation about the trial itself, it is impossible to judge the significance of this result as for example this might have been the outcome of a trial with a very small patient pool. It is understandable that giving a full explanation of a previous trial in a press release about a new trial is not feasible, but the biotech company could make a reference to a previous press release where a full explanation and result analysis of the previous trial can be found.

COMPARISON — Galapagos was already quite successful at meeting most key requirements. On top of that, the company made great improvements in mentioning contextual information since the FSMA Opinion. Although contextual information is not as important as other more essential parts of these press release, it still adds a lot of value for investors.

b. Definitely good enough — Bone Therapeutics, Mithra, Oxurion and TheraVet

Bone Therapeutics, Mithra, Oxurion and TheraVet all publish press releases disclosing the start of clinical trials and updates on patient recruitment which meet most key requirements. This part of the analysis will not mention all the characteristics that were met by the press releases of these companies to prevent repeating what has been mentioned under the *best in class* category. Rather the differences in comparison to the *best in class* companies will be discussed.

POINTS OF IMPROVEMENT — Bone therapeutics, Mithra, Oxurion and TheraVet give a structured and understandable explanation of the experiment but fail to mention secondary endpoints. Primary endpoints are sometimes mentioned, sometimes not or are mentioned very vaguely, *e.g.,* "*safety and efficacy will be evaluated*". This is a decent start, but biotech companies should provide more in-depth information (*e.g.,* how efficacy will be evaluated). These endpoints are one of the most important parts of the trial design and vital to judge the success of a trial afterwards. Therefore, endpoints should always be communicated to investors.

A second point of improvement for these companies is that although most of their press releases are well explained and understandable, they sometimes use an index or scoring that is not clear and interpretable for an investor. For instance, Oxurion provides a primary endpoint such as "an improvement of *best-corrected visual acuity* (BCVA)". This scale is introduced in the press release without any further explanation. Most of these scoring systems are used to measure efficacy or safety as primary or secondary endpoint and are usually disease specific. Consequently, these are not part of basic knowledge of an investor. As they are used to determine the efficacy of a substance and hence are vital to judge if and understand why a clinical trial was a success, they need to be explained more clearly to investors.

Press releases of companies in this class contain contextual information, but this part is usually a bit shorter than the *best in class* press releases and contains less information.

The press releases of Bone Therapeutics and Oxurion do not contain any references to external rapports or previous studies. Mithra on the other hand does provide references to external sources and provides a link to the external ClinicalTrials.gov report. TheraVet scores the lowest in this regard as they do not offer any contextual information. However, this is not the most important element of these kind of press release, and as they were able to give a sufficient explanation of the trial together with clear next steps and timing, they are still considered good enough. TheraVet also used more technical language compared to the other companies and its press releases are sometimes more difficult to comprehend.

One sidenote we do want to make is that TheraVet also published a press release announcing the start of a clinical trial which was not labelled. The difference between the two press releases is astonishing. The unlabelled press release contains almost none of the required information and would definitely fail the class.

In order to get promoted to the *best in class* category, these companies will have to follow the requirements of the FSMA Opinion more strictly. More specifically, they should address all key elements of the clinical trials in their press release, especially the primary and secondary endpoints. While doing so, they should also explain the indexes and scoring methods used during these trials. Additionally, improvements could be made in the contextual information offering.

COMPARISON — Bone therapeutics, Mithra and Oxurion did not make huge improvement after the FSMA Opinion although we do see small improvements in contextual information. The problems identified in the press releases since the FSMA Opinion were already present before the publication of the Opinion. Overall, these companies published decent press releases before the FSMA Opinion and continue to do so now.

c. Failed the class — Celyad, DMS Imaging, Onward Medical & Nyxoah

CELYAD — Celyad's press releases covering clinical trial updates miss some crucial elements and as a result do not inform their investors correctly about clinical trials in process. The size of the trial, possible randomising, the primary and secondary endpoints are not mentioned in the text. There is a link to clinicaltrials.gov where an investor can find more information, but these key elements should be mentioned in the press release itself. The summary does not reflect the most important information in the press release and contextual information is also very minimal. The indication and the drug mechanism are mentioned but are explained with very technical and hard to understand terms. Unfortunately, the press releases before the FSMA Opinion publication were also not informative enough. The company could follow the guidelines more strictly and hereby improve the quality of their press releases significantly.

DMS IMAGING — DMS Imaging (previously ASIT biotech) publishes press releases with the same characteristics as Celyad. These press releases do not contain enough information about the key elements of the clinical trials, use very technical terms and do not offer a lot of contextual information. There is also no link to an external report so investors cannot retrieve this information elsewhere. The press releases of DMS Imaging, covering a clinical trial start and patient recruitment updates, were published before the FSMA Opinion. Because of the strategical change of ASIT Biotech, there will probably not be any press releases of this kind in the future. Therefore, this company might not be as interesting for this analysis.

One aspect Celyad and DMS Imaging do well, and which we also saw for all other companies, was the ability to explain when the trial would be completed and when investors could expect results.

ONWARD MEDICAL AND NYXOAH — Press releases of MedTech companies Onward Medical and Nyxoah are quite comparable to the press releases of DMS Imaging and as a result also miss a lot of important information. The fact that these are MedTech companies should not affect their press releases covering clinical trials as we saw that Sequana Medical, another MedTech company, was identified as *best in class*. Onward medical does not even present information about when the trial could come to an end or when results should be published.

2.2. Negative news — Oxurion, UCB, Bone Therapeutics & Galapagos

Analysis showed that press releases covering clinical trials meet most of the FSMA's requirements and are able to, at least, paint a semi-accurate picture for investors. Unfortunately, the same cannot be said for press releases containing negative news about the clinical trials.

A first and very clear problem is that the biotech companies do not mention negative news in their press release titles. Oxurion uses the title "*COVID-19 Statement*" to inform investors about patient recruitment delays. UCB gives an "*update on phase on Phase 2b padsevonil safety and efficacy study in epilepsy*" to mention that a clinical trial has been terminated because no statistically significant efficacy will be reached. Bone Therapeutics, too, does not use a title that accurately represents a trial termination in both press releases. (The press release of UCB was published before the FSMA Opinion and UCB did not publish a trial termination press release since).

The reason why a trial is terminated is explained by all companies, however actual data is never shared. Of course, it is more desirable that a company publishes the announcement of a trial termination as fast as possible and does not delay this announcement to collect and process data. It should however be a good practice to release this data afterwards, especially if other trials are active with the same substance, like was the case for UCB and Bone therapeutics. Besides this, Bone therapeutics gave a clear explanation about the reason for termination and its effect on other trial I studies both pre and post FSMA Opinion. The press release of UCB however did not contain any useful information.

Galapagos published trial termination press releases before and after the FSMA Opinion. Both were of the same high quality as their press releases providing trial updates. Negative news was already mentioned in the title, they also provided a clear explanation for the underlying reason for the termination and explained its effect on other trials. Again, even though these decisions were based on (interim) results, these results were never shared with investors.

2.3. Conclusion

Most biotech and MedTech companies publish press releases covering clinical trials updates that do meet the requirements of the FSMA. Four companies (Nyxoah, Onward Medical, Celyad and DMS Imaging) do not reach these standards and could improve a lot. The most frequent working point for the biotech companies is stating the primary and secondary endpoints. When they do state these endpoints, more explanation is needed for investors to understand them.

A bonus would be if companies could always make a reference to the official report of a trial, for example on ClinicalTrails.gov. An extra bonus would be to refer to previous trials if results of these trials are being discussed.

Although most positive press releases meet the requirements of the FSMA, the press releases containing negative information can still improve a lot. The title often does not correctly inform an investor of the situation. The explanation of why a trial was terminated is sometimes stated very clearly but other times no explanation is given. The quality of press releases containing negative information is something the FSMA should keep on monitoring in the future.

The publication of the FSMA Opinion seems to have had a small impact on press releases of this category. Companies that were already aware of certain guidelines and were performing well, are now performing at the same standard or slightly better. In these press releases the most significant improvements were made in the disclosing of contextual information

3. Authority communications

ANALYSED PRESS RELEASES — In this section, the press releases related to interactions with authorities are analysed, such as authority approvals and authority communications. A distinction is made between these press releases and the press releases covering negative news, such as authority approvals that are delayed and authority approvals that are not granted, given their different nature and accordingly different ways to be disclosed.

Press releases were identified for the following companies:

- **Authority approval**
  - Hyloris and UCB (*pre* and *post* the FSMA Opinion);
  - Acacia Pharma and Mdx Health (*pre*); and
  - Mithra, argenx Biocartis, Nyxoah (*post*).

- **Authority communication —** This category operates as a residual category, capturing all the press releases that do not belong in the other three categories.
  - UCB, Acacia Pharma, Sequana Medical (*pre* and *post*);
  - Celyad, Bone, Galapagos, DMS Imaging (*pre*); and
  - Mithra, Hyloris, argenx, Oxurion (*post*).

- **Authority approval delayed —** This category is discussed separately under the section "Negative news".
  - Mithra (*pre* and *post*).

- **Authority approval not granted —** This category is discussed separately under the section "Negative news".
  - Galapagos (*pre*).

For IBA, DMS Imaging, Onward Medical and TheraVet, no press releases are analysed, as none of the press releases of these companies met the inside information criteria.

3.1. Authority approvals and communications

a. Best-in-class — UCB

GOOD PRACTICES — UCB is the textbook example of how to draft press releases related to authority communication. The main reason why UCB qualifies as *best in class*, is that the scope of the approval is set out detailed and extensively, for instance by specifying in which European countries the approval is valid[87], mentioning that the FDA also granted pediatric exclusivity for the product[88] or other details[89]. It is true that it is in the interest of the company itself to disclose this (positive) information, however this information also benefits (potential) investors. Moreover, some next material steps are described, such as in which other countries approvals are expected[90]. It is even specified which step preceded the approval.[91]

Next to these essential and well-executed disclosures, UCB distinguishes itself by the fact that overall, the essence of the press release is clear and comprehensive: investors understand the core message, which is not concealed by an overload of technical information, while at the same time providing a sufficient amount of technical and detailed information. For instance, the clinical trials are explained extensively, including amongst other p-values and other quantitative information and clinical details.[92] Moreover, a link to clinicaltrials.gov is provided, which facilitates results from clinical trials for investors if they would like to examine the study more in-depth.

Another strong point is the disclosure of contextual information: information about the condition[93], about the alternative treatments[94], "about" sections and a large number of sources are present. UCB also mentions the target market[95], something other companies rarely do. Almost every statement UCB makes about a scientific subject is backed up with studies, referenced to in footnotes and/or explicitly in the text[96]. This adds a lot of credibility to their press releases and allows investors to conduct further research. The sole (minor) point of improvement for UCB is to inform investors better about the competition for the product concerned.

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[87] *"The approval from the European Commission is valid in all 27 member states of the EU, as well as Iceland, Liechtenstein, and Norway."*

[88] *"(…) Additionally, the FDA has granted pediatric exclusivity for the product.[7]*

[89] *"(…) announced that FINTEPLA® (fenfluramine) oral solution CIV has been approved in the United States, by the U.S. Food and Drug Administration (FDA) for the treatment of seizures associated with Lennox-Gastaut syndrome in patients two years of age and older.[1] (…) It is already approved for the treatment of seizures associated with Dravet syndrome in patients two years of age and older in the US and EU.[1,8] Fenfluramine for LGS is available in the US through a restricted distribution program, called the Risk Evaluation and Mitigation Strategy (REMS) Program."*

[90] *"Bimekizumab is currently under review by the U.S. Food & Drug Administration (FDA) for the treatment of adults with moderate to severe plaque psoriasis. Regulatory reviews are also underway in Australia, Canada, Great Britain and Japan. "*

[91] *"The European Commission approval follows a positive opinion granted in June 2021 by the European Medicines Agency's Committee for Medicinal Products for Human Use."*

[92] *"The FDA approval was supported by safety and efficacy data from a global, randomized, placebo-controlled Phase 3 clinical trial in 263 patients with LGS (age 2-35 years), which demonstrated that fenfluramine at a dose of 0.7/mg/kg/day significantly reduced the frequency of drop seizures compared to placebo (p=0.0037). Nearly a fourth of those patients on fenfluramine 0.7 mg/kg/day experienced a ≥50% reduction in drop seizure frequency per 28 days; 18% with >50 to <75% reduction and 6% >75% reduction.[1] The common adverse reactions that occurred in patients treated with fenfluramine (incidence at least 10% and greater than placebo) were diarrhea; decreased appetite; fatigue; somnolence; vomiting.[1] The fenfluramine safety database includes long-term cardiovascular safety data for patients treated for up to three years in DS and LGS.[1]"*

[93] *"LGS is a severe childhood-onset developmental and epileptic encephalopathy (DEE) characterized by drug-refractory seizures with high morbidity[4] as well as serious impairment of neurodevelopmental, cognitive, and motor functions.[5] (…) LGS has far-reaching effects beyond seizures, including issues with communication, psychiatric symptoms, sleep, behavioral challenges, and mobility.[9] Additionally, sudden unexpected death in epilepsy (SUDEP) is a major concern for people living with LGS.[10]"*

[94] *""LGS is one of the most challenging epileptic encephalopathies to treat, and the vast majority of patients are not well controlled, despite a regimen of multiple antiepileptic drugs," said Kelly Knupp, M.D., MSCS, FAES, Associate Professor, Children's Hospital Colorado, USA. "As a complementary therapy, fenfluramine offers a different mechanism of action and demonstrated ability to significantly reduce the number of seizures associated with a drop, a critical measure for managing this severe form of epilepsy.""*

[95] *"LGS affects an estimated 30,000 – 50,000 patients in the U.S.[6]"*

[96] *"Full findings from the Phase 3 BE READY and BE VIVID studies are published in The Lancet, and the results of the Phase 3 BE SURE study are published in The New England Journal of Medicine.[5,6,7]"*

COMPARISON — Incidentally, it is remarkable how UCBs disclosure practices have evolved over time. Both regarding "authority approval" and "authority communication", a comparison between *pre* and *post* the FSMA Opinion was possible. In general, the disclosure practice is better in the press releases published after the Opinion on several aspects. First, more information about next steps is provided. Next, the recent publications contain a summary, which is not the case in the *pre-Opinion* publications. A third improvement is that there are footnotes provided referring to the studies that led to the approval. Last, there is much more contextual information on the product, the control group and how the product fills a gap.

b. Definitely good enough — argenx, Bone Therapeutics, Biocartis, Galapagos, Mithra, Hyloris, Acacia Pharma, Nyxoah, Oxurion, MDxHealth

For the category *definitely good enough*, it should be emphasized that these companies' disclosure practices generally pass the quality threshold, however the difference with UCB is that for each of these companies, several (often minor, contextual) points of improvement can be identified. If these companies would implement these small improvements, they would qualify as *best in class* as well. First, the good disclosure practices are discussed, whereafter the points of improvement are pinpointed.

GOOD PRACTICES — These companies did not *fail the class,* because they, just like UCB, display the excellent practice to explain the scope and implications of the authority decision at stake. For instance, Galapagos explained what a CHMP opinion implies exactly[97], which makes the press release much more comprehensive for laymen-investors. Acacia Pharma, too, explains the scope of approval[98] or elaborates on what exactly is communicated in order for investors to fully understand what is happening (*e.g.,* it is explained what scheduling by the DEA means[99]), which Nyxoah (FDA's Breakthrough Designation Program[100]) and argenx (validation of MAA[101]) do as well. Oxurion's detailed explanation on the implications of the patents[102] or Biocartis' explanation of 510(k) clearance[103] is strong, too.

On top of this, the press releases of these companies contain a clear outlining of a future plan. Mithra, for instance, displays an excellent future outline ("*The commercial launch of Estelle® in Europe will be phased during the second half of the year, starting with Germany, Austria and Poland"*), just like Galapagos[104] or Acacia Pharma[105]. Hyloris, too, describes future plans thoroughly, *e.g.,* relevant commercial partnerships and exact

[97] *"The CHMP positive opinion is a scientific recommendation to the European Commission to grant marketing authorization in Europe."*
[98] *"The approval for BARHEMSYS covers the treatment of PONV in patients who have received antiemetic prophylaxis with an agent of a different class or who have not received prophylaxis and the prevention of PONV, either alone or in combination with an antiemetic of a different class."*
[99] *"This designation is the schedule for drugs with a low potential for abuse and low risk of dependence and is consistent with that granted to many other benzodiazepine drugs, including midazolam and diazepam (Valium®)."*
[100] *"The FDA's Breakthrough Designation Program was created to help patients and healthcare providers receive faster access to innovative technologies that hold the potential to provide more effective treatment of irreversibly debilitating diseases or conditions. (…) Under the Program, the FDA will provide the Genio® system with priority review and interaction with FDA's experts throughout the premarket review phase until the product is commercialized in the US."*
[101] *"Validation of the MAA confirms that the application is sufficiently complete to begin the formal review process."*
[102] *"Patents EP3613739 and US10703752 were issued in November 2020 and July 2020 respectively, and expire in 2039, with possible patent extensions of up to 5 additional years (2044). An international application is still pending."*
[103] *"Section 510(k) of the Food, Drug and Cosmetic Act requires device manufacturers who must register, to notify FDA of their intent to market a medical device at least 90 days in advance. This is known as Premarket Notification - also called PMN or 510(k)."*
[104] *"The CHMP positive opinion will now be reviewed by the European Commission, which has the authority to authorize medicines in the 27 countries of the European Union, Norway, Iceland, Liechtenstein and UK. A Commission decision is expected in the third quarter of 2020."*
[105] *"We are on target with our commercial preparations and expect to launch BARHEMSYS in the second half of this year."*

timing[106], which constitutes interesting information from an investor's point of view. Biocartis, however, could have provided an estimated timing of the next material step, *i.e.,* commercial roll-out in the US.

Overall, these companies succeed in balancing technical and non-technical information, the latter never concealing the core message. The essence remains comprehensive for investors, which in the end, is what matters. Other good practices of some companies consist of the reservations they make, *e.g.,* Galapagos[107] or Acacia Pharma[108], and the valuation of the market by Mithra[109] (that is however not backed by a source). Last, these companies also provide a rather extensive explanation of the clinical trials concerned.

POINTS OF IMPROVEMENT — However, there are a few points in which these companies still can improve, although one has to keep in mind these merely relate to contextual information and hence do not touch upon the essence of authority communications, being the scope of the decision and the next steps. As such, it is observed that rather often, information on the target market (size and trends) and competition lacks (*e.g.,* argenx[110], Acacia Pharma, Galapagos, Oxurion, Hyloris). This constitutes, however, interesting information from an investor's point of view.

Next, the majority of companies do not back up statements with sources, nor provide links to studies (*e.g.,* argenx (very limited), Mithra, Bone Therapeutics, Acacia Pharma, Sequana Medical, Oxurion, MDxHealth). In some cases, this could really add significant value to statements though.[111] On the contrary, Biocartis, for instance, does this very well: numerous footnotes are present to back up statements (*e.g.,* a study on conventional treatment techniques), to explain technical terminology (*e.g.,* host-response test) or links referring to own studies or past press releases.

Another point of improvement is that companies sometimes tend to report in a rather subjective, speculative or vague way. One press release from Oxurion, for instance, states that *"THR-687 is a potential best-in-class small molecule pan-RGD integrin antagonist being developed to treat DME holding potential of becoming the standard of care for DME patients."* The wordings "potential best-in-class" and "holding potential of becoming the standard of care for DME patients" seem rather presumptuous, certainly given the product concerned just passed Phase 1. Another case is the title of a press release of Hyloris, which comes across relatively vague: *"Hyloris Announces Further Extension of Maxigesic® IV Footprint."* It is difficult for an investor to accurately deduct the scope of the press release based on this title. On top of this, it is meant with "footprint" that regulatory approval is received in only two countries, which thus could have been easily implemented in the title.

[106] *"Kyongbo Pharmaceuticals Co., the licensee for the South Korean market, is now gearing up to commence sales in early 2022. The licensee for Panama, Pharma Bavaria International, which has a license agreement for Maxigesic IV in 17 countries in Latin, Central America, and the Caribbean, is planning to launch the product later this year in Panama."*
[107] *"Filgotinib is an investigational agent and is not approved for use by any regulatory authority."*
[108] *"It should be noted that BYFAVO may not be marketed in the US until the Drug Enforcement Administration has determined its scheduling under the Controlled Substances Act, which is expected to take place within the next few months."*
[109] *"Currently, the total European contraceptives market is valued at approximately EUR 2.4 billion annually."*
[110] However one could see in this an indication of the target market: *"These patients represent approximately 85% of the total gMG population[1]."*
[111] For instance, references in the following statement of MDx Health (no sources provided) would facilitate further research for investors tremendously: *"Studies have shown that the test can reduce the need for unnecessary invasive biopsies and MRI procedures by up to 50%. A prospective clinical utility study recently published in the journal Urology Practice clearly demonstrated the value of SelectMDx in guiding urologists with their initial prostate biopsy decision-making. Similarly, a US based study published in the Journal of Urology assessing the cost-effectiveness of SelectMDx projected potential annual healthcare cost savings of over $500 million."*

Sometimes, the summary is too brief or even inexistant (*e.g.,* Nyxoah, Biocartis). One could argue these press releases are very short (approximately one page), which would make a summary redundant. However, a summary still helps investors to quickly capture the essence of the press release (even if it is only one page long). Particularly in the case of inside information, such a rapid understanding of a press release is important.

Last, Hyloris' reporting shows some inconsistency: in one press release, the company fails to provide extensive information on the actual product for which the approval has been obtained, just like the condition, competition and "about" sections (only an "about" section about Hyloris is present). In another press release, however, Hyloris discusses the main characteristics of the clinical trial and covers the condition and the product itself extensively. There is even a detailed "about" section about the condition. These elements are then accompanied by references to sources where preferable.

COMPARISONS — Three comparisons between press releases *pre* and *post* the FSMA Opinion were carried out (Hyloris, Acacia Pharma and Sequana Medical). It can be concluded for Hyloris and Acacia Pharma that the way of disclosing information *post* Opinion does not differ much from *pre*. The only remarkable difference is that for Hyloris, the summary is far more clear *post* Opinion: both an explanation on the product and the countries of approval are provided there, whilst the summary of the *pre-Opinion* press release solely mentions a commercialization timing. For Sequana Medical, a sound comparison between the two publications is difficult given the strongly differing content of the two publications.[112] However, apart from this content conflict, also for Sequana Medical, the press release *pre* as well as *post* contains every required element, and overall, the information is provided in a structural, clear and comprehensive manner.

c. Failed the class — Celyad

Celyad, in our view, failed the class. Contrary to the press releases discussed above, Celyad's publication does not meet the quality threshold. Positive is that the core message is clear from the title and first alinea, *i.e.,* an FDA approval of an application. However, in the remainder of the article, unlike the other companies, Celyad fails in balancing between technical and non-technical information: the explanation of the condition and product are not comprehensive for investors because of overly technical terminology. On top, the main characteristics of the trial are not discussed at all. Contextual information is poor: only the product and the condition are touched upon briefly. The targeted market, competition, "about" sections and sources all lack. Last, an explanation on the scope of the application acceptance or an estimated timing would have been interesting but is missing as well.

3.2. Negative news — authority approval delayed or not granted

Previous analysis showed that most companies reported the authority communication in a sufficiently accurate, clear and comprehensive manner. This is not the case for the disclosure of negative news, which is why this is covered in a separate section. Only two companies published authority communications containing bad news, which are discussed hereafter separately in order to accurately uncover issues that are category specific.

[112] Indeed, the *pre* release relates to an IDE approval from the FDA to start a pivotal study, while the *post* release is about a MDSAP certification. In the latter, information about trials or contextual information about products or conditions is not relevant.

AUTHORITY APPROVAL DELAY — Mithra published two press releases on the delay of an authority approval (both *pre* and *post* Opinion). For both press releases, the main point of improvement is the title, which is, in our view, somehow misleading. Both titles simply mention that Mithra announces *"an FDA update"* on the relevant products, while in fact, it concerns negative news. An investor solely reading the title on the website of Mithra is not informed well about the real gravity of the content of the press release, as the title provided can be interpreted in multiple ways (both positive and negative). Another point of improvement relates to the contextual information, being lack of an explanation about the condition. Also, links to, for instance, the concerning studies are missing (the only sources provided are to back up the estimated market potential). Positive in both press releases is the ratio technical/non-technical information, whereby the essence of the message remains clear. Moreover, the next material step and timing is mentioned.

COMPARISON — A comparison between press releases *pre* and *post* Opinion was possible. Overall, it can be stated that the FSMA Opinion did not influence the disclosure practice of Mithra regarding approval delays. The analysed press release *post* Opinion even scores worse than *pre*. This lower score is caused by the fact that *post* Opinion, the press release contains much less of additional contextual information. The competition, nor an "about" section about the product are present and were both discussed *pre* Opinion. In general, the press release *post* Opinion is far shorter, which causes the content to be less comprehensive and informative for investors. Another difference is that *post*, there is no summary.

AUTHORITY APPROVAL NOT GRANTED — Galapagos published one press release on an approval that has not been granted (*pre*-Opinion). In this press release, information is disclosed in a substandard manner, possibly due to the negative character of the news, *i.e.,* a CRL of the FDA implying that the review cycle for an application is complete and that the application is not ready for approval in its present form. First, the title of the press release states the following: *"Galapagos announces that Gilead received a complete response letter for filgotinib for the treatment of moderately to severely active rheumatoid arthritis."* Apparently, when one reads the press release further and/or looks up online what a *complete response letter* implies, this means that *"the FDA issues CRLs to indicate that the review cycle for an application is complete and that the application is not ready for approval in its present form."* Despite this concept is known when familiar with the biotech industry, one could argue that it cannot be expected from a (layman-)investor to know the meaning of a CRL. Therefore, this title could be somehow misleading, or at least concealing the negative character of the content of this press release. On top, there is no summary. Also, the remarks of the FDA are explained only very briefly[113], the next step is formulated vaguely[114] and no estimated timing is provided. Contextual information and information about the studies concerned is poor, however one should take into account that it could be the case that the company focused on a timely disclosure rather than providing extensive explanations that in fact can be found on clinicaltrials.gov, to which they indeed provide a link.

[113] *"The FDA has requested data from the MANTA and MANTA-RAy studies before completing its review of the NDA. The MANTA and MANTA-RAy studies are designed to assess whether filgotinib has an impact on sperm parameters. The FDA also has expressed concerns regarding the overall benefit/risk profile of the filgotinib 200 mg dose."*

[114] *"We are disappointed in this outcome and will evaluate the points raised in the CRL for discussion with the FDA. We continue to believe in the benefit/risk profile of filgotinib in RA."*

3.3. Conclusion

It can be concluded that in general, all the analysed companies, except for Celyad, report authority communications in a clear, comprehensive and structural manner, whereby the essence of the authority communication is clear. UCB is the leading example. Several other companies also succeed in describing the scope of the authority decision or providing information on the next material steps. However, these companies are classified as *definitely good enough* (and not *best in class*) because they fail to meet several less important good practices. For instance, some of the companies in this category do not provide certain contextual information, sources, or a summary. It could also happen that parts of the press release come across subjective or vague. Celyad's disclosure practice contains too much technical information, and the contextual information is poor, which results in Celyad *failing the class*.

The main conclusion regarding press releases on the delay or non-grant of an authority approval, is that the titles of these articles suddenly are much less clear, whereas this is never a problem for titles of press releases communicating positive news. Regarding the FSMA Opinion, it seems the impact thereof is rather limited for press releases about authority communications, except for UCB.

4. Partnerships

INTRODUCTION – The following section covers the press releases related to new partnerships focussing on research & development, new commercial partnerships aimed at the distribution and licensing of (newly developed) products, and the announcement of the end of a partnership. This analysis is subdivided in the analysis of press releases related to, respectively, R&D partnerships, commercial partnerships and the ending of a partnership.

Press releases were identified for the following companies:

- **Research & development partnership**
  - Mithra, UCB, IBA, and Galapagos (*pre* and *post* the FSMA Opinion);
  - argenx, Celyad, and Oxurion (*pre*); and
  - Biocartis, Hyloris, Bone Therapeutics, Nyxoah and TheraVet (*post*).

- **Commercial partnerships**
  - argenx and Bone Therapeutics (*pre* and *post*);
  - Mithra, IBA, Biocartis and MDxHealth (*pre*); and
  - TheraVet (*post*).

- **Partnership end**
  - Biocartis on the day of the FSMA Opinion.

4.1. Research & development partnerships

a. Best in class — Galapagos, UCB and Hyloris

GOOD PRACTICES — As for the *best in class* category, several companies stand out. The first biotech company which deserves the label as *best in class* is Hyloris. The press releases are of high quality, provide a lot of detail, but at the same time remain readable for an investor. Besides this, Hyloris delivers all the mandatory requirements. As such, the company already provides extensive information about the financial part of the deal and the reciprocal rights in its summary and heading. Moreover, the partner is discussed extensively in a separate "about" section. Additionally, Hyloris also provides significant contextual information about the disease like the amount of people suffering from it and the future evolutions the disease is believed to go through. The company also refers to third-party research as well as own clinical trials to provide the announcement with more credibility.

Galapagos also delivers all mandatory requirements, except for the elaboration on the candidate resource. This might come across as a default but given the nature of the deal and the extensive further elaboration on the financial details, the press release still qualifies as "best-in-class". Like Hyloris, the press release starts of strong in its heading and summary. As mentioned, the press release itself is very much focussed on the financial details of the agreement. Besides financials, Galapagos also elaborates heavily on the terms of the partnership, something that was not identified with other biotech firms. To provide an example, the cost splits are given, but also royalty divisions, and a breakdown of every single payment was provided for. As a bonus, Galapagos offers investors the opportunity to join a conference call and allows investors to discuss the partnership. A reason for this might be due to the high stakes and the amount of financial leverage this deal upholds for both Galapagos and its partner.

Another "best-in-class" biotech firm is UCB. Scoring again high on five of the six key points, UCB is at the same level as Galapagos. UCB does lack a description of the partner with whom they partner up with, but this does not affect the quality of the press release. A reason for it might be the partner being well-known in the sector and accordingly, the company might not need an introduction. Nevertheless, this objective was not met by UCB. The press release is also slightly less extensive on the financial side of the partnership in comparison with Galapagos but is still able to provide all necessary information for an investor to comprehend the key characteristics of the deal. The same reasoning can be pointed out for the reciprocal rights of both partners. UCB provides a sufficient explanation, but Galapagos is again more extensive. UCB does however provide a clear explanation of the candidate product around which the partnership is centred. This provides an investor with the necessary contextual information to make an informed decision on the quality of the stock. UCB is also clear on the material next step and provides an investor with a future time indication on when results may reasonably be expected. UCB also provides links to own and third-party research to provide additional data for an interested reader.

POINTS OF IMPROVEMENT – Identifying points of improvement for Hyloris is difficult. For the other two companies, points of improvement can be identified in the contextual information section. Even though these elements are not among the key elements, Galapagos and UCB could further improve the quality of their press releases by offering insights on the disease(s) their candidate product(s) are hoping to cure. To include the size of the patient range and a potential evolution in these trends can also be

recommended. For Galapagos, references could be included to back-up the facts mentioned in the press release. Also, a separate "about" section covering the candidate product is something on which the company can improve. Since previous trials are mentioned in the press releases, it could be another recommendation to provide links to previous completion of clinical trials for an individual wanting to know more.

COMPARISON – Galapagos continues its trend after the FSMA Publication. It now adds information on the disease and the candidate product, and they provide hyperlinks to external reports of governing authorities. Galapagos also remains "neutral": the press release analysed post Opinion also contains "bad news". The focus however remains balanced on the implications stemming from this news. Moreover, future additional data is provided for, and the company keeps the focus on the financials by providing a trial-by-trial description on the different money streams.

UCB also follows the same logic post FSMA Opinion. No clear differences were identified except for more added references. However, still no description of the partner is present. This remains a point of improvement.

b. Definitely good enough — Biocartis and Nyxoah

GOOD PRACTICES – The press release about the partnership start of Nyxoah scores high on several features. The reason for it not to qualify as "best-in-class" is the lack of financial information. The company provides the types of money streams in and out of Nyxoah, but unfortunately it does not quantify the size of these streams. Next to this, the quality remains high even though the press release is short. It provides the reciprocal obligations of both parties, the eventual goal of the partnership and elaborates on the partner. It provides contextual information about the disease and backs the necessary parts of the press release with references to external studies.

Biocartis also produces press releases of high quality. The most important aspect of partnerships remains however, the financial aspect. In only one of two press releases, some direct financial impact is given.[115] Other financial consequences are not disclosed. From the press releases, it is not clear how the revenues will be divided among partners, which partner will carry the costs, and in general how the partnership influences the financials of Biocartis. Except for the financial side of the deal, Biocartis provides press releases according to all standards, even including contextual information some *best in class* peers lack. This includes an explanation on the disease and trends the disease is likely to undergo. The company also provides a timing on the next material step to be undertaken. Additionally, the problems with current treatment are discussed. All of this is then backed with references to external sources adding to the credibility of the press release.

POINTS OF IMPROVEMENT – The most important aspect missing for the press releases of Nyxoah and Biocartis firms is the lack of financial data. For Biocartis also a summary can be included in the future. Nyxoah can improve on the contextual information section as well. To illustrate this aspect, the company provides information about the disease and the people suffering from it but remains superficial. All these elements can be explained in more detail by providing, for example, a separate "about" section on the disease and the trends it is likely to go through. Another identified issue for Nyxoah is the lack of details

[115] Only the investment in secured convertible notes of the partner is discloses.

on the candidate product itself. The reason for it might be the phase in which the agreement takes place: the press release is about future pre-clinical research of the Vanderbilt University. The same reasoning might go for the financial details of the deal although it should be clarified which amounts the parties owe to each other.

c. Failed the class — Oxurion, argenx, Celyad, IBA, TheraVet

GOOD PRACTICES — Besides financials, Oxurion provides key elements like the description of their partner, an elaboration on the candidate product and some of the reciprocal rights of both parties.[116] The company provides the goal of the partnership but stays on a technical level without explaining key features. This is what distinguishes them from the "Good enough" category.

Argenx provides investors with a summary in which the most important aspects are mentioned. Besides this, also the goal of the partnership is clearly mentioned, and the benefits for argenx are highlighted. Like argenx, Celyad explains the goal of the partnership and the benefits for the company. The company also provides investors with a date on which preclinical study results will be published. Celyad also provides an "about" section on their partner. Bone Therapeutics also provides below standard press releases. An aspect Bone Therapeutics does well is describing the goal and advantages of the partnership. Besides this, the partner is also discussed in detail. Good practices identified at IBA include the extensive description on the active ingredient in its candidate product, and the current problem with this ingredient which the partnership should help to overcome. Besides this, the goal of the partnership is provided for and a separate "about" section on the partner is included. Lastly, also the next material steps in the research are provided for.[117] TheraVet provides investors with non-sufficient press releases. They do provide a summary, mention the product(s) (but these are not explained) and provide an "about" section about their own company. Besides this, the goal and the benefits for the companies are included and described.

POINTS OF IMPROVEMENT – Like with the "good enough" category, Oxurion, argenx, Celyad, Bone Therapeutics, IBA and TheraVet all have in common that key financial data is missing. Whereas Oxurion still provides some information on the type of money streams coming in and out of the company due to the partnership[118], the others completely lack an indication on financials before the Opinion of the FSMA was published. Besides the superficial mentioning of financial details, Oxurion does not provide contextual information and a summary. Oxurion also does not provide explanations on technical aspects of their press releases.[119] The same goes for the disease itself: it is only explained in technical terms.[120] The average investor cannot draw conclusions from these sentences and accordingly, a proper explanation which provides clearance is advised. In combination with the fact that the provided information is too technical, further explanations on these

[116] Oxurion mentions: *"Oxurion will have an exclusive option to license in the heparanase inhibitor program".*
[117] IBA Mentions: "This strategic R&D partnership consists of an in-depth evaluation of the technical and economic feasibility of the project. Based on the outcome of this first phase, SCK CEN and IBA plan to undertake the construction and commissioning of a production unit on the SCK CEN site in Mol, Belgium."
[118] Oxurion mentions*: "Beta Therapeutics will receive an undisclosed upfront payment from Oxurion and is eligible to receive a payment upon exercising the licensing option, development, regulatory and commercial milestone payments, as well as royalties on net sales on the products developed under the partnership".*
[119] Oxurion mentions: *"Oxurion (…) announced today that it entered into a strategic research collaboration with Beta Therapeutics Pty Ltd (Canberra, Australia) to develop new heparanase inhibitors for the treatment of retinal disorders with large unmet medical needs such as dry age-related macular degeneration."*
[120] Oxurion mentions: *"Heparanase is an endoglycosidase playing an important role in modifying the extracellular matrix and in inflammatory processes. Over-expression of heparanase occurs under pathological conditions resulting in detrimental changes in the extracellular matrix and tissue micro-environment. In the retina, heparanase has been implicated in Diabetic Retinopathy (DR) and potentially in Age-related Macular Degeneration (AMD) pathogenesis."*

technical data are missing. All the above concludes that Oxurion's press release is not sufficient and again, an investor cannot base its investment decisions on this press release.

The press releases of argenx do not suffice. Again, no financial insights were disclosed. At the same time, the underlying candidate products do not get any explanation and are just mentioned by their technical name. Argenx does provide a sporadic sentence as clarification from time to time, but the explanation remains rudimentary.[121] A further shortcoming includes the lack of a partner description. Besides this, the disease, too, is not explained although an explanation might be that since argenx only tackles cancer related diseases, they believe a further elaboration might not be needed. Other contextual information is also completely missing. Overall, the press release is too superficial and key points like financials are missing.

Press releases of Celyad have the same characteristics as argenx. Overall, the press release is too technical, too superficial and it lacks key financial data. Again, no contextual information is provided for, and the overall quality of information is below standard.

For Bone Therapeutics several missing items can be highlighted. The first thing that comes to mind is the lack of a summary. Besides this, no contextual information is given. Hence, a clear description of the candidate product and the disease product is non-present. Bone Therapeutics also does not provide a next material step nor a timeframe. Lastly and besides financials details, also reciprocal rights of the partners can be discussed in more detail.

Identified points of improvement for IBA include adding a summary to the press release, explain the reciprocal rights stemming from the partnership and of course elaborate on the financial details. Besides this, contextual information could be provided for like the current trends of the disease and an indication of the amounts of patients suffering from the disease.

Next to financials, key features are missing for TheraVet like a clear heading (it is provided for but remains too rudimentary), the description of their partner, the reciprocal rights,[122] the disease description (although for the veterinary market), the description of the product market, the goal of the partnership is described, the next material step or a timing, references made and the competition.

COMPARISON – From the "*failed the class category*", IBA publishes both before and after the FSMA Opinion. Before the FSMA Opinion, IBA's publications provided superficial information and no contextual details. For example, no reciprocal rights were mentioned and information about the candidate product is missing. The press release after the FSMA opinion is significantly better than the one published before. Unfortunately, the most important aspect, financial information, is still missing. Noticeable improvements post Opinion include more details and contextual information (*e.g.,* the goal and reason why the partnership exists) and an elaboration on the active ingredient of the candidate product and the partner which whom the company is partnering up with Lastly, also the next material step to be undertaken by the companies is included.

For all these companies, except IBA, mitigating circumstances might be invoked since all these press releases were published before the FSMA Opinion.

[121] An example is the following sentence: *"argenx and Chugai have entered into a research license and option agreement under which argenx may access Chugai's SMART-Ig® ("Recycling Antibody" and part of "Sweeping Antibody" technology) and ACT-Ig® (Antibody half-life extending technology)."*

[122] Although it is mentioned that "each party will file its own patents".

d. Out of category – Mithra

It is difficult to capture Mithra within one category as the quality of their press releases differentiates substantially. In the identified pre-Opinion press release, the company provides a clear, qualitative, and nuanced press release scoring high on all the essential elements needed for an investor. The start of their new research and development partnership is explained in simple terms, whilst providing the investor with enough detailed facts and figures to offer a broad and complete view on the partnership. The press release also starts off with a clear title in which the essential elements are mentioned, namely partner and financials. The press release adds a clear summary to this in which the financials are explained in more detail as well as the reason for the partnership. The company also elaborates on the products the partnership will affect. Mithra provides the investor with details on the reciprocal rights of all parties involved, and extensively highlights the financials of the deal. Besides this, the candidate product is explained. Although in footnote, the explanation is clear and sufficient in comparison with its peers. One could argue that Mithra scores among the best of the "best-in class" category for this category of press releases.

A whole other direction goes the press release which are not labelled as inside/regulated information. The length of the press release decreases significantly from almost two pages to only half a page. On top of this, the elaboration on the financial details is completely gone.[123] Besides the lack of financial data, the candidate product is not mentioned, nor are the rights and obligations stemming from this deal. No contextual information is provided, and the goal of the partnership is only mentioned briefly.

The same goes for a press release *post* Opinion. Unfortunately, the high quality of the pre-Opinion press release is not upheld post-Opinion. Despite elaborating on contextual information like the disease and the expected trends of this disease, some key characteristics are missing. The press release does not cover financial consequences anymore nor does it provide details on their partner. Significant improvements are again needed.

e. Conclusion

Overall, contextual information is sometimes not provided for in R&D partnership announcements. This remains however not always necessary as long as the six main points of information are covered. These are the financial consequences of the deal, the reciprocal rights every party derives from the partnership, a clear description of the partner, a clear heading, the goal of the partnership and, where applicable, the candidate product about which the partnership revolves.

In this research, the press releases of UCB, Galapagos and Hyloris provide the highest quality of information towards investors. These "best-in-class" are closely followed by Nyxoah and Biocartis. To improve the quality of their press releases, the biotech firms need to focus more on financial data and elaborate more on the rights and obligations deriving from the partnerships. Firms that do not make the cut include Oxurion, Celyad, argenx, IBA, Bone Therapeutics and TheraVet. Next to the lack of financial data, all these firms provide information without providing context and lack the clarity other firms often provide. From their press releases an investor cannot conclude the scope and significance of the partnership, making it impossible to base an investment decision on. A last word is

[123] Mithra only announces that *"Financial terms of the contract were not disclosed."*

to be set about Mithra. Pre-Opinion being one of the best-in-class, the drop in quality is surprising to say the least. This drop in quality occurred both when press releases where non-labelled as well as post FSMA Opinion.

4.2. New commercial partnerships

a. Best in class – Mithra, IBA, Biocartis, Bone Therapeutics and argenx

GOOD PRACTICES — The press releases from Mithra, IBA, Biocartis, Bone Therapeutics and argenx all are of high quality. Even before the FSMA Opinion had been published, the quality was outstanding and the companies provided investors with all necessary elements to make an informed investment decision. The firms follow the same logic and reasoning, providing lots of data and explanation for their investors. Moreover, all these press releases are labelled as inside/regulated information. Mithra, IBA, Biocartis and Bone Therapeutics all provide information about the key characteristics of the deal. The companies differentiate themselves in amounts of details they provide, the elaboration in financials or contextual information.

The press releases of Mithra and argenx start with a summary covering the most noteworthy details of the deal. Further, Mithra stands out by providing a sensitivity analysis on their estimation of the deal's worth. Mithra, Biocartis and IBA provide investors with an estimate on the stand of the disease and the evolution they believe the disease will go through. They provide also more details on the timing of the deal and the next material steps for all companies. Besides this, another noteworthy practice is the referral of Biocartis. The company tends to continuously refer to external sources to provide their press releases with additional credibility. A last noteworthy, good practice is delivered by argenx. They follow the example set by Galapagos in the R&D partnership category by providing investors with the possibility to dial-in for a conference call to discuss the partnership in more detail. Overall, Mithra, Biocartis, IBA and argenx all provide excellent press releases explaining their new commercial partnerships.

POINTS OF IMPROVEMENT – For Mithra and Bone Therapeutics, a further point of improvement is to provide even more context by referring to previous studies, sharing these results briefly and refer to external sources to grant the press release more authority. No company provides a sensitivity analysis like Mithra does. This might be a future good practice for all companies. Biocartis and IBA both added no summary to their press release. We advise these companies to integrate this in the future. Biocartis also lacks a separate "about" section covering the candidate product. Further identified points of improvement for all companies include providing more wide-ranging coverage of details like an estimate on the disease market and potential future evolutions.

COMPARISON — Bone Therapeutics is a company that did publish before and after the FSMA Opinion. Pre-Opinion, Bone Therapeutics provided the same key characteristics as the other "best-in-class" peers. Post Opinion, Bone Therapeutics is providing investors with additional information on the current stance of the clinical trial and the fact that contextual information about the candidate product is now to be found in a separate section of the press release.

The press releases covering new commercial partnerships coming from argenx have similar characteristics as the other peers Post Opinion. However, before the release of the

FSMA Opinion, the press release of argenx lacked a description of their partner. This lacune is covered post-publication.

b. Failed the class — MdxHealth and TheraVet

GOOD PRACTICES — As opposed to the previous discussed press releases which provide excellent information, the ones coming from MDxHealth do not provide investors with the key characteristic that made the others "best-in-class." MDxHealth lacks the financials to provide investors with a clear view on the partnership. The other characterises are nevertheless in the same line with the other companies.

Besides MDxHealth, also TheraVet does not live up to the standard of the other biotech firms. Even though a rise in quality has been spotted throughout the short span of the reporting period, TheraVet refuses to provide the underlying financial data on which the commercial partnerships are build. Besides this, the heading eventually became clear, providing the name of the partner and the goal of the partnership. Identified other good practices include an explanation of the company strategy and how the partnership fits in this strategy. They also provide an indication what the next press release will be and when this can be expected.

RECOMMENDATIONS — The first identified recommendation for MDxHealth is to include financial data. This would make the company fall within the "best-in-class" category. Other possible recommendations are similar to what has been mentioned under the *best in class* category and look at providing more contextual information like, for example, the referral to external sources.

Going through an evolution, TheraVet can still improve on several items. Besides its financials, the company can still improve in providing a description about the disease, talking about the next material step and timing. Besides this, TheraVet could also explain the competitive landscape in which it plans to operate.

c. Conclusion

The quality of press releases about the start of a commercial partnership is high among biotech companies. The biotech sector also labels commercial partnerships on a consistent basis throughout the scope of this research. Being among the "*best in class*" are Mithra, IBA, Biocartis, Bone Therapeutics and argenx. All these firms elaborate extensively on the financials of the deal, on the reciprocal rights the deal brings, describe their partner thoroughly, elaborate on the candidate product covering the deal and explain the goal of the partnership. Besides this, the mentioned firms often provide contextual information and sometimes even go the extra mile by providing investors the opportunity to join conference calls and by providing them with sensitivity analysis. A potential improvement point might be to focus even more on contextual information by, for example referring to past clinical trials or by providing more information on timing and the next material steps. Two biotech firms that failed to live up to the standard are MDxHealth and TheraVet. They lack the financials necessary for an investor to make an informed investment decision. The recommendation for these firms is to look at their peers in the sector and publish in a similar fashion.

4.3. Partnership end

With regards to the end of a partnership only Biocartis published a press release during the period in which press releases were analysed, on the day of the FSMA Opinion.

a. The standard — Biocartis

GOOD PRACTICES — Biocartis released two press releases on the day of the release of the FSMA Opinion. The first one announced that Biocartis and its partner were considering a potential end of their partnership. The second press release announced the definitive end of the collaboration. This is a practice which can only be cheered upon and looks like the essence in terms of timing on releasing inside information. The press release itself does include some key characteristics. Biocartis discloses the termination fee which has been agreed upon and it also briefly discusses the previous goal of the partnership. Biocartis released also details about the direct consequences of the termination.

RECOMMENDATIONS — Biocartis remains to superficial about the rights and assets every party acquires due to the termination. Besides this, the underlying reason for the partnership to end is not talked about sufficiently; an investor remains in the dark about the real reason why the termination was not successful. This remains however information an investor needs in order to make a solid assessment on the company and to decide whether he or she still wants to entrust it with its resources. Besides this, nothing was mentioned about the candidate-product and what happens with it post termination. The last items missing include the initial details of the deal and the potential impact this deal would have had on the company's financials if the partnership were to be successful. Overall, the words chosen by the company remain too vague.[124]

b. Conclusion

Biocartis is the only company that published an end of a partnership during the scope of this research. To make general conclusions appears premature. For this reason, instead of a conclusion, a reference is made to what has been written in the discussion above.

4.4. Conclusion

In general, the quality of the press releases about the start of commercial partnerships upholds a higher quality standard than the announcements of research and development partnerships. This conclusion is inevitably drawn from the above analysed press releases. Another significant difference is the consistency in which biotech firms label their press releases as inside or regulated when talking about commercial partnerships. The overall recommendation is to provide the same quality standard from the press releases covering the start of commercial partnerships to the press releases covering new research and development partnerships. It is wise for biotech firms to treat all press releases as being inside or regulated information. Another observation involves the fact that financial data is key for investors to base its decisions upon. Therefore, it is advisable to keep the focus on this aspect in the press releases covering partnerships. Besides this, an investor needs to know about the product which the partnership covers and the partner

[124] *"This termination will have no impact on our ambitions to grow in the US and in our export markets. Similarly, the termination will not affect the financial performance in 2020 other than as a result of the settlement."*

itself in non-technical terms. Providing more contextual information is going the extra mile and is advisable for firms that wish to deliver the highest quality of information.

To conclude this section, an overview is given of the firms with the difference in quality for both commercial and research & development partnerships.

	R&D	Commercial
Best in class	• UCB • Galapagos • Hyloris	• Mithra • IBA • Biocartis • Bone Therapeutics • argenx
Good enough	• Biocartis • Nyxoah	
Failed the class	• Oxurion • argenx • Bone therapeutics • Celyad • IBA • TheraVet	• MDxHealth • TheraVet
Out of category	• Mithra	

Table 7: ***Overview of partnership press release quality***

C. DISCLOSURE OF INSIDE INFORMATION BEYOND BORDERS — QUALITATIVE ANALYSIS

INTRODUCTION — This third section of the results provides an answer to the third sub question, *i.e.,* which disclosure practices of inside information within the biotech industry can be observed in other countries. This is opportune in order to establish recommendations for the FSMA that are as complete as possible. A rich source of inspiration for this purpose can be found beyond borders. Therefore, first, US case law and regulatory insights from the US, Japan and Australia are discussed. Next, a quantitative analysis of press releases of foreign biotech companies is conducted. As discussed, in five countries (US, Sweden, UK, France, Switzerland), three companies were selected, totalling 133 analysed press releases.

1. US case law and regulatory insights from the US, Japan and Australia

OVERVIEW — In this section, inspiration for recommendations is looked for in several other jurisdictions. First, case law and comment letters from the US are analysed. Next, some regulatory insights from the Japan and Australia are discussed.

1.1. US

INTRODUCTION — Despite being a global hub for biotech firms, it remains surprising that the US has no such thing as a disclosure guideline like the published FSMA Opinion. This could be due to the fact that the legal system of the US is less statutory based (like Europe), but is built on precedents and case law[125], or because there are less general disclosure obligations for firms in the US.[126] Be it material[127] or public[128] disclosure, for the sake of this paper we presume that biotech specific information[129] are all disclosed through press releases, just like the Belgian analysed biotech firms do.

INSPIRATION TO BE FOUND IN CASE LAW AND SEC COMMENTS — Despite the lack of clear guidance on the exact same topic, there is still guidance to be found in the US biotech market in other forms than exact guidelines for disclosure of inside. There are extensive amounts of case law present on whether these press releases constitute misleading information. Besides, there is the heavily regulated issuance of securities where guidelines are also present and in which details need to be disclosed about the same topics which are generally disclosed by Belgian biotech firms. Through a reasoning *a simile*, these same principles can be used to draw inspiration for a future possible reworking of the FSMA Opinion on disclosure for Belgian biotech firms.

[125] Judges thus draw inspiration from case law instead of combining elements in a written legal document.
[126] The general standard for US based firms on what needs to be disclosed appears straightforward: companies are under no obligation to disclose information unless failing to do so would lead to investors being misled with respect to other company disclosures.
[127] For public companies, one of the fundamental concepts of the United States' security laws is that public corporations must publicly disclose information to potential investors and shareholders that is material, or significant, which allows them to make informed investment and proxy voting decisions (https://s3.amazonaws.com/brt.org/archive/reports/BRT.The%20Materiality%20Standard%20for%20Public%20Company%20Disclosure.2015.10.29.pdf). There is a lot that might be material early on in a company's existence. Almost everything in terms of expected milestones, regulatory interactions, and clinical updates might be considered material. In contrast to these small businesses, the materiality analysis for large businesses varies. Updates are compared to the entire company, so there is more room to claim that something is not relevant to an investment decision.
[128] Besides material and obligatory disclosure, there is also voluntary disclosure (8-K filings). A company has a tremendous motivation to give more information regarding biotechnology products. These incentives are primarily designed to help external capital providers understand the future costs and benefits of continuing the product development process.
[129] Such as clinical trial design and registration, participant enrolment, interim analysis, study completion or top-line results, scientific journal publication (peer-reviewed results), and regulatory application (discussions, letters, and filings with the regulatory agency).

a. Case law

CASE LAW BUILT ON CLASS ACTIONS — The study of US case law starts in 2018.[130] Cases were examined built on class action securities claims directed towards biotech (or "lifesciences") companies. This class action securities claim is the general way for investors towards court who seek compensation for their incurred losses (LaCroix, 2017). Overall, American litigation occurs on most occasions where stock prices fall, whether wrong or misleading communication are to blame or not (Locker, 2021). This concludes American investors almost desperately try to recuperate any suffered losses from a bad turned-out investment.

NO DISCLOSURE OF FALSE, MISLEADING OR WRONGLY PRODUCED INFORMATION —The first observed tendency is that US courts hold biotech firms to similar rules as identified in the Belgian disclosure practice. Despite US public firms having no continuous obligation to disclose inside information, what is disclosed cannot be false, misleading, or wrongly produced (Payne, 2018). However, highly optimistic statements are often allowed by courts, even though they seem reasonably unlikely. Besides this, and similar to the Belgian practice, it remains appropriate for US companies to publish results late instead of premature and incorrect. Like pointed out in the FSMA Opinion, upon deciding to disclose, companies are held to publish indications from regulators pointing at unreliable results revealed to the company in non-public communication.[131]

RISK DISCLOSURES — Extensive risk disclosure forms another identified practice among US biotech firms. This manifests itself in firms providing investors with, for instance, the likelihood of regulatory approval for a product flowing out the product pipeline (Carr V Zosano corp., 2021), firms providing extensive disclaimers indicating that interim or topline results[132] might still possess wrong data along with an explanation that data might be preliminary, firms disclosing critical information about the trial design limitations and so on. In the US, companies need to address uncertainties about underlying clinical hypotheses and give an indication on the consequent risks that trials might not succeed. They must also describe all these risk factors in their press releases and provide an indication what these risks uphold, what happens if something goes wrong and what the success factors are.

REGULARLY REVIEW OF THESE RISK FACTORS — Besides this, it is established by precedent that companies should also regularly review these risk factors. By doing so, they need to make sure to update and tailor cautionary statements to address new developments and changing circumstances. Companies cannot rely on boilerplate unchanging risk factors but need to adapt these risks if more details become available for the companies on which they base their presumptions. The sample type occurs when a company has received less-than-positive regulatory feedback. A company must adjust its risk disclosure accordingly in the next publication to avoid litigation. Another example obliges companies to adjust their risk disclaimers when side effects are known, or adverse events occurred during clinical trials. A good practice would be to address the reason why it happened, include the risk that such safety related issues may recur, but also, and above all, provide an indication on the effects this causes for future regulatory approval.

[130] Among others, this analysis is based on Locker, 2019; Locker, 2020; Locker, 2021; Bullerjahn, 2022.
[131] See C-14 of the FSMA Opinion.
[132] Even Phase III results.

CASE LAW EXAMPLES OF RISK DISCLOSURE ELEMENTS — This established practice of risk disclosures is often the reason why courts tend to rule in favour of biotech firms and rule for a motion to dismiss in class actions. In the identified court cases ruled for dismissal, the preceding press releases included warnings about (1) known toxicity risks of similar products; (2) adverse events experienced in prior clinical trials; (3) the risk that multiple ongoing trials may yield different results; (4) the risk of multiple endpoints or measuring dates confounding results; (5) the risk of using "surrogate" measures for potential complications; (6) the possibility that control groups might skew blinded interim results; (7) the fact that the FDA may require additional studies; (8) the possibility that earlier trial results may not be repeated; (9) the risk that interim positive results may reverse; (10) the fact that adverse events or safety issues may make an efficacious drug not approvable or marketable; (11) the fact that only certain subgroups may benefit and that this may not be sufficient to support approval or marketability of the drug; (12) the fact that "positive" or even statistically significant results do not assure approval or market acceptance; and (13) the fact that future funding for required trials or studies may not be forthcoming.

b. Comment letters

STRONG EMPHASIS ON PROSPECTUS DISCLOSURE — As mentioned before, the disclosure practice of biotech firms and the focus of the SEC strongly centres around IPO prospectus (or SEC form S-1). Of the 1500 comment letters made by the SEC in 2021, only 5% where non-S-1 form related (Chan *et al.*, 2022). This strong emphasis on prospectus disclosure has only grown in recent years as the SEC implemented regulatory amendments in late 2020 to modernize and strengthen the disclosure standards.[133] The goal of these amendments was too easier identify compliance rules for businesses by stressing the disclosure of all material information to investors whilst minimizing needless or redundant disclosure. Amongst others, amendments were made to the rules relating to descriptions of business, legal proceedings, and risk factor disclosures.

CLINICAL AND PRE-CLINICAL STUDIES — From the analysis made, it became clear that the SEC's focus lies on making adequate disclosures for clinical and pre-clinical studies. Details that were requested include, but are not limited to: (1) providing investors with details on the dates of the trial so that investors have an indication when results can be expected; (2) the sponsor(s) of the clinical trial; (3) the location where the trials take place; (4) scope and size in order to make an assessment to the statistical relevance of the trial; (5) the duration of the trial so that investors know when results may reasonably be expected; (6) the characteristics of the participants; (7) a methodology on the dosage of the candidate-product; (8) primary and secondary endpoints and whether the primary goal of each clinical research is to assess safety or efficacy; (9) declare whether results from a foreign country would be acceptable in the country without the need for repeat testing in circumstances where they conducted various stages of trials in different countries; and off course (10) the final results on the clinical trial.

LICENSE, DISTRIBUTION OR R&D PARTNERSHIPS — In relation to license, distribution or research and development partnerships, the SEC's overall focus lies on information clarity and describing the specifics of each agreement. The key disclosure points for each agreements include (1) the material terms of the agreement, including all reciprocal

[133] https://www.sec.gov/news/press-release/2020-192.

consequences for every party (rights and obligations); (2) the duration of the agreement; (3) nature of payments also indicating which are the eventual upfront and aggregate milestone amounts; (4) termination provisions if they are mentioned in the contract; (5) nature, scope, and ownership of transferred intellectual property rights; (6) the royalty range and term; (7) expiration of the last of the patent rights licensed; and (8) the potential existence of any material march-in-rights and their possible impacts. The details mentioned here, are not included in the FSMA Opinion. Accordingly, these details are often not found in the Belgian disclosure practice.

NEW PRODUCTS — With regards to new products, the SEC asks from biotech firms among others to explain their (1) novel or differentiating features being explored with respect to each product candidate; (2) the extent of alignment between clinical trial findings and initial product goals; (3) concrete reasoning for comparing candidates with existing products in the market; (4) intellectual-property protection status; (5) any approvals received by the FDA or other approvals needed to advance the candidate to the next phase of development; and (6) feasibility plans, along with any material collaborations, involved with development also; (7) number of patents held or applied for and the specific products or technology to which each patent relates in every jurisdiction where patents have been issued; and (8) patent expiration dates and expected expiration dates for pending applications. Again, this amount of detail is not included in the FSMA Opinion nor identified in the Belgian disclosure practice.

1.2. Japan

GUIDEBOOK ON INFORMATION DISCLOSURE — A jurisdiction that does provide guidance on voluntary disclosure of inside information by biotech firms, is the Japanese Ministry of Economy, Trade and Industry (METI). On the 4th of March 2021, METI and its Study Group for Encouraging Dialogue between Biotech Venture Businesses and Investors, published its Guidebook on Information Disclosure.[134] The guidebook's major goal is to organize the reasons for and key aspects of non-financial information disclosure that is significant for investors in determining the future corporate value of biotech enterprises resulting in voluntary disclosure by companies.

Overall, the analysis shows the Japanese voluntary disclosure guidelines are similar to the Belgium and US practices. The Japanese guidelines, however, seem more detailed and recommend some additional items that are not present in the Belgian guidelines. These additional points of information will be discussed hereafter.

PRESENTATIONS AND PUBLICATIONS — With regards to press releases covering publications of results in scientific papers, presentations given at conferences and similar events, it is important for the Japanese regulator to provide investors with an easy-to-understand explanation of the outline and main points of the conference presentation posters. Besides this, it is important to explain the slides that were presented, or other materials used or showed. The Japanese regulator does not expect investors to be up to date with the latest developments of the medical world and only expects the average common knowledge from investors. As a result, the more technical aspects of presentations or publications need to be explained. Additionally, it is often difficult for investors to access information, like for example participating in academic conferences.

[134] METI (2021). Guidebook on Information Disclosure for Encouraging Dialogues between Biotech Venture Businesses and Investors, https://www.meti.go.jp/english/press/2021/0304_005.html. It should be noted that this research is based on a translation of this guidebook as the official version is only available in Japanese. Despite numerous reminders, the Japanese regulator did not reply to our requests for a translation.

Therefore, the Japanese regulators advises to publish videos of presentations on the company's website. Another remarkable aspect is the advice to disclose qualitative information actively such as audience reactions and questions asked to promote investors understanding.

AUTHORITY COMMUNICATIONS — For authority communication with regulators, it is important that investors can judge whether the business is progressing smoothly, and to predict how much sales growth can be expected after the product launch. In progression through the clinical phases, it is advisable to provide stakeholders with the status of negotiations with regulatory authorities in a timely manner as progress is made. It is thus advised to already start explaining elements of the communication during the clinical trials.

MARKET — As became clear from the abovementioned differences, the Japanese regulator, often provides more detailed recommendations. This is also the case for information on the product market. It is recommended to provide an estimate about the number of patients suffering from the disease and a realistic indication of patients targeted by the developed product, estimate the projected market share the product will hold, give an estimate about the anticipated product unit price, and make already a prognose towards anticipated sales.

COMPETITIVE LANDSCAPE — With respect to the competitive landscape, too, the Japanese regulator elaborates extensively on what preferably to disclose. Identified good practices include providing the names of competing drugs and provide the names of competing companies along with progress of their trails. Whilst comparing to existing therapies, press releases should ideally also include the issues with existing therapies and trial results. All these recommendations would lead investors to a more accurate understanding of competitors. This in turn would lead to a more objective assessment of the potential of the developed product and accordingly, to a more accurate assessment of the company's value. For cases where there is no competition, it is advisable to not simply state that there is no competition, but to argue for the superiority of the developed product on the basis that it fulfils an unmet need for an existing treatment.

VISUALISATION OF INFORMATION — Next to the extensive details, the Japanese Guidebook also provides information on the presentation of these details. Every piece of information should be provided for in graphs and figures. Not only the data needs to be disclosed this way, but also information such as the comparisons to existing therapies, the comparison of competitors, estimated revenues, patient recruitment, *etc.* This makes the representation of data easy to understand and allows for a global view on the most essential elements.

1.3. Australia

AUSTRALIAN CODE OF BEST PRACTICE FOR REPORTING BY LIFE SCIENCE COMPANIES — Australia is the second country for which a clear and comparable code of good practices guideline for biotech firms was identified, *i.e.,* the Code of Best Practice for Reporting by Life Science Companies as published by the Australian Securities Exchange.[135] This code was first published in 2005 and revised in 2013. The Code, just like the FSMA Opinion, is

[135] Australian Securities Exchange (2022). Code of Best Practice for Reporting by Life Science Companies. Retrieved June 14, 2022, from https://www.asx.com.au/documents/research/Code_of_Best_Practice_for_Reporting_by_Life_Science_Companies.pdf.

non-binding and merely serves as guidance for life sciences companies. The Australian guidelines provide for some interesting insights.

CAUTIOUS REPORTING — A general trend in the Code is the emphasis in every section on cautious reporting. Moreover, emphasis is also provided on including negative news, amongst others for the following elements. Positive R&D results should not be reported selectively if, at the same time, other relevant negative results are withheld. Companies should be cautious about providing their own positive judgment of a non-clinical safety package before having the evidence confirmed by an ethics or regulatory committee. When the decision is made to publish these results, a *caveat* that the data is still subject to review, should be included. Companies should also ensure that any announcement regarding a clinical trial clearly states the way in which the study is linked to a relevant regulatory process. This way, the regulator wants to make sure that investors are not misled about the commercial or regulatory significance of a trial. Besides this, biotech firms should consider explaining the approval process in their announcements and make it apparent that meeting endpoints does not always imply regulatory approval. Companies should also avoid misleading investors about the likelihood or timeliness of approval, as well as the possibility of the product's success on the market after approval. Concretely, it should be clarified that meeting primary endpoints does not mean that the product *ipso facto* will end up on the commercial market and that still significant steps must be gone through, even in a third phase clinical trial.

INTELLECTUAL PROPERTY AND REGULATORY EXCLUSIVITY RIGHTS — The Australian Code dedicates an entire section to the disclosure of Intellectual property (IP) and regulatory exclusivity rights, as these are an important consideration in the valuation of biotech firms. Patents[136], trade secrets[137] and regulatory exclusivity[138] are listed as some of the more commonly used forms of rights in the sector. As a general rule, the Code states that disclosure is required if the IP matter is likely to have a material effect on the stock price (*e.g.,* if they have a material effect on the ability of a company to maintain market exclusivity) and these matters are unlikely to be prejudicial to the company. Thereby, the company should also explain the commercial significance of that information. The Code then continues by listing examples of information that companies should consider disclosing, tailored to the different IP rights. These guidelines can be found in Appendix D. It is surprising that the FMSA Opinion does not cover the intellectual property rights of the candidate products involved. Information on IP rights provide crucial information on how many years the company can still gain revenues from a candidate product after coming to market and are detrimental to make a valid assessment on the value of a company.

FINANCIAL INFORMATION OF PARTNERSHIPS — Further, the Australian regulator recommends that investors must be provided with a wealth of financial information about partnerships. For example, licensing fees, milestone payments, research expenditures, royalties, and profit sharing should all be included in press releases data. It is also recommended to mention royalty rate ranges, or the lowest and maximum that the licensee will pay for the rights granted by the license, as well as the event(s) that will

[136] The Code describes patents as follows: *"Patents are useful for providing a company with the right to prevent others from using their technology."*
[137] The Code describes trade secrets as follows: *"Trade secrets are useful for protecting information such as proprietary manufacturing or discovery processes, which can be difficult to protect by patent."*
[138] The Code describes regulatory exclusivity as follows: *"Regulatory exclusivity is tied to approval of a product (e.g., drug, medical device or veterinary product) and may come in a number or forms depending on the country in which regulatory approval of the product has been granted. Examples of these forms of exclusivity (defined in the Glossary of Terms) are: (1) Data exclusivity; (2) Marketing exclusivity; and (3) Orphan drug status."*

cause payments to be made (fee upon signing, annual fee, percentage of net sales *etc*.). In case royalty rates are revealed, the basis on which they were calculated should also be stated (*e.g.,* paid as a percentage of net sales, total sales, or profits). Other details on contractual obligations include the conditions that allow the agreement to be cancelled, as well as details on how intellectual property rights would be handled after termination, reversion rights, the respective parties' responsibility to supply necessary resources, significant milestones, and the parties' respective obligations to meet the milestones, and the transaction's ultimate impact on the company's capital requirements. These are similar to the requirements put forward by the Japanese Regulator.

SMALL TOOLS TO MAKE SCIENTIFIC INFORMATION MORE COMPREHENSIVE — Just as in the FSMA Opinion, the Australian regulator stresses the importance of using comprehensive language that is not too technical as most investors might have little or no understanding of the science behind the company's operations. Many businesses have responded to this issue by publishing extensive addenda and glossaries that explain both generic and company-specific terminology and concepts. Another option is to include a Q&A section in the announcement that addresses any issues that require clarification.

1.4. Recommendations for the FSMA

From the analysis of the US, Japan and Australia, we can conclude that most disclosure rules beyond borders are similar to the guidelines of the FSMA. Hence, from an international regulatory perspective, the FSMA Opinion is close to complete. However, some interesting differences were identified, which are resumed hereafter.

OPEN VS. MORE RIGID FRAMEWORK OF GUIDELINES — A first difference lies in the detail that other regulators provide. Whereas the FSMA provides a general principle-based framework in which the regulator provides biotech firms the freedom to transform these principles into concrete implementations, foreign regulators opt for a more rigid framework with more limited freedom for companies. Regulators abroad mention all the details necessary to comply with the good practice guidelines. As we saw in the qualitative analysis of this work, Belgian biotech firms tend to differentiate significantly regarding the quality of and provision of details in their press releases. The principle-based approach might be the reason for it. Following foreign disclosure practices and guidelines, it could be an option for the FSMA to opt for a more *ex ante,* strict approach, in which good practices are formulated more concrete and more extensive details are requested from the start. In our view, this would increase the efficiency of enforcement and would elevate the general quality of the press releases significantly.[139]

RISK DISCLOSURE PRACTICES — Another recommendation might be to look at the extensive risk disclosure practice as identified in the US. Although not all risk disclosures might be useful or necessary in a Belgian context, it might be worthwhile to examine these elements which may contribute towards better investor protection. The goal remains after all to guide investors towards better and sound investment decisions. Including extensive risk disclosures like US firms do, may build a new practice in Belgium that would provide investors with a valuable added information source. The risk disclosure practice might also cause press releases to be less "one-sided" and provide for further nuance. For companies,

[139] A proof of concept may be found in the firms which have a double listing in for example Belgium and the US. Most companies tend to publish press releases of high quality. Next to being more mature, another reason for this might be the compliance of the firm with more extensive guidance from foreign jurisdictions. Companies publishing high quality press releases are argenx and Galapagos. Nyxoah and MDxHealth produce sufficient press releases. Only Celyad produces press releases of a very low quality. The latter is nevertheless the exception to the rule.

a reason to include more extensive risk disclosure might be to expel their risk in future litigation processes in case some clinical trials eventual go wrong.

VISUALISATION OF INFORMATION — A remarkable practice identified in Japan is the disclosure of information in the form of graphs and figures. In the FSMA Opinion, the use of tables is indeed recommended under GP-25, however, this could be extended to more contextual information such as the comparisons to existing therapies, competitors, estimated revenues, patient recruitment, *etc.* As this provides investors with a more schematic and global views of very relevant information, this might be a welcome addition to summaries in longer press releases.

IP AND REGULATORY EXCLUSIVITY RIGHTS — A last, but very interesting, practice is the disclosure of Intellectual property (IP) and regulatory exclusivity rights. This would allow investors to make better estimates of the fruitful period in which candidate products generate revenues. This, in turn, provides investors with more information on the true value of the candidate product and thus the company as a whole.

2. **Foreign companies**' disclosure practices — US, Sweden, UK, France, Switzerland

OVERVIEW — In this section, the disclosure practices of foreign companies are analysed. As discussed in the methodologic part, three companies were selected for five countries (US, Sweden, UK, France, Switzerland). From these companies, around three press releases per category were analysed, except for the part "labelling practices abroad", where more press releases were looked at in order to know whether the company makes use of a label or does not do this at all. In total, 133 press releases were analysed. First, these labelling practices are discussed, whereafter an in-depth analysis of the press releases per category is conducted.

2.1. Labelling practices abroad

INTRODUCTION — First, the labelling practices within the foreign companies are analysed. Hereby, it should be noted that no conclusions for the *entire* market can be drawn, as only three companies per market were analysed. However, the analysis may give indications in one direction or another.

FOREIGN COMPANIES LABELLING PRESS RELEASES AS INSIDE INFORMATION — In all the analysed US companies, no press release was labelled as inside information. This can be explained by the fact that in the US, there is no general obligation to disclose inside information which falls outside a specific list of events (Payne, 2018).[140] In France, it is remarkable that none of the observed companies indicate that press releases contain inside information, despite the MAR being applicable on these companies. In the UK[141], the three companies make use of the inside information label, however Avacta only tags the bare minimum of press releases compared to other companies. In the UK, the mentioning of inside information is placed at the bottom of the press release, which is less clear than in Belgium, where most companies place the label at the top of the article (not: Galapagos). In Sweden, the three companies all indicate whenever a press release

[140] Such as: *"the issuer filing for bankruptcy or receivership, a material modification of the rights of security holders, or significant acquisitions or dispositions."*

[141] In the UK, the "UK MAR" is indeed applicable after Brexit: *"the onshoring of EU MAR has resulted in UK markets and financial instruments remaining subject to the same requirements and protections under UK MAR as under EU MAR as in effect on 31 December 2020 (…)"* (Debevoise, 2021).

contains inside information. Besides this, just like in the UK, the label is always present at the bottom of the press release. This is something the FSMA could monitor, so that Belgian companies keep on doing it the better way to protect clarity for investors. In Switzerland, all three companies use a label to indicate the information is price sensitive.[142] It should be noted that both in Switzerland and Sweden companies provide a filter on their website so the inside information can be found easily, whilst Belgian companies do not have this (except for Galapagos), despite Belgian companies are obligated to maintain inside information in an easily identifiable section of the website (just like the Swiss[143] and Swedish[144] companies).[145]

2.2. Clinical trial results

NO MAJOR DIFFERENCES WITH BELGIAN PRACTICES — When comparing the press releases, covering intermediate and topline results published by biotech firms listed in countries other than Belgium, to the ones published by Belgian listed biotech companies, no major differences are apparent. There is not one country of which the press releases are of a much higher quality. The situation for every country seems to be quite similar to that of Belgium, namely that there are both companies that publish nearly perfect press releases and companies that publish press releases of very low quality. France and Switzerland for example have companies providing information to their investors extremely well. DBV Technologies (France) and Obseva (Swiss) publish press releases that are on par with the press releases of *best in class* Belgian companies. But in the same countries there are companies such as Abionyx (France) and Newron (Swiss) that fail the class as their press releases suffer from the same issues as the Belgian press releases published by Nyxoah and Acacia Pharma. There is not one country where press releases of all the companies are of a very high level and so it seems that there is no market authority in another country direct biotech companies' press releases better. Not in one of all the analysed press releases was an aspect discussed that was not already listed in the FSMA Opinion. Therefore the GPs of the FSMA Opinion concerning the publication of results are very complete.

US COMPANIES DISCLOSING NEGATIVE INFORMATION MORE THOROUGHLY — It was however apparent that some companies did discuss two aspects quite differently. GP 20 of the Opinion mentions "giving a balanced view of favourable and less favourable findings" most companies both Belgian and internationally listed focus however heavily on the positive results. The three companies listed on Nasdaq give a more thorough explanation of the negative aspects when compared to the Belgian firms. Of course, this is strongly linked with the limitation of their liability. This has been discussed in more detail above. Comparing these statements to these of Belgian biotech companies leads us to conclude

[142] Issuers listed on SIX are obligated to disclose price-sensitive facts by an *ad hoc* announcement, beginning with *"Ad hoc announcement pursuant to Art. 53 LR"* (the MAR does not prescribe such a specific label). See article 53 of the SIX Listing Rules: https://www.ser-ag.com/dam/downloads/regulation/listing/listing-rules/lr-en.pdf

[143] *Ad hoc* announcements must be kept available on the website *"in einem leicht auffindbaren Verzeichnis aufzuschalten"*, which can be translated as "a directory that is easy to find". Except for Newron Pharma, all the observed Swiss companies have a filter to classify these *ad hoc* announcements.

[144] In Sweden, the MAR is applicable as well. On the websites of two of the three Swedish companies (Immunicum and Calliditas Therapeutics) a filter can be applied, too, in order to only select "regulatory press releases".

[145] Article 3 (b) of the Commission Implementing Regulation (EU) 2016/1055[145] specifies that the website, on which the issuer must post and maintain inside information[145], must *"allow users to locate the inside information in an easily identifiable section of the website."* Swedish companies, to which the same disclosure rules apply as in Belgium, seem to interpret these rules differently as well, just like the Swiss companies. Such a filter of course adds to the clarity and ease for investors. Therefore, the FSMA could recommend companies to also provide such a filter on their website, as this is required by law and seems to be done in at least two other countries where (practically) the same rules apply. It is indeed true the FSMA already recommends displaying the different types of regulated information separately on the website (FSMA Circular, 2012), however this is not focussed on biotech companies. Particularly within this sector, where inside information is ubiquitous, such a filter could be a very good practice.

that the majority of Belgian biotech companies can make quite some improvements in this area. This is an element of the press releases FSMA should follow up strictly in the future.

IMPACT OF THE NEWS ON NEXT STEPS — GP 21 of the FSMA Opinion encourages companies to "mention the next material step and, to the extent possible, the expected timing." Belgian companies mostly disclose when the results might be published/presented or give a vague explanation such as "this brings us one step closer to commercialization of the drug." Some companies listed internationally however disclose what the positive (or negative) topline results mean for their further interactions with the FDA (or other authorities) and give a much clearer explanation of what actions will be undertaken and how this news is important for following steps of the drug development process. One example of this:

"*Soleno will submit these data to the FDA as part of an ongoing discussion with the Agency regarding the clinical data necessary to support the submission of a New Drug Application (NDA) to market DCCR for the treatment of PWS. The FDA has previously conveyed to Soleno that another clinical trial will likely be needed and that open-label data and comparisons with natural history sources such as PATH for PWS may have statistical and other limitations, but it has agreed to review the data to determine whether it is appropriate for the Company to submit an NDA."* [146]

A clarification of GP 20 and 21 could be added where it is stated that companies should give a more in-depth explanation about the negative aspects of the trial and about the next step with authorities and how they expect this process to develop.

2.3. Clinical trial updates

LOW QUALITY ABROAD — Generally, the press releases disclosing clinical trial updates of the biotech firms listed outside of the Euronext Brussels are of lower quality as those of the Belgian biotech companies. A majority of these press releases contains less information compared to the Belgian press releases. Nothing could be identified in these press releases that is not already mentioned in the FSMA Opinion, which leads us to conclude that the GPs mentioned in the FSMA Opinion are rather complete regarding clinical trial updates.

FAILURE TO EXPLAIN ENDPOINTS ABROAD AS WELL — One remarkable point resulting out of this analysis is that the major problem identified for Belgian press releases, also constitutes an international problem. Press releases announcing the start of a clinical trial fail to explain what the primary and secondary endpoints of that trial are, and therefore fail to disclose one of its key factors. Molecular partner (Swiss), Scancells Holdings (UK), BioInvent (Sweden), Calliditas Therapeutics (Sweden) and BioXcel Therapeutics (US) are some of the companies identified in this analysis that failed to disclose these endpoints at the start of a new clinical trial. This is thus a major point of improvement, both for the Belgian biotech industry as internationally.

[146] https://investors.soleno.life/news-releases/news-release-details/soleno-therapeutics-announces-positive-data-showing-continued.

2.4. Authority communications

SCOPE AND IMPLICATIONS EXPLAINED THOROUGHLY — From the press releases related to authority communications of the US companies, one point in particular is noteworthy: the scope and implications of the authority decision is explained very well by Soleno (explaining Fast Track designation[147]) and Poseida Therapeutics (explaining Orphan drug designation[148]). In France (Abionyx[149] and DBV Technologies[150]) and Sweden (Immunicum[151]), too, this extensive explanation on the authority decision can be found. Immunicum even goes a step further by providing a link for more information on that type of decision. This confirms that attention could and should be paid to a clear explanation of authority decisions for laymen-investors to understand what the decision entails. It is true some Belgian companies (UCB, Galapagos, Acacia Pharma and Nyxoah) already do this, however other companies could improve on this.

EXPLANATION ON REASONS FOR REFUSAL OF APPROVAL — Another great example of something at which the Belgian companies can improve, is shown by DBV Technologies (France), that elaborates extensively on the reasons for the refusal of an approval, just like the steps the company wants to take to resolve the FDA comments.[152] This quality level of issue-explanation in case of a negative authority communication has not been observed within the Belgian biotech industry.

STEPS PRECEDING AUTHORITY DECISION — Last, Newron (Swiss) briefly drafts what preceded the authority decision[153], just like Calliditas (Sweden)[154], Obseva (Swiss)[155] and, less elaborate, Transgene (France)[156]. This is something not a lot of companies do (in

[147] *"Fast Track designation is intended to provide patients with serious conditions and unmet medical needs access to new drugs earlier by assisting their development and accelerating their review by the FDA. Fast Track designation allows additional meetings with the FDA to discuss Soleno's development plan to ensure the appropriate data are collected and encourages frequent written communication with the FDA regarding design of clinical trials and use of biomarkers. If certain criteria are met, the drug will be eligible for Accelerated Approval and Priority Review and also Rolling Review, which allows Soleno to submit to the FDA sections of its New Drug Application (NDA) as they are finished instead of waiting for all sections to be completed before submitting the marketing application."*

[148] *"Orphan drug designation is granted by the FDA Office of Orphan Products Development to drugs and biologics which are intended for the treatment, diagnosis or prevention of rare diseases/disorders that affect fewer than 200,000 people in the U.S. Under the Orphan Drug Act, the FDA may provide grant funding toward clinical trial costs, tax advantages, FDA user-fee benefits and seven years of market exclusivity in the United States following marketing approval by the FDA."*

[149] Abionyx, just like Poseida Therapeutics, explains the ins and outs of the Orphan drug designation in the US. In another press release, the company describes the working of a Compassionate Access Authorization, including the conditions that need to be fulfilled.

[150] DBV Technologies briefly but clearly explains the scope and timing following a MAA validation: *"Following the MAA validation, the EMA's Committee for Medicinal Products for Human Use (CHMP) will review the application and provide a recommendation to the European Commission (EC) on whether to grant a marketing authorization. DBV expects to receive the first set of questions from the EMA approximately 120 days post-validation."*

[151] Immunicum sums up all the advantages of the RMAT designation and explains what the RMAT designation entails exactly and when a therapy is eligible for it. The press release even contains a link to more information on the RMAT designation. In another press release, Immunicum describes Orphan Designation in the EU in detail. Next to what it means and when a medicine is eligible, it is for instance explained what the timeline and benefits are.

[152] *"The FDA has identified concerns regarding the impact of patch-site adhesion on efficacy and indicated the need for patch modifications, and subsequently a new human factor study. The FDA has also indicated that supplementary clinical data would need to be generated to support the modified patch. In addition, the FDA requested additional Chemistry, Manufacturing and Controls data. The Agency did not raise any safety concerns related to Viaskin Peanut. DBV intends to request a meeting with FDA to discuss the FDA's comments as well as requirements for additional clinical data that may be needed to support BLA resubmission."*

[153] *"In May 2019, the FDA requested that Newron complete additional short-term explanatory studies in rats and human subjects to address concerns on findings from a recently completed study of Evenamide in rats, as well as CNS events observed following high dose administration of Evenamide in dogs. Newron met with the FDA on August 28, 2019, to discuss the issues, the proposed plans for these studies and the eventual start of the Phase III program with Evenamide."*

[154] *"In May 2021, Calliditas announced that it had submitted a Marketing Authorisation Application (MAA) to the EMA, which had previously granted Orphan Drug Designation to this drug candidate in the treatment of IgAN. In July 2021, Calliditas and STADA announced that the two companies had entered into a license agreement to register and commercialize Kinpeygo in the European Economic Area (EEA) member states, Switzerland and the UK."*

[155] *"The CHMP's positive opinion follows the recent FDA acceptance for review of the uterine fibroids New Drug Application (NDA) (PDUFA date of September 13, 2022)."*

[156] *"This announcement follows the approval received in December 2020 from the Belgian health authorities."*

Belgium, this was only observed for UCB[157]), but which provides an interesting contextual framework for investors.

2.5. Partnerships

OVERALL TREND: HIGHER QUALITY FOR COMMERCIAL PARTNERSHIPS — An overall trend was spotted in which biotech firms have the tendency to report higher quality press releases and cover more content for commercial partnerships when talking about license and distribution agreements than for research and development partnerships. A company where this was extremely clear was Avacta (UK). Next to this, there is also the significant difference in quality within the same types of partnerships. The cross-border extensions of these tendencies already noticed in Belgium, confirms the idea that this problem is not Belgium specific. In the following section, the most outstanding practices will be highlighted from which the FSMA can draw inspiration.

DIAL IN CONFERENCE CALL AND MENTIONING NAMES OF RESEARCHERS WORKING ON R&D PARTNERSHIP — The United States' biotech firms provide two noteworthy practices. First, Poseida Therapeutics (US) offers investors with an opportunity to dial in to a conference call. This practice has already been seen among Belgian biotech firms (like Galapagos and argenx). By providing investors the opportunity to dial-in and get an in-debt analysis alongside the possibility to ask pertinent questions, companies provide investors with the best opportunity to capture information. This practice can only be cheered upon and might be included in future good practices in Belgium. The second item which stood out, was the mentioning of the names of researchers working on a R&D partnership. The honour of mentioning this practice is for Solena. Although the cause for it might be the self-interest of the company (promoting the credibility of the company by partnering up with reputable and renowned researchers), this still seems like a practice which provides food for thought.

RISK DISCLOSURES — The American companies are not surprisingly frontrunners in incorporating extensive safety warnings and tailored forward looking statements. Amongst others, they explain the chances and the impact of the partnership on potential FDA approval. Other company which can be seen doing this are DBV (France) and Molecular partners (Swiss). It is also remarkable to see that how bigger the company, the more extensive this aspect becomes.

IP RIGHTS AND REFLECTING ON PAST STEPS, REGULATORY STATUS — Another good practice includes elaborating on the already performed clinical trials and regulatory status. Observa (Swiss), Immonicum (Sweden) and Bionyx (France) provide exemplary illustrations. BioInvent (Sweden) provides insights into their IP rights. This is something which has been spotted before and might require the attention of the FSMA. Example of a commercial partnerships, which in our view comes close to perfection can be found at Calliditas Therapeutics (Sweden) and Observa (Swiss). Next to an extensive elaboration on the financials, these company also provides a clear explanation on the steps leading up to regulatory approval.

INFORMATION ON TERMINATION OF PARTNERSHIP —Interesting insights were also found in the UK. Scancell (UK) is one of few companies which provide information on the termination of a partnership. The company gave an indication on the next step (continue inhouse or search for another partner), something the Belgian good practices indicate but

[157] However more briefly than Newron and Calliditas: *"The European Commission approval follows a positive opinion granted in June 2021 by the European Medicines Agency's Committee for Medicinal Products for Human Use."*

which was not identified in Belgium. Additional information was also given to what happens to the products and the rights attached to it developed under the partnership.

OVERVIEW OF PIPELINE — Another good practice which was identified, and which can be introduced for all categories of press releases is providing investors with an overview of all the candidate products the company is working on in the "about" section. This overview can provide investors with a more global view on the firm. Again, the reason for this might be the self-interest of the company in this specific case but incorporating a practice like this in the general reporting habit of companies might benefit investors.

2.6. Conclusion

FSMA OPINION SEEMS COMPLETE — The main takeaway from the foreign disclosure practices is that all analysed press releases focus on similar aspects as identified in the FSMA Opinion. Out of 133 press releases, only two new elements were identified that are not yet part of the FSMA Opinion.

IP AND REGULATORY EXCLUSIVITY RIGHTS — The first aspect is the disclosure of IP rights of a product in development and regulatory exclusivity rights. As previously discussed, IP rights make up a significant part of the drug development process. These rights are nevertheless not identified in the Belgian disclosure practices, nor mentioned in the FSMA Opinion. Accordingly, we conclude that the FSMA might consider adding a GP in the Opinion to encourage companies on the disclosure of their IP rights and its implications on a drug in development.

EXTENSIVE RISK DISCLOSURES — A second noteworthy foreign practice is the extensive risk disclosures in press releases. Foreign companies, especially the US firms, extensively inform investors about all risks involved in the development process of a drug. These risk disclosures contain information about side effects, trial design limitations, possible remarks of authorities, *etc*. This way, investors are warned about the inherent risk which lies in developing medicine in the biotech sector. Above all, such disclosures make press releases less one-sided, adds more nuanced and overall, makes the press release more complete.

SIMILAR ISSUES ABROAD AS IN BELGIUM — Like with new identified practices, also no country was identified that had a remarkably higher quality in press releases than Belgium. Moreover, the analysis showed that similar issues, as identified in the Belgian practices, occur in countries abroad as well. These problems include the lack of disclosure of primary and secondary endpoints at the start of the trial and, from a more overarching point of view, the significant differences in quality of press releases from different companies.

IMPACT OF NEWS ON NEXT STEPS — Looking into more detail, it is also apparent how certain aspects of press releases are disclosed differently by some companies. A first notable difference is how companies disclose the next step and timing in a press release. Some companies provide investors with an in-depth explanation of the effects caused by the disclosed news on the next steps of the drug development process and how this news could influence future discussions with authorities. This aspect was noticed in different types of press releases disclosing news about, among others, new partnerships, starts of clinical trials and clinical trial results.

NUANCE ABOUT FUTURE AND NEGATIVE NEWS — A second notable difference is the use of more nuanced and careful language when making statements about the future and the disclosure of negative news. This is especially true when publishing clinical trial results. The analysis showed that biotech firms listed on Nasdaq adhere more to the requirements of nuance and non-excessive or exaggerated terms than the average Belgian biotech firm. The Nasdaq listed companies provide investors with much more inside on the negative aspects of the drug development process and the language. Besides this, the language used is also much more scrupulous.

D. RECOMMENDATIONS FOR THE FSMA

INTRODUCTION — This last section provides an answer to the fourth sub question, *i.e.,* which recommendations could be given to the FSMA. These recommendations will be structured as follows. The first part will focus on the labelling practices of Belgian biotech companies. Next, recommendations regarding possible improvements to the FSMA Opinion are listed. This section concludes by listing all the points of attention on which the FSMA can then focus its efforts on a streamlined manner in the future.

1. Labelling practices

CORRECTNESS OF LABELLING — With respect to the issue of labelling price sensitive press releases legally incorrect, the points of improvement are elaborated on extensively already in part V.A. The main recommendations are resumed hereafter:

- The main priority, within the context of label use, for the FSMA should be to approach Galapagos and point out that it is required by law to clearly indicate that a press release contains inside information if this is the case. Currently, Galapagos merely uses the label "Regulated information" and this on a consistent basis, whilst the distinction between both labels should be made.
- Celyad, Nyxoah, Hyloris, MDxHealth and Bone Therapeutics use the correct label on some occasions, but use "Regulated information" more often. Clear communication from the FSMA about these companies' legal obligations, together with monitoring future label use, should resolve this problem.

ACCURACY OF LABELLING — Some companies conduct a poor *ex-ante* assessment on the potential significant effect of a press release on the stock price.

- UCB, Celyad, Oxurion and Biocartis all label only a small part of press releases that appeared to be significant. The FSMA should communicate to these companies that they should assess the price sensitive nature of press releases more loosely and label more often.
- Nyxoah, on the other hand, tends to label an overload of press releases. This should also be monitored by the FSMA to ensure no misuse is made on the labelling practice of press releases with the goal of boosting the company's value.

CATEGORIES —Some categories of press releases tend to cause a significant effect more often, without being labelled accordingly. The FSMA should monitor these categories more closely than others.

Labelled accurately	**More frequent labelling**
▪ Authority approval not granted ▪ Authority approval delayed ▪ Topline results ▪ Post-hoc analysis ▪ Patient recruitment ▪ Acquisition ▪ Partnership update ▪ Acquisition info ▪ New product ▪ Schedule of conferences ▪ Commercialization update	▪ Authority approvals ▪ Authority communication ▪ Interim results ▪ Publication of results ▪ Trial termination ▪ Clinical trial start ▪ New R&D partnership ▪ New commercial partnership
Monitor evolution	**Less frequent labelling**
▪ Presentation of results ▪ General conference presentation	▪ New commercial contract

*Repetition of Table 6: **Overview of labelling practices for different press release categories***

2. Companies to closely monitor

COMPANIES THAT ARE NOT COMPLIANT — From the analysis of press releases, it results that some companies only comply with the FSMA Opinion to a very limited extent. Constructive communication from the side of the FSMA should help to elevate the quality of these companies' disclosure practices step by step. It concerns the companies listed hereafter. Special attention should go to Celyad, that failed compliance in all categories.

- TheraVet (partnerships)
- MDxHealth (partnerships)
- Nyxoah (topline results)
- Oxurion (topline results and partnerships)
- Acacia Pharma (topline results)
- IBA (partnerships)
- DMS Imaging (trial updates)
- Onward Medical (trial updates)
- Celyad (failed all categories)

PRESS RELEASES PUBLISHING BAD NEWS — Press releases publishing bad news, such as negative trial results or the non-grant or delay of an authority approval, "deserve " special attention. This type of press releases, even when published by companies that comply with the Opinion for other types of news, displays multiple flaws. It is thus highly recommended that the FSMA monitors these press releases and their content thoroughly. Thereby, the authority should certainly pay attention to the following matters:

- Unclear title (typically merely containing *"update", e.g., "FDA update"*);
- No or very limited explanation on the reasons for not granting an approval;
- No or few data provided;
- No summary and contextual information; and
- Generally, short press release that is less comprehensive and elaborate.

3. Recommendations with respect to the Opinion

Combining insights from both the domestic and international analysis, multiple improvement points were identified that, if implemented, would add a lot of value to the FSMA Opinion. First, a generic comment regarding the Opinion as a whole is made. Next, two potential new GPs are discussed. Furthermore, existing GPs are pinpointed that could be expanded. Last, it is highlighted what GPs the FSMA should monitor closely.

GENERIC COMMENT — From the analysis of foreign regulators, it became clear that these opt for a more rigid framework with little room for companies to manoeuvre, whereas the FSMA provides a general principle-based framework in which the biotech companies have the freedom to transform the guidelines into concrete implementations. This is indeed adequate to avoid pushing towards unnecessarily detailed disclosures, however in some cases, it could be useful to formulate good practices more concrete. It is recommended to do so for every good practice that, following this research, does not seem to be implemented properly by biotech companies. For the good practices not causing issues, it is advisable to keep the open guidelines.

NEW GP — First, a potential new GP was identified, inspired by the international guidelines and foreign press releases. In our view, this aspect is currently underreported, but could add great value to the FSMA Opinion.

- The proposed GP is the disclosure of IP rights and regulatory exclusivity rights. As discussed before, these rights are of major importance to value a drug candidate and have great implications on the future revenues a drug might create. We suggest incorporating a new GP to encourage companies to disclose information on the IP rights of new drug candidate. Thereby, the GP could require companies to explain the IP right obtained, its duration and scope/restrictions.

EXPANSION OF GP — In our view, expansions of certain GPs can be helpful to make sure the right information is shared with investors.

- GP-09 of the FSMA Opinion clearly states that the press release must contain a balanced mix of non-technical and technical information to make the press release understandable for investors with different levels of knowledge. Most companies are able to provide this mix. However, often, more information is required when a very technical, disease specific scoring system or index is used to measure efficacy of a certain drug. An extra explanation could be added to GP-09 to encourage companies to explain these indexes.
- GP-13 instructs companies to include, where necessary, meaningful cautionary statements and explanations. This GP is then explained further with respect to forecasts of sales volume. In our view, this explanation should be expanded with the need for a risk disclosure. This risk disclosure could inform investors about all the risk related to the development process of a certain drug. For instance, a press release could indicate that although a successful phase III is achieved, this does not necessarily imply a marketing authorisation. The objective of this expansion is thus to avoid press releases to disclose information in an overly and solely positive manner (and this beyond the scope of sales forecasts, as the GP currently could be interpreted that way). The Opinion should, in this regard also explain that this risk disclosure should be tailored to the developments in

the drug development process concerned, such as safety profiles and efficacy of a drug, previous trial limitations, possible concerns raised by authorities but also partnerships and approval progression. This risk disclosure section could exist next to the already recommended "about" sections and should give an up-to-date nuanced outcurve to investors, warning them about the potential risk investing in the biotech sector implies.

- GP-21 states that, when possible, biotech companies should disclose their next step and the expected timing of these steps. After analysing international press releases, we believe that Belgian biotech companies could disclose much more detailed information about how the news presented influences future plans of the company, especially informing investors on the next steps and discussions involving the authorities. Companies could, for instance, disclose what the impact of clinical trial results or a new partnership could be for the next regulatory steps. In our view, an expansion of GP-21 could make this happen.

MONITOR GPS — Last, two GPs the FSMA which should be monitored closely, are discussed.

- GP-19 states that biotech companies should refer to their own website when relevant and that biotech companies should also clearly state what the primary and secondary endpoints of a clinical trial will be. Unfortunately, in the analysis it became clear that although these two requirements are very important, most companies struggle to meet these requirements.
  This GP could include more details as to improve on the quality of reporting. Currently, companies only refer to previous trials by providing one or two sentences on how positive these results were. This presents investors with a very shallow and one-sided view on a trial. An alteration of the GP could be that when companies, for example, disclose information on efficacy and safety of a previous trial, they should refer to the previous press release that contains the complete topline results of this trial. This way, investors can interpret the full results themselves, instead of relying on a few out-of-context sentences. Besides this, most companies also fail to disclose primary and secondary endpoints of a trial. These endpoints remain one of the most important features of a trial and therefore, solely disclosing that "safety and efficacy will be measured" does not suffice.
- GP-20 states that biotech companies should give a balanced view of favourable and less favourable findings. The international analysis made apparent that Belgian companies can make enormous improvements in this regard. As this is an important GP to ensure that investors are informed correctly, we encourage the FSMA to monitor this GP closely and reinforce it when necessary.

Add new GP	Expansion of GP	Monitor GP
• IP rights	• GP-09: Mix of non-technical and technical information • GP-13: Risk disclosure • GP-21: Next step and timing	• GP-19: Refer to own website • GP-19: Key features endpoints • GP-20: Positive and negative aspects of the trial

Table 8: ***Overview of the suggested adaptations for the FSMA Opinion***

VI. CONCLUSION

A. Labelling practices of Belgian biotech companies

A model was built implementing 3 different proxies: the BEL All-Share index, the SETM-BT index and the trading volume of the BEL All-Share index. This allowed the model to identify which press releases have a significant (positive or negative) impact on the stock price and/or the trading volume of a company.

CORRECTNESS OF LABELLING — Biotech companies use three different labels on press releases they expect to have a significant impact on the stock of their company. These labels are "Inside information", "Regulated information" and "Regulated and Inside information". Legally, only the last label is correct for press releases containing inside information (however by the sole use of "Inside information", the core message is clear as well for investors). Table 4 shows which companies were able to use the correct label and which ones were not.

Constant use of correct label	Constant use of wrong label	(1 or 2) Label mistake(s)	Alternating labels
• argenx • DMS Imaging • Sequana Medical	• Galapagos ("Regulated information") • Acacia Pharma ("Inside information") • Onward Medical ("Inside information")	• IBA • UCB • Mithra • Biocartis	• Celyad • Nyxoah • Hyloris • MDxHealth • Oxurion • Bone Therapeutics

Repetition of Table 4: ***Overview of label use per company***

The companies in the second column are probably unaware that they are using the label in a non-correct manner. We believe that clear communication between the FSMA and these companies should resolve this issue quickly. The companies in the third column made one or two labelling mistakes probably due to human error. We believe that the chance that this would happen again in the future is rather small. Companies alternately using both the wrong label and the right label, without a clear pattern, should be informed by the FSMA about the legal requirements of how to label their press releases. These labelling practices should then also be monitored by the FSMA in the foreseeable future.

ACCURACY OF LABELLING — The model identified press releases that had a significant impact on the stock. Data showed that 72% of all non-labelled press releases did indeed not have a significant effect on the stock. At the same time, 60% of all labelled press releases did have a significant effect. The top 6 performing companies, in terms of accurately labelling their press releases, publish labelled press releases of which 72% have a significant impact on the stock (Graph 5). This leads us to conclude that other companies can improve their labelling practices, as shown in table 5.

Best performing	Label more often	Label less often
▪ argenx ▪ Acacia Pharma ▪ Galapagos ▪ Mithra ▪ IBA ▪ Bone Therapeutics	▪ UCB ▪ Celyad ▪ Oxurion ▪ Biocartis	▪ Nyxoah

*Repetition of Table 5**: Overview of best performing companies in terms of frequency***

Further analysis showed how different types of press releases were labelled and how often a press release from a certain category caused a significant impact on investors' behaviour. The graph below shows what changes need to be made to the labelling practices for different press release categories.

Labelled accurately	More frequent labelling
▪ Authority approval not granted ▪ Authority approval delayed ▪ Topline results ▪ Post-hoc analysis ▪ Patient recruitment ▪ Acquisition ▪ Partnership update ▪ Acquisition info ▪ New product ▪ Schedule of conferences ▪ Commercialization update	▪ Authority approvals ▪ Authority communication ▪ Interim results ▪ Publication of results ▪ Trial termination ▪ Clinical trial start ▪ New R&D partnership ▪ New commercial partnership
Monitor evolution	**Less frequent labelling**
▪ Presentation of results ▪ General conference presentation	▪ New commercial contract

*Repetition of Table 6**: Overview of labelling practices for different press release categories***

The first quadrant contains press releases that are mostly labelled accurately. Here, no action of the FSMA is required. The second quadrant shows the types of press release the FSMA should monitor closely in the future. At this point in time, no general problems were identified for these categories. However, in specific cases, these press releases did contain important information that needed to be labelled. Hence, it is important that the FSMA monitors labelling practices for these press releases. The third category contains press releases which often have an impact on the sentiment of investors. Currently, these press releases are mostly not labelled while they do cause a significant effect on the stock market. Consequently, biotech companies should more critically assess their labelling practice towards these types of press releases. The fourth quadrant contains one type of press releases that is labelled too often. The reason for it might be to try and boost the importance of the company by making the press release seem more important. This practice should be kept to a minimum and should be monitored closely by the FSMA.

B. Biotech compliance with the FSMA Opinion

COMPLIANCE PER COMPANY — The first takeaway from the qualitative analysis concerns the significant discrepancy between companies in compliance with the FSMA Opinion. Some companies show a high tendency to follow the FSMA guidelines whilst others show the complete opposite. Companies like Sequana Medical and UCB publish press releases that generally adhere to the requirements of the Opinion (regardless of the topic). Other companies, such as Celyad, fail to do so throughout the whole line of categories. An overview of the companies' compliance is provided in table 9.

Company	Clinical trial updates	Topline results	Authority communication	Partnerships
Sequana Medical	Best	Best	Good	
Hyloris	Best		Good	Best
UCB		Good	Best	Best
Galapagos	Best	Good	Good	Best
Mithra	Good	Best	Good	
argenx		Best	Good	Good
Bone Therapeutics	Good	Best	Good	Good
Biocartis		Good	Good	Good
TheraVet	Good	Best		Failed
MDxHealth		Good	Good	Failed
Nyxoah		Failed	Good	Good
Oxurion	Good	Failed	Good	Failed
Acacia Pharma		Failed	Good	
IBA				Failed
DMS Imaging	Failed			
Onward Medical	Failed			
Celyad	Failed	Failed	Failed	Failed

Table 9: ***Companies' compliance with FSMA Opinion for different press release categories***

IMPACT FSMA OPINION —This thesis also analysed the impact of the FSMA Opinion on the disclosure practice of biotech firms. The second takeaway concludes that the overall impact of the FSMA Opinion seems rather low. This should however be nuanced, as the impact could only be measured for 21 out of the 68 possibilities (30,8%) as not all companies provided a *pre* and *post* Opinion press release for every category. The table below provides an overview on the companies and categories for which a comparison was possible. It also shows the extent of improvement after the publication of the FSMA Opinion for every company.

Some companies (Galapagos and UCB) did react on the Opinion by improving the quality of press releases for specific categories. Other companies, such as Hyloris or Acacia Pharma, show small or no improvement at all. The improvements prompted by the FSMA Opinion are very category and company specific. The largest improvements were observed in the press releases disclosing results of clinical trials. The Opinion also influenced the press releases disclosing partnerships and clinical trial updates. Improvements in the disclosure of authority communications were seen in only two companies.

Company	Clinical trial updates	Topline results	Authority communication	Partnerships
Galapagos	Medium	Big		Small
UCB		Small	Big	Small
IBA				Medium
Sequana Medical		Medium	No	
Mithra	Small	Medium	No	No
argenx		Small		Small
Bone Therapeutics	Small			Small
Celyad	Small			
Oxurion	Small			
Hyloris			Small	
Acacia Pharma			No	

Table 10: ***Companies' improvement made since the FSMA Opinion***

PRESS RELEASES PUBLISHING BAD NEWS — This type of press releases, even when published by companies that comply with the Opinion for other types of news, displays multiple flaws. The FSMA should monitor these press releases and their content thoroughly. Special attention should go to practices like an unclear title, limited explanation on the reasons for not granting an approval, no or few data provided, no summary and contextual information, and in general, less comprehensibility.

C. FSMA Opinion adaptations

Combining the insights resulting from the analysis of Belgian press releases, international guidelines and foreign companies, the following possible points of improvement for the FSMA Opinion were identified:

Add new GP	Expansion of GP	Monitor GP
• IP rights	• GP-09: Mix of non-technical and technical information • GP-13: Risk disclosure • GP-21: Next step and timing	• GP-19: Refer to own website • GP-19: Key features endpoints • GP-20: Positive and negative aspects of the trial

Repetition of Table 89: ***Overview of the suggested adaptations for the FSMA Opinion***

NEW GP — It is proposed to add a GP addressing the need to elaborate when, or if an IP right for a drug candidate is obtained, its duration, scope and restrictions. This would cover an important part of the drug development process to which currently little to no attention is being given.

EXPANSION OF GPS — It is recommended to expand GP-13 with the need for a risk disclosure in the press release that would inform investors about all the risk related and tailored to the development process of a certain drug, *e.g.,* risks related to the safety profiles and efficacy of a drug, but also partnerships and approval phases.

Next, GP-09 should be expanded in order to encourage companies to include explanations of specific scoring systems and indexes to make this aspect of the press release less technical. GP-21 should be expanded so that companies would disclose more information about how the presented news influences future plans of the company.

Companies should also provide investors with information on the next steps and discussions involving the authorities.

MONITOR GPS — GP-19 states that biotech companies should refer to their own website when relevant and clearly mention the endpoints of a clinical trial. Moreover, GP-20 states that biotech companies should give a balanced view of favourable and less favourable findings. The analysis showed that a majority of companies struggle to meet these important requirements. We encourage the FSMA to monitor these GPs closely and reinforce them when necessary.

This research concludes that most press releases succeed in transmitting the essence to the investor. It is, however, apparent that a minority of these press releases fully comply with the requirements of the FSMA. The publication of the FSMA Opinion already brought about important improvements within certain companies. For most companies, improvements can nevertheless still be made. Although a few recommendations are formulated to enhance the FSMA Opinion even more, the domestic and international analysis showed that this publication already contains all key elements and is quite unique in the world.

VII. FUTURE RESEARCH OPPORTUNITIES

We recognise this research paper is a long-term endeavour in which we have only taken the first steps. Our practical recommendations and conclusions might - and hopefully - already have an impact, but we believe we have only provided a glimpse of what future research may bring. The possibilities this thesis has opened are plenty. First, we were grateful we could pioneer a cooperation between the FSMA and Vlerick Business School. Hopefully, our thesis is the first among many mutual beneficial research projects.

Besides this, also academically we believe this research can serve as the foundation for many. During our nine-week journey, we inevitably encountered limitations to our work. A first thing that comes to mind is the limited timeframe from which we could take our sample. The main goal of this research was to qualitatively analyse press releases from Belgian biotech firms benchmarked against the FSMA Opinion. At date of writing, this Opinion however was written less than two years ago. Since developing a candidate product often takes several years to complete, this timeframe caused some biotech firms to not have run through the complete cycle of clinical trials. Additionally, some firms are currently taking their first steps as a public biotech firm. Consequently, partnerships, authority communications and other categories of press releases were occasionally impossible to identify.

Both elements caused a limit in our quantitative research as we were not able to analyse every category of press release for every biotech firm. For this reason, we would like to invite our future fellow researchers, whereas this will be future Vlerick (PhD) students, researchers or others working in service of the FSMA, to revise this research after two, three or four years in order to provide a more comprehensive overview of the Belgian biotech sector.

During this research, we did not only encounter limitations. We also stumbled upon many opportunities. This research looked abroad to identify possible common practices the Belgian biotech sector can take note of. Whereas we tried to look at as many markets as possible, we could - given the timeframe - only examine a limited number of markets and companies, and only conduct a qualitative analysis. This could however serve as the first step for much broader research, in which thorough multi-country, for instance European, studies can be conducted. Even a global study in which the entire biotech sector is included, falls within the scope of possibilities. Such research would provide of course for even more prominent insights, both from a quantitative and a qualitative perspective. It would be interesting to see whether the assumptions and conclusions made under this project would withstand global analysis.

Naturally, expanding the scope to multiple jurisdictions and increasing the number of companies and publications analysed, heavens the burden. We are nevertheless aware of the possibilities the current stage of technology offers. Through artificial intelligence (AI), and more specifically, supervised machine learning and natural language processing (NLP), the intensive task of going through press releases can be reduced significantly. NLP already offers the possibility of capturing the meaning of text through semantic analysis. Besides this, identifying trends and patterns in significant amounts of date through topic classification falls within the range of possibilities. Of course, to optimize NLP, machine learning is needed. This entails the practice of applying algorithms that teach programs how to automatically learn and improve from experience without being explicitly programmed.

Given our background and the limited time frame of this project, we were not able to apply these techniques and to develop, for instance, a topic classification model. For the purpose of this project, this was no necessity as there was only a "limited number" of press releases that needed to be analysed. However, these techniques open up numerous opportunities for future research.

The ultimate goal is a combination of all the above-mentioned elements. This could provide the FSMA with a tool in which biotech websites are permanently monitored on the publication of press releases containing inside information. These press releases would then automatically be analysed. From this analysis, a prediction could be deducted as to whether certain press releases contain inside information. In case the press release does not live up to the standard the FSMA Opinion upholds, the regulator could get a notification in which is indicated what good practice is lacking and whether this deficit is significant. Consequently, a regulator could instantly intervene upon publication and provide the company with suggestions or warnings to improve the quality of its disclosure practices. As such, these press releases could be adjusted so that investors would be informed with uniform publications among the whole biotech industry. This would, ultimately, ensure investors having the most complete and consistent piece of information at their disposal, giving them every possible opportunity to make the most appropriate investment decisions.

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IX. APPENDICES

Appendix A. Belgian biotech industry: pipeline and financials

Company	Pipeline size	Revenue	Operational cash flows	Profits before tax
Asic Biotech	0	3.885.000 €	-1.603.000 €	3.896.000 €
Biocartis	9	48.269.000 €	-65.716.000 €	-71.715.000 €
Bone Therapeutics	5	2.745.000 €	-12.784.000 €	-5.138.000 €
Celyad	4	0 €	-26.500.000 €	-26.600.000 €
Galapagos	9	484.846.000 €	-503.827.000 €	-122.999.000 €
Hyloris	7	3.096.000 €	-11.250.000 €	-11.282.000 €
IBA	0	311.955.000 €	33.054.000 €	100.425.000 €
MDxHealth	4	22.239.000 €	-22.548.000 €	-29.002.000 €
Mithra	6	22.668.000€	-87.875.000 €	-116.875.000 €
Nyxoah	1	800.000 €	-25.336.000 €	-24.639.000 €
Oxurion	2	1.100.000 €	-26.970.000 €	-29.500.000 €
Sequana Medical	2	370.500 €	-23.617.000 €	-23.615.000 €
UCB	16	5.777.000.000 €	1.553.000.000 €	1.226.000.000 €
Median	**4**	**3.885.000 €**	**-23.617.000 €**	**-24.639.000 €**
Average (UCB not included)*	**4,083**	**75.164.458 €**	**-64.581.000 €**	**-29.753.666 €**
Average (UCB included)	**5,0**	**513.767.192 €**	**59.848.307 €**	**66.842.769 €**

All Information in this table was extracted out of each biotech's annual reports of 2021.
*The average is shown without UCB, as one could argue about the pure biotechnology character of this company. Moreover, their excellent results could cause a distorted image of the industry financials.

Appendix B. Evaluation sheets

Different evaluation sheets were made for the most common press releases. The most important GPs, extracted from the FSMA Opinion, are structurally listed in the evaluation sheets which were used as a help tool during the qualitative analysis.
Abbreviations are used to show what GPs are more important than others:

- MH = a must have
- MH (IA) a must have if applicable
- NTH = a nice to have

Appendix B.1. Evaluation sheet topline and interim results

Topline and Interim results	
General good practices	
Non-technical and technical information	
MH	(GP 09) A balanced mix of non-technical and (supporting) technical information
MH	(GP 10) Technical information does not obscure the main, non-technical, messages
Specific good practices	
General + Efficacy & Safety results	
MH	(GP 18) A clear heading
MH (IA)	(GP 18) A clear summary that accurately reflects the content
MH	(GP 19)The main features of the clinical trial, for example:
Such as	Research Question
	Blinding
	Randomisation
	Target population
	Sample size
	Endpoints
MH	(GP 20) A clear and well-structured discussion of the main results and conclusions. The press release itself should contain all important findings
MH	(GP 20) A balanced view of favourable and less favourable findings
MH	(GP 20) The novelty of the results
MH (IA)	(GP 21) The next material step
MH (IA)	(GP 21) The expected timing
MH	(GP 22) Include in the summary whether or not the primary objectives and endpoints (for the primary analysis sample) have been met
Specific results	
MH	(GP 25) Sufficient quantitative information to support the main conclusions, giving insight into the clinical and, when relevant, statistical strength (typically indicated via p values).
MH	(GP 25) Contains at least those explanations and details that are necessary to ensure investors are not misled, such as disclosures on how the issuer reached and presented its results
MH	(GP 26) Do not overstate the significance and novelty of the results
MH (IA)	(GP 26) Distinguish, where relevant, between statistical and clinical significance
MH	(GP 26) Mention important caveats such as study limitations
MH	(GP 26) The novelty of the results is clear
Contextual information	(GP 27) Provide or refer to relevant contextual information about, for example:
NTH	(GP 27) The indication
NTH	(GP 27) Target market (size and trends)
NTH	(GP 27) The competitive landscape with existing treatments and their risk-benefit profile
NTH	(GP 27) The product candidate (and active comparator if used as control group) and how the issuer believes it can fill a gap, improving the risk-benefit profile versus other treatments
NTH	(GP 27) A sections after the body of the press release, entitled “About the [indication of interest/product candidate/active comparator]”
NTH	(GP 27) Refer to other documents of the issuer (such as the annual report or a prospectus) or thirdparty reports for more details or as a reference indicating the source of the information

Appendix B.2. Evaluation sheet start clinical trial

Start clinical trial	
General good practices	
Non-technical and technical information	
MH	(GP 09) A balanced mix of non-technical and (supporting) technical information
MH	(GP 10) Technical information does not obscure the main, non-technical, messages
Specific good practices	
General	
MH	(GP 18) A clear heading
MH (IA)	(GP 18) A clear summary that accurately reflects the content
MH	(GP 19)The main features of the clinical trial, for example:
Such as	Research Question
	Blinding
	Randomisation
	Target population
	Sample size
	Endpoints
	…
MH (IA)	(GP 21) The next material step
MH (IA)	(GP 21) The expected timing
Contextual information	(GP 27) Provide or refer to relevant contextual information about, for example:
NTH	(GP 27) The indication
NTH	(GP 27) Target market (size and trends)
NTH	(GP 27) The competitive landscape with existing treatments and their risk-benefit profile
NTH	(GP 27) The product candidate (and active comparator if used as control group) and how the issuer believes it can fill a gap, improving the risk-benefit profile versus other treatments
	(GP 27) A sections after the body of the press release, entitled “About the [indication of interest/product candidate/active comparator]”
NTH	(GP 27) Refer to other documents of the issuer (such as the annual report or a prospectus) or thirdparty reports for more details or as a reference indicating the source of the information

Trial halted (or trial on hold)	
General good practices	
Non-technical and technical information	
MH	(GP 09) A balanced mix of non-technical and (supporting) technical information
MH	(GP 10) Technical information does not obscure the main, non-technical, messages
Specific good practices	
General	
MH	(GP 18) A clear heading
MH (IA)	(GP 18) A clear summary that accurately reflects the content
MH	(GP 19)The main features of the clinical trial, for example:
Such as	Research Question
	Blinding
	Randomisation
	Target population
	Sample size
	Endpoints
	…
Trial halted	
MH	(GP 30) The fundamental underlying reason and considerations.
MH (IA)	(GP 31) Provide, to the extent possible, information on the probability and (earliest) timing for a potential resumption of the trial or the potential start of a new (modified) trial.
MH (IA)	(GP 32) Mention, if relevant, the potential impact on other trials with the same product candidate or the absence thereof

Appendix B.3. Evaluation sheet authorisation approval and communication

Authorisation approval & communication	
General good practices	
Non-technical and technical information	
MH	(GP 09) A balanced mix of non-technical and (supporting) technical information
MH	(GP 10) Technical information does not obscure the main, non-technical, messages
Specific good practices	
General	
MH	(GP 18) A clear heading
MH (IA)	(GP 18) A clear summary that accurately reflects the content
Approval & communication	
MH	(GP 33) Explain the scope and any limitations or restrictions
MH (IA)	(GP 34) Mention the next material step and, to the extent possible, the expected timing
IA: if the approval/communication is caused by specific trial results	(GP 25) Explain the main features en results of the clinical trial
Contextual information	(GP 27) Provide or refer to relevant contextual information about, for example:
NTH	(GP 27) The indication
NTH	(GP 27) Target market (size and trends)
NTH	(GP 27) The competitive landscape with existing treatments and their risk-benefit profile
NTH	(GP 27) The product candidate (and active comparator if used as control group) and how the issuer believes it can fill a gap, improving the risk-benefit profile versus other treatments
NTH	(GP 27) A sections after the body of the press release, entitled “About the [indication of interest/product candidate/active comparator]”
NTH	(GP 27) Refer to other documents of the issuer (such as the annual report or a prospectus) or thirdparty reports for more details or as a reference indicating the source of the information

Appendix B.4. Evaluation sheet partnership start

Partnership Start	
General good practices	
Non-technical and technical information	
MH	(GP 09) A balanced mix of non-technical and (supporting) technical information
MH	(GP 10) Technical information does not obscure the main, non-technical, messages
Specific good practices	
General	
MH	(GP 18) A clear heading
MH (IA)	(GP 18) A clear summary that accurately reflects the content
MH (IA)	(GP 21) The next material step
MH (IA)	(GP 21) The expected timing
Contextual information	(GP 27) Provide or refer to relevant contextual information about, for example:
NTH	(GP 27) The indication
NTH	(GP 27) Target market (size and trends)
NTH	(GP 27) The competitive landscape with existing treatments and their risk-benefit profile
NTH	(GP 27) The product candidate (and active comparator if used as control group) and how the issuer believes it can fill a gap, improving the risk-benefit profile versus other treatments
NTH	(GP 27) A sections after the body of the press release, entitled “About the [indication of interest/product candidate/active comparator]”
NTH	(GP 27) Refer to other documents of the issuer (such as the annual report or a prospectus) or thirdparty reports for more details or as a reference indicating the source of the information
Partnership	
MH	(GP 35) Provide sufficient qualitative information:
Such as	Description of the partner
	Partnership’s objective and advantages
	Material clauses with important rights and obligations
	Scope and the degree of exclusivity
	…
MH	(GP 35) Provide sufficient quantitative information:
Such as	Structure-payment terms
	Cash impact, payments planned & amounts
	Possible milostone fees and/or royalty payments
	Who will bear what costs
	…

Appendix B.5. Evaluation sheet partnership stop

Partnership Stop	
General good practices	
Non-technical and technical information	
MH	(GP 09) A balanced mix of non-technical and (supporting) technical information
MH	(GP 10) Technical information does not obscure the main, non-technical, messages
Specific good practices	
General	
MH	(GP 18) A clear heading
MH (IA)	(GP 18) A clear summary that accurately reflects the content
MH (IA)	(GP 21) The next material step
MH (IA)	(GP 21) The expected timing
Contextual information	(GP 27) Provide or refer to relevant contextual information about, for example:
NTH	(GP 27) The indication
NTH	(GP 27) Target market (size and trends)
NTH	(GP 27) The competitive landscape with existing treatments and their risk-benefit profile
NTH	(GP 27) The product candidate (and active comparator if used as control group) and how the issuer believes it can fill a gap, improving the risk-benefit profile versus other treatments
NTH	(GP 27) A sections after the body of the press release, entitled “About the [indication of interest/product candidate/active comparator]”
NTH	(GP 27) Refer to other documents of the issuer (such as the annual report or a prospectus) or thirdparty reports for more details or as a reference indicating the source of the information
Partnership	
MH	(GP 36) Mention, to the extent known, the fundamental underlying reasons and considerations
MH	(GP 37) Disclose the impact on the company:
Such as	Cash impact, payments planned & amounts
	Loss of milostone fees and/or royalty payments
	Material clauses with important rights and obligations when ending partnership
	Who will bear what costs
	…
MH	(GP 37) Provide longer-term considerations (new partner search, alternatives)

Appendix C. Belgian biotech industry: market caps and average market cap

Company	Market cap on June 7th, 2022 (in euros)
Bone	6.095.000,00 €
TheraVet	14.572.000,00 €
Oxurion	23.128.000,00 €
Celyad	42.477.000,00 €
Acacia Pharma	88.826.000,00 €
Biocartis	115.379.000,00 €
MDxHealth	115.573.000,00 €
DMS Imaging	201.097.000,00 €
Mithra	318.050.000,00 €
Hyloris	410.738.000,00 €
Galapagos	3.466.000.000,00 €
argenx	16.228.000.000,00 €

Companies not included (MedTech/Big Pharma)
UCB
IBA
Nyxoah
Sequana Medical
Onward Medical

Average market cap	Average market cap without Galapagos and argenx
1.752.494.583,33 €	133.593.500,00 €

Appendix D. Extract from Australian Code of Best Practice for Reporting by Life Science Companies

- **Regulatory exclusivity** is tied to approval of a product (e.g., drug, medical device or veterinary product) and may come in a number or forms depending on the country in which regulatory approval of the product has been granted. Examples of these forms of exclusivity (defined in the Glossary of Terms) are:
  - » Data exclusivity;
  - » Marketing exclusivity; and
  - » Orphan drug status.

It is important to note that none of the above rights necessarily provide a company the right to actually use their technology without infringing another company's IP or regulatory exclusivity rights.

What should be disclosed?

The basic principle is that all matters pertaining to IP should be disclosed if they are likely to have a material effect on the price of securities (e.g., if they have a material effect on the ability of a company to maintain market exclusivity) and they are unlikely to be prejudicial to the company. Chapter 3 of the Listing Rules and Guidance Note 8 provide an explanation of general information that need not be disclosed. If a company elects to disclose information, it should also explain the commercial significance of that information. A clear and comprehensive explanation will assist investors to understand the value of the IP.

Examples of information that companies should consider disclosing include:

Patents

The level of disclosure in relation to patents may vary from company to company. For example, if a company's major market is the US, after grant of a US patent the company may disclose the fact that the patent has been granted, the patent number, the expiry date and a brief discussion of the subject matter claimed and how it relates to the company's commercial activities.

Companies may also consider reporting grant of a patent term extension, since this will confer an additional period of exclusivity protecting a commercial product.

The fact that a patent application has been filed is seldom material, it is generally only after grant that a patent right becomes a material asset, which should be disclosed. If information relating to patent filings or progress on patent applications is made, however, communication to the market should be balanced and informative. Particular care needs to be taken to ensure that investors are not given a misleading impression of the breadth of protection afforded by a patent, the likelihood of grant of a patent or the ability of the company to enforce its patent rights.

Trade secrets

Obviously, companies cannot disclose their confidential information in reports to the market. However, they should consider disclosing if there has been a loss of confidentiality in any of their trade secrets, particularly for important or essential technologies, or if they have commenced litigation to prevent or gain re-imbursement for theft of trade secrets.

Regulatory exclusivity

Companies should consider disclosing any events that result in gain or loss of regulatory exclusivity. Such events could be approval of a new product by a regulatory body, approval of a new indication for a drug, approval of orphan drug status, expiry of market/data exclusivity or successful challenge to orphan drug status. Regulatory exclusivities vary from country to country and care should be taken when reporting on the extent of the right and period of exclusivity conferred.

Adverse actions

If material, challenges to a company's IP rights (e.g., by opposition or re-examination of patents), challenges a company makes to a competitors IP rights, and publicly available information regarding litigation such as infringement claims should be reported to the market. Similarly, resolution of challenges or litigation may also be reported. Of course, the materiality of any information must be considered on a case-by-case basis. For large companies involved in many oppositions on a regular basis, it may not be material that they have commenced a new opposition. However, for a small company built on single technology, a challenge to a patent covering that technology may be material.

4.5 Licensing and other relationships of commercial significance

This section deals with licensing and other relationships that can have a significant influence on valuation. The types of arrangements that may require disclosure under this section include:

- Material transfer agreements;
- R&D collaborations;
- Licensing agreements;
- Supply agreements;
- Co-marketing agreements;
- Joint ventures;
- Partnerships and alliances

Companies must balance commercial sensitivity and the need to enable investors to properly assess the value of the transaction. There is often commercial sensitivity to the publication of details of these agreements, and parties to transactions which do not have Listing Rule disclosure obligations may object to their disclosure. As discussed in Section 2 of the Code, in these situations it is important that companies carefully evaluate their obligations under Listing Rule 3.1.

Appendix E. Overview of analysed Belgian press releases

Appendix E.1. Bone Therapeutics

Bone Therapeutics										
	Prior					Post				
Type	Datum	Regulated	Inside	Koersgevoelig	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval										
Authority approval delayed										
Authority approval not granted										
Authority communication	20/12/2019	No	No	No	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=c4ce102394					
	23/03/2020	Yes	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=4fde3fd18e					
Clinical trial start (first patient)	18/05/2020	No	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=7df258149e	12/01/2021	Yes	No	No	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=b679d7f81d
First patient treated										
Intermediate results	13/06/2019	Yes	Yes	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=68f1988df4	19/07/2021	Yes	No	No	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=2f0a632c42
	14/10/2020	No	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=2c226a07b9					
New commercial partnership	5/10/2020	Yes	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=44b8013b39	29/11/2020	Yes	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=74ad55b1fb
						29/10/2020	Yes	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=422214c4ae
New partnership						28/09/2021	Yes	No	No	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=6324e28787
						14/01/2021	Yes	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=092cdd1045
						10/11/2020	Yes	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=1f38dd8cc0
Partnership end										
Partnership update										
Patient recruitment	20/10/2020	Yes	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=be94da927e	22/12/2020	Yes	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=11977997d0
Post-hoc analysis										
Presentation announcement										
Presentation results										
Publication announcement										
Publication results										
Topline results	14/09/2018	Yes	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=b466c4732c	30/06/2021	No	No	No	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=faa82af5a0
	17/10/2018	No	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=917301c58c					
Trial end	6/11/2018	Yes	Yes	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=83d76c1da9	30/08/2021	Yes	No	Yes	https://us9.campaign-archive.com/?u=514b2fb84e2983c90f0acbd2a&id=26e61ce5c6
Trial on hold										

Appendix E.2. Acacia Pharma

Acacia										
	Prior					Post				
Type	Datum	Regulated	Inside	Koersgevoelig	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval	2/07/2020	No	Yes	Yes	https://acaciapharma.com/news/2020/07/acacia-pharma-announces-us-fda-approval-of-byfavo-remimazolam-for-injection-					
	27/02/2020	No	Yes	Yes	https://acaciapharma.com/news/2020/02/acacia-pharma-announces-us-approval-of-barhemsys-amisulpride-for-the-					
	27/07/2020	No	Yes	No	https://acaciapharma.com/news/2020/07/acacia-pharma-advances-preparations-for-us-launch-of-barhemsys					
Authority approval delayed										
Authority approval not granted										
Authority communication	6/10/2020	No	Yes	Yes	https://acaciapharma.com/news/2020/10/acacia-pharma-announces-byfavo-remimazolam-its-newly-approved-product-for-procedural-sedation-clears-final-hurdle-on-path-to-commercial-	29/09/2021	No	Yes	Yes	https://acaciapharma.com/news/2021/09/acacia-pharma-announces-submission-and-validation-of-marketing-authorization-application-for-barhemsys-amisulpride-injection-in-major-european-markets
	12/03/2020	No	Yes	Yes	https://acaciapharma.com/news/2020/03/acacia-pharma-announces-brief-extension-of-fda-review-period-for-nda-for-byfavo	16/09/2021	No	Yes	No	https://acaciapharma.com/news/2021/09/acacia-pharma-announces-initiation-of-pivotal-study-of-byfavo-in-pediatric-procedural-sedation
	26/09/2019	No	Yes	Yes	https://acaciapharma.com/news/2019/09/acacia-pharma-announces-new-barhemsys-pdufa-target-date-of-26-february-2020					
	8/07/2019	No	Yes	Yes	https://acaciapharma.com/news/2019/07/acacia-pharma-plans-to-resubmit-the-barhemsys-nda-in-q3-2019					
	3/05/2019	No	Yes	Yes	from-fda-for-barhemsys					
	8/10/2018	No	Yes	Yes	review-of-barhemsys					
	7/12/2018	No	Yes	No	date-confirmed-for-5-may-2019					
	15/10/2018	No	Yes	No	regulatory-review-of-barhemsys					
Clinical trial start (first patient)										
Commercialisation update	24/08/2020	No	Yes	Yes	https://acaciapharma.com/news/2020/08/barhemsys-amisulpride-injection-launched-and-commercially-available-in-the-us-for-the-treatment-and-prevention-of-postoperative-nausea-vomiting-ponv	1/07/2021	No	Yes	Yes	https://acaciapharma.com/news/2021/07/acacia-pharma-announces-significant-continued-progress-with-formulary-uptake-of-barhemsys-and-byfavo-in-the-us
	15/07/2020	No	Yes	Yes	https://acaciapharma.com/news/2020/07/acacia-pharma-assigned-us-license-for-byfavo-remimazolam-by-cosmo-pharmaceuticals-nv	28/01/2021	No	Yes	No	https://acaciapharma.com/news/2021/01/acacia-pharma-launches-byfavo-remimazolam-in-the-united-states-for-procedural-sedation-in-adults-
Intermediate results										
New commercial partnership	10/01/2020	No	Yes	Yes	https://acaciapharma.com/news/2020/01/acacia-pharma-enters-into-strategic-in-licensing-investment-and-loan-transaction-with-					
New partnership										
Partnership end										
Partnership update										
Patient recruitment										
Post-hoc analysis	12/07/2019	No	No	No	https://acaciapharma.com/news/2019/07/editorial-on-positive-data-for-barhemsys-treatment-of-ponv-published-in-anesthesia-analgesia	13/12/2021	No	Yes	Yes	https://acaciapharma.com/news/2021/12/acacia-pharma-announces-successful-completion-of-barhemsys-post-approval-requirement-study-in-
Publication results	12/12/2018	No	No	No	https://acaciapharma.com/news/2018/12/positive-clinical-results-for-apd403-in-cinv-published-in-supportive-care-in-cancer					
Topline results	22/01/2019	No	No	No	data-for-barhemsys					
Trial end										
Trial on hold										

Appendix E.3. IBA

IBA										
	Prior					Post				
Type	Datum	Regulated	Inside	Koersgevoelig	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval	17/12/2018	No	No	No	https://www.iba-worldwide.com/sites/protontherapy/files/media_docume	28/09/2021	No	No	No	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/
	18/09/2018	No	No	No	worldwide.com/sites/protontherapy/files/media_docume					
Authority approval delayed										
Authority approval not granted										
Authority communication										
Clinical trial start (first patient)						24/08/2021	No	No	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/210824_protecttrial_iba_pr_en.pdf
Commercialisation update	29/03/2019	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/290319_iba_industrial-northstar-en.pdf	5/05/2022	Yes	No	No	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/220505_p-cgnnt-order_en.pdf
	24/09/2020	Yes	Yes	No	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/20200924_downpayment_cgn-en.pdf	20/12/2021	No	No	No	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/211220-pr-iba_induxcenter-en.pdf
	21/10/2018	No	No	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/pr_arctherapy_18oct_final.pdf					
First patient treated	16/09/2020	No	No	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/20200916-1st_patient-leuven-en-final.pdf					
	25/01/2019	No	No	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/mid_77121_a_first_patient_apollo.pdf					
New commercial contract	1/09/2020	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/20.09.01-iba-proetus_plus-sichuan-en.pdf	14/02/2022	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/220214-p1-sogaz-russia-en.pdf
	28/01/2020	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/2019_12_04_georgia_press_release_v10_-_clean_corporate_0.pdf	23/12/2021	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/iba20212312-arkansas-p1-en-final.pdf
	29/03/2019	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/200319-iba-selected-to-install-proteusplus-shenzen-en-final_clean.pdf	19/11/2021	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/211118-iba-aviano-p1-en.pdf
	21/12/2018	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/20181214-iba_to_install_proton_therapy_center_in_charleroi-and-dosi-update-en.pdf	7/04/2021	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/20210407-iba-advocate-ro-en-final.pdf
	29/05/2018	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/180529_china_iba_press_release_onep1_final_0.pdf	21/12/2021	Yes	Yes	No	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/211221_iba-new-mexicop1-en-b.pdf
New commercial partnership	26/08/2020	Yes	Yes	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/200824_iba_marco_polo_v8_final_1.pdf					
New partnership	22/10/2018	No	No	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/181022_victoria_final.pdf	15/09/2021	No	No	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/20210915-iba_and_sck-ac225-en-ff.pdf
New product	20/09/2019	No	No	No	https://www.iba-worldwide.com/content/iba-subsidiary-normandy-hadrontherapy-launches-development-carbon-therapy-system-normandy	26/01/2022	No	No	No	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/20220126-iba_launches_new_compact_cyclotron_cyclone_key-en.pdf
Partnership end										
Partnership update	9/03/2020	No	No	Yes	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/pr-iba-mcgill-collaboration_en.pdf	26/10/2021	No	No	No	https://www.iba-worldwide.com/sites/protontherapy/files/media_document/2110126-iba_raysearch-astro21-en.pdf

Appendix E.4. Sequana Medical

Sequana Medical										
	Prior					Post				
Type	Datum	Regulated	Inside	Koersgevoelig	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval	4/06/2019	Yes	Yes	Yes	content/uploads/2019/06/Press-release_FDA-approval-start-POSEIDON_ENG.pdf					
Authority approval delayed										
Authority approval not granted										
Authority communication						14/02/2022	No	No	Yes	https://www.sequanamedical.com/wp-content/uploads/2022/02/Press-Release_MDR-certification_14-Feb-2022_English_vF.pdf
						3/11/2021	No	No	Yes	https://www.sequanamedical.com/wp-content/uploads/2021/11/Press-Release_MDSAP-certification_ENG_3-Nov-2021_vF.pdf
Clinical trial start (first patient)	7/01/2020	No	No	No	https://www.sequanamedical.com/wp-content/uplo	1/06/2021	No	No	No	https://www.sequanamedical.com/wp-content/uploads/2021/05/Press-Release_FPI-SAHARA_1-June-2021_ENGLISH_vF.pdf
First patient treated										
Intermediate results	22/10/2020	Yes	Yes	Yes	https://www.sequanamedical.com/wp-content/uploads/2020/10/Press-Release_Interim-RED-DESERT_ENG_20201022_vF.pdf	19/11/2020	Yes	Yes	Yes	https://www.sequanamedical.com/wp-content/uploads/2020/11/Press-Release-POSEIDON-early-interim_ENG_19-Nov-2020_vF.pdf
						7/12/2021	Yes	Yes	No	https://www.sequanamedical.com/wp-content/uploads/2021/12/Press-Release_SAHARA-interim_7-Dec-2021_ENGLISH_vF.pdf
						1/07/2021	Yes	Yes	No	https://www.sequanamedical.com/wp-content/uploads/2021/06/Press-Release_POSEIDON-second-interim_1-July-2021_ENG_vF.pdf
						5/04/2022	No	No	Yes	https://www.sequanamedical.com/wp-content/uploads/2022/04/Press-Release_POSEIDON-Implantation_5-April-2022_ENGLISH_vF.pdf
New partnership										
New product										
Partnership end										
Partnership update										
Patient recruitment						4/10/2021	Yes	Yes	No	https://www.sequanamedical.com/wp-content/uploads/2021/10/Press-Release_POSEIDON-patient-expansion_ENG_4-Oct-2021_vF.pdf
						6/12/2021	No	No	Yes	https://www.sequanamedical.com/wp-content/uploads/2021/12/Press-Release_EoR-POSEIDON_6-Dec-2021_ENGLISH_vF.pdf
Publication results	16/06/2020	No	No	No	https://www.sequanamedical.com/wp-content/uploads/2020/06/Press-release_MOSAIC-paper_16-June-2020_ENG.pdf					
Topline results	27/05/2019	Yes	Yes	No	https://www.sequanamedical.com/wp-content/uploads/2019/05/Press-release_FIH-DSR-results_ENG.pdf	11/05/2021	Yes	Yes	No	https://www.sequanamedical.com/wp-content/uploads/2021/05/Press-Release_Topline-RED-DESERT_11-May-2021_ENGLISH_vF.pdf
Trial end										
Trial on hold										

Appendix E.5. Biocartis

Biocartis										
	Prior					Post				
Type	Datum	Regulated	Inside	Koersgevoelig	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval	28/02/2019	No	No	No	ess-releases/2019/190227-Press-release-MSI-launch-ce-ivd_ENG.pdf	30/11/2021	No	No	Yes	s/2021-11/211130%20PR%20SeptiCyteRAPID_510k_ENG
Authority approval delayed										
Authority approval not granted										
Authority communication										
Clinical trial start (first patient)										
First patient treated										
Intermediate results										
New commercial partnership	3/09/2018	Yes	Yes	Yes	https://investors.biocartis.com/sites/default/files/press-releases/2019/180831-PR-Biocartis-and-Wondfo-China_EN.pdf	26/03/2020	Yes	No	No	https://investors.biocartis.com/sites/default/files/press-releases/2020/200325_pr_sepsis_ixp_eng_final.pdf
	12/03/2019	No	No	Yes	https://investors.biocartis.com/sites/default/files/press-releases/2020/190311_press_release_bms_eng_final.pdf	4/05/2021	No	No	No	https://investors.biocartis.com/sites/default/files/2021-04/210503%20PR%20AZ_EGFR_NewCollaboration_ENG_FINAL.pdf
New partnership	29/11/2018	No	No	No	https://investors.biocartis.com/sites/default/files/press-releases/2019/181128-PR-AstraZeneca-EN.pdf	22/04/2021	Yes	Yes	Yes	https://investors.biocartis.com/sites/default/files/2021-04/210421%20PR%20Skyline_ENG_FINAL.pdf
						3/11/2020	No	No	Yes	https://investors.biocartis.com/sites/default/files/press-releases/2020/201102_pr_endpoint_eng_final_1.pdf
Partnership end						29/10/2020	Yes	Yes	Yes	https://investors.biocartis.com/sites/default/files/press-releases/2020/201029_pr_exas_outcome_eng_final.pdf
Partnership update	3/12/2018	No	No	Yes	https://investors.biocartis.com/sites/default/files/press-releases/2019/181203-PR-GH_Biocartis_Expansion_EN.pdf	29/10/2020	Yes	Yes	Yes	https://investors.biocartis.com/sites/default/files/press-releases/2020/201029_pr_exas_update_eng_final.pdf
	1/09/2020	No	No	Yes	https://investors.biocartis.com/sites/default/files/press-releases/2020/200831_pr_lifearc_eng_final.pdf					
Patient recruitment										
Post-hoc analysis										
Publication results	26/06/2020	No	No	No	https://investors.biocartis.com/sites/default/files/press-releases/2020/200625_pr_idyllamulticenterstudyus_eng_final.pdf	4/05/2022	No	No	Yes	https://investors.biocartis.com/sites/default/files/2022-05/220503%20PR%20GeneFusion_MSKCC_ENG_FINAL.pdf
	27/06/2018	No	No	No	https://investors.biocartis.com/sites/default/files/press-releases/2019/180626_PR_Idylla_Supersummary_EN.pdf	25/01/2022	No	No	Yes	https://investors.biocartis.com/sites/default/files/2022-01/220124%20PR%20EGFR%20Study%20UK_ENG_FINAL_0.pdf
Topline results										
Trial end										
Trial on hold										

Appendix E.6. Celyad

Celyad										
	Prior					Post				
Type	Datum	Regulated	Inside	Koersgevoelig	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval										
Authority approval delayed										
Authority approval not granted										
Authority communication	24/07/2018	Yes	No	No	https://celyad.com/2018/07/24/celyad-announces-fda-acceptance-of-ind-application-for-cyad-101-a-first-in-class-non-gene-edited-allogeneic-car-t-candidate/					
Clinical trial start (first patient)	13/01/2020	No	No	Yes	https://celyad.com/2020/01/13/celyad-successfully-doses-first-patient-with-cyad-02-in-cycle-1-trial-for-r-r-aml-and-mds/	4/12/2020	No	No	Yes	https://celyad.com/wp-content/uploads/2020/12/Celyad-Oncology-IMMUNICY-vFinal-1.pdf
Intermediate results						11/06/2021	No	No	Yes	https://celyad.com/2021/06/11/celyad-oncology-presents-preliminary-data-from-phase-1-immunicy-1-trial-of-shrna-based-allogeneic-car-t-candidate-cyad-211-in-relapsed-refractory-multiple-myeloma-at-the-european-hematology-associatio/
						18/01/2021	No	No	Yes	https://celyad.com/2021/01/18/celyad-oncology-presents-data-update-from-phase-1-alloshrink-trial-for-cyad-101-in-mcrc-at-asco-gi-symposium/
New commercial partnership	4/10/2018	No	No	Yes	https://celyad.com/2018/10/04/celyad-announces-exclusive-agreement-for-horizon-discoverys-shrna-platform-to-develop-next-generation-allogeneic-car-t-therapies/					
	29/09/2020	Yes	Yes	No	https://celyad.com/wp-content/uploads/2020/09/Celyad-Oncology-Merck-KEYTRUDA-Collaboration_vFinal.pdf					
New partnership										
Partnership end										
Patient recruitment										
Post-hoc analysis	1/06/2020	No	No	Yes	https://celyad.com/wp-content/uploads/2020/06/Post-ASCO-Press-Release_vFinal.pdf	12/11/2020	Yes	No	No	https://celyad.com/2021/11/12/celyad-oncology-presents-preclinical-data-on-allogeneic-car-t-therapy-program-and-highlights-keynote-b79-clinical-trial-design-at-the-society-for-immunotherapy-of-cancer-sitc-36th-annual-meeting/
Presentation announcement	10/12/2019	No	No	Yes	https://celyad.com/2019/12/10/celyad-presents-update-on-r-r-aml-and-mds-program-at-61st-ash-annual-meeting/	7/12/2020	Yes	Yes	Yes	https://celyad.com/wp-content/uploads/2020/12/Celyad-Oncology-Post-ASH-Press-Release_vFinal.pdf
Presentation results	9/11/2018	Yes	Yes	Yes	https://celyad.com/2018/11/09/celyad-presents-update-on-cyad-01-solid-tumor-clinical-program-at-the-sitc-33rd-annual-meeting/	13/12/2021	No	No	Yes	https://celyad.com/2021/12/13/celyad-oncology-presents-updates-on-shrna-based-car-t-programs-at-the-63rd-ash-annual-meeting-and-exposition/
	1/11/2018	Yes	Yes	Yes	https://celyad.com/2018/11/01/celyad-to-present-new-cyad-01-data-from-think-study-in-relapsed-refractory-acute-myeloid-leukemia-at-2018-ash-annual-meeting/	20/07/2021	No	No	Yes	https://celyad.com/2021/07/20/celyad-oncology-presents-updates-on-allogeneic-car-t-clinical-candidates-and-shrna-based-preclinical-concepts-at-research-development-day/
Topline results										
Trial end										
Trial on hold						2/03/2022	Yes	No	Yes	https://celyad.com/2022/03/02/celyad-oncology-announces-clinical-hold-of-cyad-101-002-phase-1b-trial/
						28/02/2022	Yes	No	Yes	https://celyad.com/2022/02/28/celyad-oncology-announces-voluntary-pause-of-cyad-101-002-phase-1b-trial/

Appendix E.7. Nyxoah

Nyxoah										
	Prior					Post				
Type	Datum	egulate	Inside	rsgevo	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval						4/10/2021	Yes	Yes	No	release-details/nyxoah-announces-ce-mark-indication-approval-treat-complete
						14/09/2021	Yes	Yes	No	https://nyxoah.gcs-web.com/news-releases/news-release-details/nyxoah-announces-us-fda-breakthrough-
						9/02/2021	No	No	No	https://nyxoah.gcs-web.com/news-releases/news-release-details/nyxoah-receives-fda-approval-full-body-15t-and-3t-mri
Authority approval delayed										
Authority approval not granted										
Authority communication										
Clinical trial start (first patient)						3/03/2021	No	No	Yes	https://nyxoah.gcs-web.com/news-releases/news-release-details/nyxoah-announces-publication-first-positive-clinical-data-osa
Commercialisation update						10/01/2022	Yes	No	No	https://nyxoah.gcs-web.com/news-releases/news-release-details/nyxoah-provides-general-corporate-update
First patient treated										
Intermediate results										
New commercial partnership										
New partnership						2/02/2021	No	No	Yes	https://nyxoah.gcs-web.com/news-releases/news-release-details/nyxoah-and-vanderbilt-university-enter-exclusive-licensing
Partnership end										
Partnership update										
Patient recruitment										
Post-hoc analysis										
Presentation announcement	24/02/2021	No	No	Yes	https:/	10/03/2022	Yes	No	No	https://nyxoah.gcs-web.com/news-releases/news-release-details/nyxoah-participate-oppenheimer-32nd-annual-healthcare-conference
						4/02/2022	Yes	No	No	https://nyxoah.gcs-web.com/news-releases/news-release-details/nyxoah-present-btig-medtech-digital-health-life-science
						13/09/2021	Yes	No	Yes	https://nyxoah.gcs-web.com/news-releases/news-release-details/nyxoah-announces-participation-cantor-2021-virtual-global
						14/03/2022	Yes	No	No	https://nyxoah.gcs-web.com/news-releases/news-release-details/nyxoah-announces-participation-cantor-2021-virtual-global
Topline results						7/06/2021	Yes	Yes	No	https://nyxoah.gcs-web.com/news-releases/news-release-details/nyxoah-better-sleep-trial-reaches-its-primary-endpoints
Trial end										
Trial on hold										

Appendix E.8. Oxurion

Oxurion

	Prior					Post				
Type	Datum	egulate	Inside	rsgevc	Link	Datum	egulate	Inside	rsgevc	Link
Authority communication						7/01/2022	No	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20-%20Clinical%20Pipeline%20Update%20-%20PR%20FINAL.pdf
						10/06/2021	No	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20PR%20-%20THR687%20IND%20IRB%20Phase%202%20in%20DME_%20100621.pdf
						9/11/2020	Yes	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20-%20New%20Patent%20THR%20687%20-%20EN%20FINAL.pdf
Clinical trial start (first patient)	1/09/2020	No	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20THR-149%20PH2%20FPI%20PR%20_%20FINAL%20EN%20%281%29.pdf	15/11/2021	No	No	No	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20-%20THR149%20PartB%20FPI%20FINAL.pdf
Intermediate results	20/08/2019	No	Yes	Yes	https://www.oxurion.com/content/oxurion-nv-reports-topline-month-3-results-phase-2a-study-evaluating-thr-317-anti-plgf					
	1/06/2019	No	No	No	https://www.oxurion.com/sites/default/files/upload/news/PR%20OXUR-Topline%20THR-149%20001%20FIN%20010719.pdf					
New partnership	5/11/2018	No	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/181105%20-%20OXUR%20PR%20BThpx%20051118%20EN.pdf					
Partnership end										
Partnership update	22/10/2018	No	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20PR%20Retina%20Global%20Partnership%2022102018.pdf					
Patient recruitment	4/09/2019	No	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/PR%20OXUR%20THR%20687%20FE%20040919%20FINAL.pdf	7/01/2022	No	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20-%20Clinical%20Pipeline%20Update%20-%20PR%20FINAL.pdf
	24/04/2019	No	No	Yes	https://www.oxurion.com/content/oxurion-nv-announces-full-enrollment-phase-1-trial-evaluating-safety-plasma-kallikrein	8/06/2021	No	No	No	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20PR%20-%20THR149%20Ph2%20PartA%20EC_080621%20%281%29.pdf
Post-hoc analysis										
Presentation results	9/02/2020	Yes	No	No	https://www.oxurion.com/sites/default/files/upload/news/OXUR-%20Angiogenesis%20THR687%20Ph%20I%20Topline%20Data%20FIN%20090220_.pdf	3/05/2022	No	No	No	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20ARVO%202022%20Data%20Release%20FINAL.pdf
						14/02/2022	No	No	No	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20-%20Data%20from%20Agiogenesis%202022%20-%20final2.pdf
Publication results						17/08/2021	No	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20-%20Publication%20THR687%20Ph%201%20data%20Ophthalmology%20Science%2017082021%20FINAL.pdf
						7/04/2021	No	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/OXUR-%20THR687%20in%20Progress%20in%20Retinal%20and%20Eye%20Research%20-%20Final%20%281%29.pdf
Topline results	7/01/2020	Yes	No	Yes	https://www.oxurion.com/sites/default/files/upload/news/PR%20OXUR-Topline%20THR-687%20001%2007012020%20FIN.pdf					
Trial end	19/12/2019	Yes	No	No	https://www.oxurion.com/sites/default/files/upload/news/OXUR-BusClinical%20Update%2019122019%20EN.pdf	25/06/2021	No	No	No	https://www.oxurion.com/sites/default/files/upload/news/OXUR%20-%20Focus%20Organisation%20250621%20FINAL.pdf
Trial on hold	28/03/2020	No	No	No	https://www.oxurion.com/content/oxurion-nv-covid-19-statement					

Appendix E.9. DMS Imaging

DMS Imaging										
	Prior					Post				
Type	Datum	egulate	Inside	rsgevc	Link	Datum	egulate	nsider	rsgevc	Link
Authority approval										
Authority approval delayed										
Authority approval not granted										
Authority communication	7/10/2019	No	Yes	No	https://www.asitbiotech.com/images/gb/pdf/2019/2019-10-07_-_ASIT_PR_-GMP_certification-ENG-Final_9b8f4_51ea5.pdf					
	26/11/2018	No	No	Yes	https://www.asitbiotech.com/images/gb/pdf/2018/261118_PR_ASIT_GMP_Unit_EN_eb43c.pdf					
	17/12/2018	No	No	Yes	https://www.asitbiotech.com/images/gb/pdf/2018/PR_ASIT_lots-hdm_EN_6ce36.pdf					
Clinical trial start (first patient)	31/01/2019	Yes	Yes	Yes	https://www.asitbiotech.com/images/gb/pdf/2019/PR_gpASIT_011-First_Patient_In_EN_bb17d.PDF					
Commercialisation update						25/01/2022	No	No	No	https://www.asitbiotech.com/images/fr/pdf/2022/ASIT_CP_Closing-ASIT-Biotech_25012022_FR_0bd06.pdf
First patient treated						16/04/2021	No	No	No	https://www.asitbiotech.com/images/fr/pdf/2021/2021-04-16-PR-FR_Signature_du_traite_dapport_6901b.pdf
Intermediate results	29/03/2019	No	No	Yes	https://www.asitbiotech.com/images/gb/pdf/2019/PR_ASIT_SAB_EN_cfc1a.pdf					
New commercial partnership						4/04/2022	No	No	No	https://www.asitbiotech.com/images/PDF/en/2022/DMS-Imaging_CP_MicroX_04042021-FR_a6557.pdf
New partnership	20/09/2020	Yes	Yes	Yes	https://www.asitbiotech.com/images/fr/pdf/2020/2020-09-20_Press_release_partenariat_et_prorogation_sursis_700e0.pdf					
New product	11/06/2018	Yes	Yes	Yes	https://www.asitbiotech.com/images/gb/pdf/2018/PR_ASIT_peanut_ENG_vf.pdf					
	25/06/2018	Yes	Yes	No	https://www.asitbiotech.com/images/gb/pdf/2018/PR_ASIT_newHDM_vf_EN.pdf					
Partnership end										
Partnership update	5/11/2018	Yes	Yes	No	https://www.asitbiotech.com/images/gb/pdf/2018/PR_ASIT_BIO2018_EN.pdf					
Patient recruitment	2/05/2019	Yes	Yes	No	https://www.asitbiotech.com/images/gb/pdf/2019/190502_PR_ASIT_NewMilestones_EN_f7aa1.pdf					
	2/04/2019	Yes	Yes	Yes	https://www.asitbiotech.com/images/gb/pdf/2019/190329_PR_ASIT_FYR-2018_EN_ae9be.pdf					
Post-hoc analysis										
Publication results	5/03/2019	No	No	Yes	https://www.asitbiotech.com/images/gb/pdf/2019/190502_PR_ASIT_NewMilestones_EN_f7aa1.pdf					
Topline results	20/12/2019	Yes	Yes	Yes	https://www.asitbiotech.com/images/ASIT_biotech_next_steps_2020_ENG_PR_20Dec2019_03edd.pdf					
Trial end	25/11/2019	Yes	Yes	Yes	https://www.asitbiotech.com/images/ASIT_biotech_next_steps_2020_ENG_PR_20Dec2019_03edd.pdf					
Trial on hold										

Appendix E.10. Onward Medical

Onward Medical										
	Prior					Post				
Type	Datum	egulate	Inside	rsgevo	Link	Datum	egulate	nside	rsgevo	Link
Authority approval										
Authority approval delayed										
Authority approval not granted										
Authority communication										
Clinical trial start (first patient)						9/03/2022	No	Yes	No	https://ir.onwd.com/static-files/06773e57-7c99-46da-8137-b8195073b8c9
						16/12/2021	No	Yes	Yes	https://ir.onwd.com/static-files/96be4ee2-62cc-436d-85fb-b46eaeba0166
Commercialisation update						28/03/2022	No	Yes	No	https://ir.onwd.com/static-files/41f3f2dc-2bdc-4f88-8766-2365f9ee6dae
						6/01/2022	No	No	No	https://ir.onwd.com/static-files/559a0a79-9ac0-4e39-957c-dc7a75aa022a
First patient treated										
Intermediate results										
New commercial partnership										
New partnership										
Partnership end										
Partnership update										
Patient recruitment										
Post-hoc analysis										
Presentation announcement										
Presentation results										
Publication announcement						7/04/2022	No	Yes	No	https://ir.onwd.com/static-files/541e51e5-48e3-4d49-9a63-3346d29882aa
						7/02/2022	No	Yes	Yes	https://ir.onwd.com/static-files/164cb0b4-f8a7-4e55-b334-bda7d1c577c9
Publication results										
Topline results										
Trial end										
Trial on hold										

Appendix E.11. MDxHealth

MDxHealth										
	Prior					Post				
Type	Datum	egulate	Inside	rsgevc	Link	Datum	egulate	Inside	rsgevc	Link
Authority approval	26/10/2018	Yes	No	Yes	https://mdxhealth.com/press_release/mdxhealth-r-mdxhealth-announces-approval-for-					
Authority approval delayed	7/08/2020	Yes	Yes	No	alth-provides-update-on-medicare-coverage-					
Authority approval not granted										
Authority communication	26/08/2019	No	No	Yes	https://mdxhealth.com/press_release/mdxhealth-r-mdxhealth-announces-favorable-draft-medicare-coverage-for-the-selectmdx-test/	21/05/2021	No	No	Yes	https://mdxhealth.com/press_release/mdxhealth-announces-favorable-draft-medicare-coverage-for-the-selectmdx-for-prostate-cancer-test/
	23/07/2018	No	No	No	https://mdxhealth.com/press_release/mdxhealth-r-medicare-establishes-final-positive-local-coverage-determination-for-use-of-confirmmdx-for-prostate-cancer/					
Clinical trial start (first patient)										
Commercialisation update	27/07/2020	No	No	Yes	https://mdxhealth.com/press_release/mdxhealth-r-6/					
	5/03/2019	No	No	No	https://mdxhealth.com/press_release/mdxhealth-selectmdx-liquid-biopsy-test-for-prostate-					
First patient treated										
Intermediate results										
New commercial contract										
New commercial partnership	14/02/2019	No	No	Yes	https://mdxhealth.com/press_release/mdxhealth-r-mdxhealth-signs-partnership-with-					
	6/06/2018	No	No	No	https://mdxhealth.com/press_release/mdxhealth-launch-agreement-with-philips-for-prognostic-prostate-cancer-biomarker/					
Partnership end										
Partnership update										
Patient recruitment										
Post-hoc analysis										
Presentation announcement										
Publication results	31/07/2018	Yes	No	No	https://mdxhealth.com/press_release/mdxhealth-selectmdx-study-demonstrates-cost-effectiveness-in-us-healthcare-system/					
	10/06/2019	No	No	Yes	https://mdxhealth.com/press_release/mdxhealth-r-multi-center-study-validates-selectmdxs-high-negative-predictive-value-and-sensitivity/					
Topline results										
Trial end										
Trial on hold										

Appendix E.12. UCB

UCB										
	Prior					Post				
Type	Datum	Regulated	Inside	Koersgevoelig	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval	22/07/2019	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/UCB-announces-approval-of-Cimzia-in-China	28/03/2022	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/US-FDA-Approves-FINTEPLAR-Vfenfluramine-Oral-Solution-for-Treatment-of-Seizures-Associated-with-Lennox-Gastaut-Syndrome-LGS
	9/04/2019	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/FDA-Approves-Evenity-nbsp-Romosozumab-For-The-Treatment-Of-Osteoporosis-In-Postmenopausal-Women-At-High-Risk-For-Fracture	24/08/2021	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/UCB-Announces-European-Commission-Approval-of-BIMZELXRV-bimekizumab-for-the-Treatment-of-Adults-with-Moderate-to-Severe-Plaque-Psoriasis
	8/01/2019	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/EVENITY-romosozumab-Receives-Approval-In-Japan-for-the-Treatment-of-Osteoporosis-In-Patients-at-High-Risk-of-Fracture					
Intermediate results	17/10/2019	Yes	Yes	Yes	https://www.ucb.com/stories-media/Press-Releases/article/Bimekizumab-Phase-3-Psoriasis-Study-Meets-All-Endpoints-Achieving-Significantly-Greater-Efficacy-Versus-Placebo-and-Ustekinumab	18/01/2022	Yes	Yes	Yes	https://www.ucb.com/stories-media/Press-Releases/article/Positive-Top-Line-Results-for-BIMZELXRVbimekizumab-in-Phase-3-Non-Radiographic-Axial-Spondyloarthritis-Study
Topline results	24/07/2020	Yes	Yes	Yes	https://www.ucb.com/stories-media/Press-Releases/article/Bimekizumab-Superior-to-Cosentyx-in-Achieving-Complete-Psoriasis-Skin-Clearance	4/02/2022	Yes	Yes	Yes	https://www.ucb.com/stories-media/Press-Releases/article/UCB-announces-positive-data-in-myasthenia-gravis-with-zilucoplan-phase-3-study-results
	6/12/2019	Yes	Yes	No	https://www.ucb.com/stories-media/Press-Releases/article/Bimekizumab-Phase-3-Psoriasis-Study-Demonstrates-Superiority-Versus-Humira	21/01/2022	Yes	Yes	Yes	https://www.ucb.com/stories-media/Press-Releases/article/Positive-Top-Line-Results-for-BIMZELXRVbimekizumab-in-Second-Phase-3-Psoriatic-Arthritis-Study
	15/11/2019	Yes	Yes	Yes	https://www.ucb.com/stories-media/Press-Releases/article/Bimekizumab-Positive-Results-Confirmed-in-Second-Phase-3-Psoriasis-Study	16/12/2021	Yes	Yes	No	https://www.ucb.com/stories-media/Press-Releases/article/Positive-Top-Line-Results-for-BIMZELXRVbimekizumab-in-Phase-3-Ankylosing-Spondylitis-Trial
						10/12/2021	Yes	Yes	No	https://www.ucb.com/stories-media/Press-Releases/article/UCB-announces-positive-Phase-3-results-for-rozanolixizumab-in-generalized-myasthenia-gravis
						19/11/2021	Yes	Yes	No	https://www.ucb.com/stories-media/Press-Releases/article/Positive-Top-Line-Results-from-BIMZELXRVbimekizumab-Phase-3-Psoriatic-Arthritis-Study-Demonstrated-Significant-Improvements-in-Joint-and-Skin-Symptoms
Trial termination	13/03/2020	Yes	Yes	Yes	https://www.ucb.com/stories-media/Press-Releases/article/UCB-provides-an-update-on-Phase-2b-padsevonil-safety-and-efficacy-study-in-epilepsy-ARISE					
Authority communication	22/09/2020	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/UCB-Achieves-Important-Regulatory-Milestone-for-Bimekizumab	16/10/2021	Yes	Yes	Yes	https://www.ucb.com/stories-media/Press-Releases/article/Update-on-US-FDA-Review-of-Biologics-License-Application-BLA-for-bimekizumab
	18/10/2019	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/EVENITY-romosozumab-Receives-Positive-CHMP-Opinion-for-the-Treatment-of-Severe-Osteoporosis-in-Postmenopausal-Women-at-High-Risk-of-Fracture	25/06/2021	Yes	Yes	Yes	https://www.ucb.com/stories-media/Press-Releases/article/UCB-Receives-Positive-CHMP-Opinion-Recommending-Approval-of-BIMZELX-bimekizumab-in-the-EU-for-the-Treatment-of-Adults-with-Moderate-to-Severe-Plaque-Psoriasis
	27/06/2019	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/UCB-and-Amgen-Provide-Regulatory-Update-on-Status-of-EVENITY-romosozumab-in-the-EU					
	16/01/2019	no	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/UCB-and-Amgen-Receive-Positive-Vote-From-FDA-Advisory-Committee-In-Favor-of-Approval-For-EVENITY-Romosozumab-nbsp					
New partnership	29/07/2020	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/UCB-enters-into-collaboration-with-Roche-to-develop-antibody-treatment-for-people-living-with-Alzheimer-s-Disease	2/12/2021	No	No	No	https://www.ucb.com/stories-media/Press-Releases/article/UCB-Announces-Global-Partnership-to-Bring-Disease-Modifying-Therapies-to-People-Living-with-Parkinson-s-Disease
	16/06/2020	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/New-Capture-the-Fracture-Partnership-aims-for-25-Percent-Reduction-in-the-Incidence-of-Hip-and-Vertebral-Fractures-due-to-Osteoporosis-by-2025					
New commercial partnership						30/11/2021	No	No	No	https://www.ucb.com/stories-media/Press-Releases/article/UCB-and-Chiesi-enter-global-license-agreement-for-zampilimab-a-novel-monoclonal-antibody-for-fibrotic-lung-diseases
Publication results						23/04/2021	No	No	Yes	https://www.ucb.com/stories-media/Press-Releases/article/The-New-England-Journal-of-Medicine-Publishes-Results-from-Two-Bimekizumab-Phase-3-Studies-in-Moderate-to-Severe-Plaque-Psoriasis

Appendix E.13. Hyloris

Hyloris										
	Prior					Post				
Type	Datum	Regulated	Inside	Koersgevoelig	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval	7/09/2020	No	No	Yes	https://www.	21/09/2021	Yes	No	No	https://www.globenewswire.com/news-release/2021/09/21/2300186/0/en/Hyloris-Announces-Further-Extension-of-Maxigesic-IV-Footprint.html
						19/10/2021	No	No	Yes	https://www.globenewswire.com/news-release/2021/10/19/2316112/0/en/Hyloris-Announces-Approval-of-Maxigesic-IV-in-the-UK-and-Ireland.html
Authority approval delayed										
Authority approval not granted										
Authority communication						1/11/2021	Yes	No	Yes	https://www.globenewswire.com/news-release/2021/11/01/2324058/0/en/Hyloris-Announces-FDA-Acceptance-of-New-Drug-Application-for-Maxigesic-IV-in-Post-Operative-Pain.html
Clinical trial start (first patient)						1/11/2021	Yes	No	Yes	https://www.globenewswire.com/news-release/2021/11/02/2324979/0/en/Hyloris-Announces-Start-of-Phase-2-Study-of-Miconazole-Domiphen-Bromide-Vaginal-Cream-in-Vulvovaginal-Candidiasis.html
Commercialisation update						24/06/2021	Yes	Yes	Yes	https://www.globenewswire.com/news-release/2021/06/24/2252256/0/en/Hyloris-Successfully-Renegotiates-License-Agreements-for-Lead-Products-with-the-Alter-Pharma-Group.html
						6/05/2021	Yes	No	No	https://www.globenewswire.com/news-release/2021/05/06/2224033/0/en/Hyloris-Announces-Extension-of-Footprint-of-Maxigesic-IV-into-South-America.html
First patient treated										
Intermediate results										
New commercial partnership						13/10/2021	Yes	No	No	https://www.globenewswire.com/news-release/2021/10/13/2313079/0/en/Hyloris-Acquires-Breakthrough-Patented-Technology-to-Develop-and-Market-Aspirin-IV-in-the-U-S-in-Acute-Coronary-Syndrome.html
						28/04/2021	Yes	No	Yes	https://www.globenewswire.com/news-release/2021/04/28/2218241/0/en/Hyloris-Announces-Major-Commercial-Partnership-in-the-U-S-for-Maxigesic-IV.html
New partnership						17/12/2021	Yes	No	No	https://www.globenewswire.com/news-release/2021/12/17/2354206/0/en/Hyloris-Enters-into-Strategic-Partnership-with-Vaneltix-for-Treatment-of-Acute-Pain-in-Interstitial-Cystitis.html
						10/11/2021	Yes	Yes	No	https://www.globenewswire.com/news-release/2021/11/10/2331089/0/en/Hyloris-Broadens-Pipeline-with-Novel-Patented-Combination-Product-Candidate-in-Acute-Myeloid-Leukaemia-and-Small-Cell-Lung-Cancer.html
Partnership end										
Partnership update										
Patient recruitment										
Post-hoc analysis										
Presentation announcement										
Presentation results										
Publication announcement										
Publication results										
Topline results										
Trial end										
Trial on hold										

Appendix E.14. Mithra

Mithra										
	Prior					Post				
Type	Datum	Regulated	Inside	Koersgevoelig	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval						20/05/2021	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2021/05/2021-05-20-European-Approval-Estelle-EN.pdf
						15/04/2021	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2021/04/2021-04-15-Estelle-Approval-US-EN.pdf
						8/03/2021	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2021/03/2021-03-08-Estelle-Approval-Canada-EN.pdf
Authority approval delayed	6/10/2020	Yes	Yes	No	https://investors.mithra.com/wp-content/uploads/2020/10/2020-10-06-FDA-update-EN.pdf	6/10/2021	Yes	Yes	No	https://investors.mithra.com/wp-content/uploads/2021/10/2021-10-06-Update-FDA-Myring-EN.pdf
	14/12/2018	Yes	Yes	No	https://investors.mithra.com/wp-content/uploads/2018/12/2018-12-14-Myring_update-en.pdf					
Authority approval not granted										
Authority communication						26/03/2021	Yes	Yes	Yes	[illegible]26-Positive-Opinion-EMA-for-Estelle-EN.pdf
Clinical trial start (first patient)	9/10/2019	No	No	Yes	https://investors.mithra.com/wp-[illegible]					
Commercialisation update	7/01/2019	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2019/01/2019-01-07-Donesta_Perinesta-en.pdf					
Intermediate results	6/12/2018	No	No	No	https://investors.mithra.com/wp-content/uploads/2018/12/2018-12-06-Ovarian_Function_Estelle_EN-final.pdf	14/01/2022	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2022/01/2022-01-14-Top-Line-Results-Donesta-Phase-III-EN.pdf
New commercial partnership	1/10/2019	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2019/10/2019-10-01-Deal-US-Estelle-with-Mayne-Pharma-EN.pdf					
	12/09/2018	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2018/09/2018-09-12-Mithra-license-Estelle-GR-EN.pdf					
New partnership	30/07/2018	No	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2018/07/2018-07-30-CERES-EN-FINAL.pdf	26/04/2022	No	No	Yes	https://investors.mithra.com/wp-content/uploads/2022/04/2022-04-26-Mithra-CDMO-Partnership-Medincell-EN.pdf
	16/05/2018	No	No	Yes	https://investors.mithra.com/wp-content/uploads/2018/05/2018-05-16-Contract-Midas-final-en.pdf					
Partnership end										
Partnership update										
Patient recruitment	1/04/2020	Yes	Yes	No	https://investors.mithra.com/wp-content/uploads/2020/04/2020-04-01-Update-Donesta-EN.pdf	21/09/2021	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2021/09/2021-09-21-Completion-Recruitment-US-Study-and-Additional-Recruitment-in-the-European-Study-EN.pdf
Post-hoc analysis	30/05/2018	No	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2018/05/2018-05-30-Donesta-Phase-IIb-severity-en.pdf	14/04/2022	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2022/04/2022-04-14-Donesta-Launch-Recruitment-and-Consolidated-Positive-Results-EN.pdf
Topline results	30/01/2019	Yes	Yes	No	https://investors.mithra.com/wp-content/uploads/2019/01/2019-01-30-Estelle-Phase-III-US-en-final.pdf					
	8/09/2018	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2018/08/2018-08-08-Estelle-Phase-III-EU-RU-en.pdf					
Trial end						21/09/2021	Yes	Yes	Yes	https://investors.mithra.com/wp-content/uploads/2021/09/2021-09-21-Perinesta-update-EN.pdf
Trial on hold										

Appendix E.15. argenx

argenx										
	Prior					Post				
Type	Datum	Regulated	Inside	Koersgevoelig	Link	Datum	Regulated	Inside	Koersgevoelig	Link
Authority approval						20/01/2022	Yes	Yes	No	https://www.argenx.com/sites/default/files/media-documents/ARGX_Japan_Approval_Press_Release.pdf
Authority approval delayed						17/12/2021	Yes	Yes	No	https://www.argenx.com/sites/default/files/media-documents/argenx_US_gMG_PDUFA_Press_Release.pdf
Authority approval not granted										
Authority communication	28/08/2018	No	No	Yes	https://www.argenx.com/news/argenx-receives-feedback-japans-pmda-phase-3-clinical-trial-and-regulatory-pathway	25/08/2021	No	No	Yes	https://www.argenx.com/sites/default/files/media-documents/MAA_Acceptance_Press_Release_8-25-21.pdf
Clinical trial start (first patient)										
First patient treated										
Intermediate results	3/10/2018	Yes	Yes	No	https://www.argenx.com/news/argenx-announces-new-cusatuzumab-argx-110-aml-data-abstracts-published-connection-60th					
New commercial partnership	2/12/2018	Yes	Yes	Yes	https://www.argenx.com/news/argenx-enters-exclusive-global-collaboration-and-license-agreement-cilag-gmbh-international	6/01/2021	No	No	Yes	https://www.argenx.com/news/argenx-and-zai-lab-announce-strategic-collaboration-efgartigimod-greater-china
New partnership	6/10/2020	No	No	Yes	https://www.argenx.com/news/argenx-expands-capabilities-antibody-engineering-through-key-technology-partnerships	6/01/2021	No	No	Yes	https://www.argenx.com/news/argenx-and-zai-lab-announce-strategic-collaboration-efgartigimod-greater-china
Partnership end										
Partnership update										
Patient recruitment										
Post-hoc analysis										
Presentation announcement										
Presentation results										
Publication announcement										
Publication results										
Topline results	26/05/2020	Yes	Yes	Yes	https://www.argenx.com/news/argenx-announces-positive-topline-phase-3-adapt-trial-results	5/05/2022	Yes	Yes	Yes	https://www.argenx.com/sites/default/files/media-documents/ARGX_ADVANCE_TLR.pdf
	16/09/2018	Yes	Yes	Yes	https://www.argenx.com/news/argenx-reports-positive-topline-results-phase-2-proof-concept-trial-efgartigimod-primary	22/03/2022	Yes	Yes	Yes	https://www.argenx.com/sites/default/files/media-documents/argenx_ADAPT-SC_TLR_Press_Release.pdf
Trial end										
Trial on hold										

Appendix E.16. Galapagos

Galapagos										
	Prior					Post				
Type	Datum	egulate	Inside	rsgevc	Link	Datum	egulate	nsider	rsgevc	Link
Authority approval	15/08/2019	No	No	No	medicines-agency-validates-marketing-application-for-filgotinib-for-the-treatment-of-rheumatoid-arthritis	25/09/2020	No	No	No	grants-marketing-authorization-for-jyseleca-filgotinib-for-the-treatment-of-adults-with-moderate-to-severe-active-rheumathoid-
Authority approval delayed										
Authority approval not granted	19/08/2020	Yes	No	Yes	https://www.glpg.com/press-release/2203/galapagos-announces-that-gilead-received-a-complete-response-letter-for-filgotinib-for-the-treatment-of-moderately-to-severely-active-rheumatoid-arthritis					
Authority communication	24/07/2020	Yes	No	Yes	https://www.glpg.com/press-release/2209/gilead-and-galapagos-announce-positive-european-chmp-opinion-for-jyseleca-filgotinib-for-the-treatment-of-adults-with-moderate-to-severe-rheumatoid-arthritis	17/09/2021	No	No	No	https://www.glpg.com/press-releases#?page=2
	2/07/2019	Yes	No	Yes	https://www.glpg.com/press-release/3427/gilead-announces-intent-to-submit-new-drug-application-for-filgotinib-to-u-s-food-and-drug-administration-this-year	2/11/2020	No	No	No	https://www.glpg.com/press-release/2183/european-medicines-agency-validates-marketing-application-for-filgotinib-for-the-treatment-of-ulcerative-colitis
Clinical trial start (first patient)	7/01/2019	No	No	Yes	https://www.glpg.com/press-release/3463/galapagos-starts-first-phase-1-trial-with-toledo-compound	9/11/2020	No	No	Yes	https://www.glpg.com/press-release/2177/first-patient-dosed-with-glpg3667-in-psoriasis-patient-phase-1b-trial
	24/09/2019	Yes	No	No	https://www.glpg.com/press-release/3317/galapagos-reports-initiation-of-global-roccella-phase-2-clinical-trial-with-glpg1972-s201086-in-osteoarthritis-patients	18/05/2021	No	No	No	https://www.glpg.com/press-release/2094/galapagos-announces-first-patient-enrolled-in-filosophy-study-to-advance-understanding-of-jyseleca-filgotinib-effectiveness-and-safety-in-a-real-world-setting
Intermediate results	28/03/2019	Yes	No	Yes	https://www.glpg.com/press-release/3447/gilead-and-galapagos-report-updated-safety-information-for-filgotinib-in-rheumatoid-arthritis-ra	14/07/2021	Yes	No	Yes	https://www.glpg.com/press-release/2082/galapagos-demonstrates-early-clinical-activity-with-sik2-3-inhibition-in-inflammation
	11/09/2018	Yes	No	Yes	https://www.glpg.com/press-release/3331/gilead-and-galapagos-announce-filgotinib-meets-primary-and-all-key-secondary-endpoints-in-first-phase-3-study-in-rheumatoid-arthritis	4/03/2021	Yes	No	Yes	https://www.glpg.com/press-release/2112/galapagos-reports-primary-endpoint-for-the-ongoing-filgotinib-manta-and-manta-ray-safety-studies
	29/05/2019	No	No	No	https://www.glpg.com/press-release/3435/gilead-and-galapagos-to-present-latest-data-on-filgotinib-at-the-annual-european-congress-of-rheumatology-eular-2019	12/10/2020	No	No	No	https://www.glpg.com/press-release/2189/phase-2b-3-trial-shows-efficacy-of-filgotinib-for-the-induction-and-maintenance-of-remission-in-moderately-and-severely-active-ulcerative-colitis
New commercial partnership	19/07/2019	Yes	No	No	https://www.glpg.com/press-release/3337/morphosys-and-galapagos-sign-global-license-agreement-for-mor106-with-top-pharma-partner	16/12/2020	Yes	No	Yes	https://www.glpg.com/press-release/2167/gilead-and-galapagos-announce-new-commercialization-and-development-agreement-for-jyseleca-filgotinib
New partnership	14/07/2019	Yes	No	Yes	https://www.glpg.com/press-release/3425/gilead-and-galapagos-enter-into-transformative-research-and-development-collaboration	5/11/2020	No	No	Yes	https://www.glpg.com/press-release/2179/oncoarendi-and-galapagos-enter-into-exclusive-collaboration-on-chitinase-inhibitors-in-fibrosis
	16/04/2020	No	No	No	https://www.glpg.com/press-release/2144/galapagos-and-ryvu-announce-research-collaboration					
Partnership end										
Partnership update										
Patient recruitment										
Post-hoc analysis										
Publication announcement										
Publication results										
Topline results	20/05/2020	Yes	No	Yes	https://www.glpg.com/press-release/2136/gilead-and-galapagos-announce-positive-topline-results-of-phase-2b-3-trial-of-filgotinib-in-moderately-to-severely-active-ulcerative-colitis	14/07/2021	Yes	No	Yes	https://www.glpg.com/press-release/2080/galapagos-reports-positive-topline-results-with-selective-tyk2-inhibitor-glpg3667-in-phase-1b-psoriasis-study
	24/10/2018	Yes	No	No	https://www.glpg.com/press-release/3309/topline-interim-results-of-falcon-trial-part-1-in-cf	30/11/2020	No	No	No	https://www.glpg.com/press-release/2173/galapagos-reports-positive-topline-results-with-glpg1205-in-ipf-patients-in-pinta-proof-of-concept-trial
	11/09/2020	No	No	Yes	https://www.glpg.com/press-release/2199/primary-endpoint-achieved-with-ziritaxestat-in-novesa-trial-in-systemic-sclerosis-patients					
Trial end	15/10/2019	Yes	No	Yes	https://www.glpg.com/press-release/2187/galapagos-and-servier-report-topline-results-for-roccella-phase-2-clinical-trial-with-glpg1972-s201086-in-knee-osteoarthritis-patients	10/02/2021	Yes	No	Yes	https://www.glpg.com/press-release/2118/galapagos-and-gilead-discontinue-isabela-phase-3-trials-in-ipf
	29/10/2019	Yes	No	Yes	https://www.glpg.com/press-release/3395/mor106-clinical-development-in-atopic-dermatitis-stopped-for-futility					
Trial on hold										