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Stimulating translational research: several European life science institutions put their heads together

Mohamed Bentires-Alj[1,2], Abinaya Rajan[1,3], Wim van Harten[1,3], Henri G.A.M. van Luenen[1,3], Stefan Kubicek[1,4], Jesper B. Andersen[1,5], Janna Saarela[1,6], Simon J. Cook[1,7], Geert Van Minnebruggen[1,8], Sergio Roman-Roman[9], Cornelia Maurer[1,10], Janine T Erler[1,5], and Michela G. Bertero[1,11,12]

[1] EU-Life Translational Working Group
[2] Friedrich Miescher Institute for Biomedical Research (FMI), Basel, Switzerland
[3] The Netherlands Cancer Institute (NKI), Plesmanlaan 121, 1066 CX Amsterdam, The Netherlands
[4] CeMM Research Center for Molecular Medicine of the Austrian Academy of Sciences, Vienna, Austria
[5] Biotech Research and Innovation Centre (BRIC), University of Copenhagen, Copenhagen, Denmark
[6] Institute for Molecular Medicine Finland (FIMM), University of Helsinki, Helsinki, Finland
[7] The Babraham Institute, Babraham Research Campus, Cambridge CB22 3AT, UK
[8] Flanders Interuniversity Institute for Biotechnology (VIB), Rijvisschestraat 120, 9052 Zwijnaarde, Belgium
[9] Institut Curie, 26 rue Ulm, 75005 Paris, France
[10] Max Delbrück Center for Molecular Medicine (MDC), Robert-Rössle-Strasse 10, 13125 Berlin, Germany
[11] Centre for Genomic Regulation (CRG), Dr Aiguader 88, 08003 Barcelona, Spain
[12] Universitat Pompeu Fabra (UPF), Barcelona, Spain

Translational research leaves no-one indifferent and everyone expects a particular benefit. We as EU-LIFE (www.eu-life.eu), an alliance of 13 research institutes in European life sciences, would like to share our experience in an attempt to identify measures to promote translational research without undermining basic exploratory research and academic freedom.

'There does not exist a category of science to which one can give the name applied science. There are sciences and the applications of science, bound together as the fruit of the tree which bears it' [1]. We propose that in the biomedical sciences there are six major phases. The first phase is open-ended research, aimed at understanding the core principles governing biological systems; the ensuing discoveries may have short-term, long-term, or no direct applications at all. Second, there is disease-oriented research aimed at understanding the pathogenesis and/or evolution of maladies, referred to as use-inspired basic research [2]; this includes research in animal models aimed at validating specific targets as causative drivers of disease. The results may only apply to the studied disease, but can have far-reaching relevance for other diseases and may also elucidate fundamental principles of biology. The third phase is research aimed at treating a disease and testing it in preclinical models. Fourth is clinical research for testing diagnostic tools and treatment modalities in patients. The fifth phase is monitoring the effects of therapies: refining the mechanism of action, and understanding side-effects and potential resistance mechanisms. Finally comes research into the socioeconomic impact of a new treatment. Although this suggests one-way traffic from bench to bedside, in practice there is a continuous back and forth between the different phases (Figure 1). The realm of translational research has blurred boundaries and there is a plethora of definitions of translational research [3]. However, one thing is certain: it is important to almost everyone [4] because it attracts strong opinions and wide-ranging expectations, and everybody agrees that the process of translating findings from the lab to clinical application should be faster and more (cost) effective.

How can one advance biomedical translational research, phases two to six of the above-described continuum, and make it optimally benefit from exploratory research and vice versa? We propose seven recommendations (Box 1) and five measures discussed below.

Although this paper focuses on improving translational research, we must stress its tight dependence on exploratory research. As such, fostering open-ended research in life sciences, from molecules to cells to model organisms, is a key measure any stakeholder should take to ensure that translational research has a bright future.

Measure 1. Interdisciplinary research and training

Translational research requires interdisciplinary scientists who speak the same language and understand the common problems. We need to train a new generation of researchers for whom translational research is 'second nature'. Institutes in our alliance do this successfully through a variety of mechanisms including themed translational research PhD and MD–PhD programs, industry-sponsored PhD projects, postdocs jointly supervised by academia and industry, interdisciplinary education for clinician scientists and basic researchers, mentoring of clinician scientists by leading experimental teams and visits of researchers to hospital wards, and research

Corresponding author: Bentires-Alj, M. (bentires@fmi.ch).

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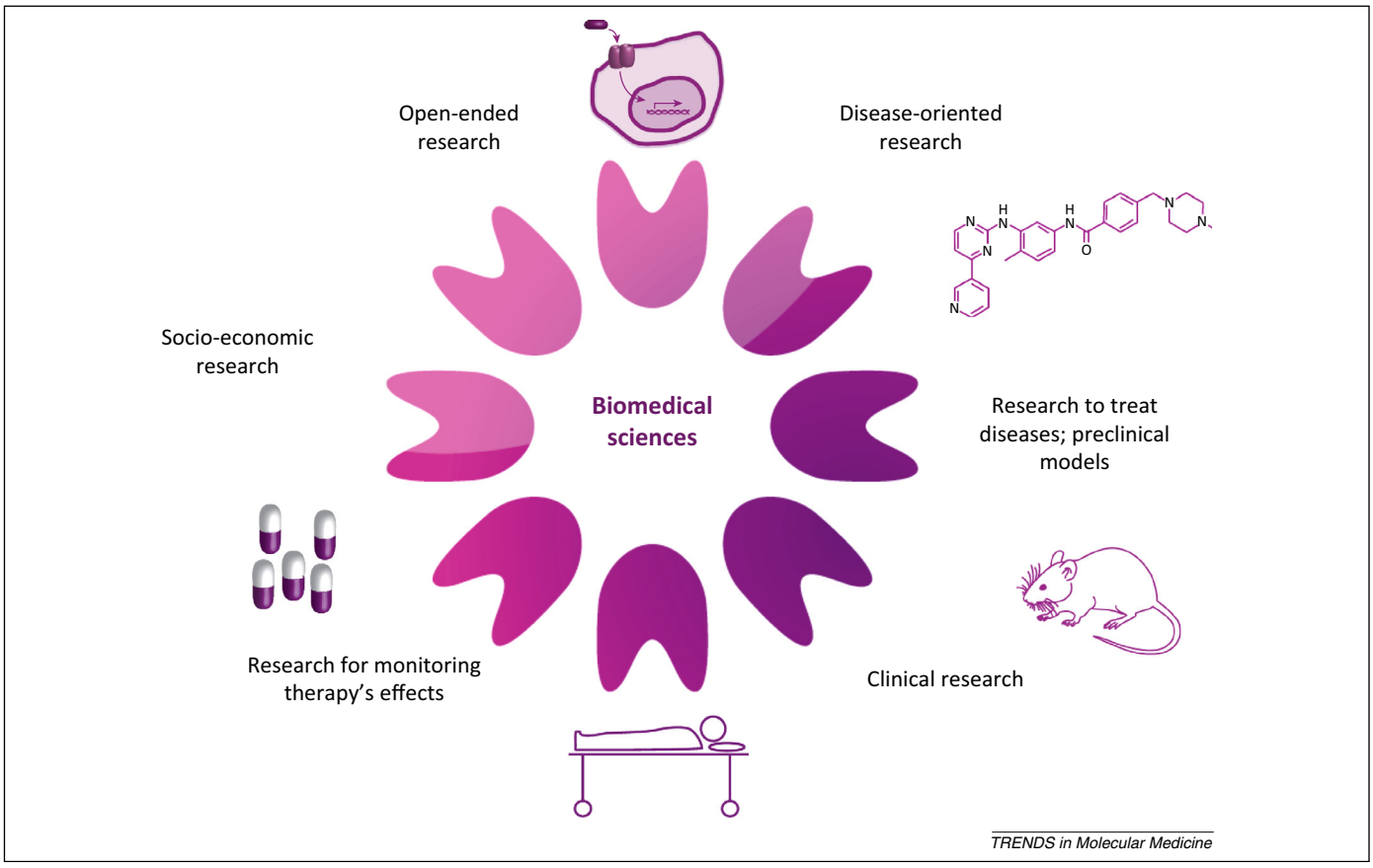

Figure 1. The blurring boundaries of translational research.

opportunities for physician scientists by giving them protected research time. The Knowledge Exchange and Commercialization program at the Babraham Institute promotes scientific exchange not only between academics and clinicians but also between charities, industry, and policy makers. VIB recently launched its 'Stellar' project where senior academics are welcomed for sabbatical stays in the laboratories of Johnson & Johnson. In a pure academic setting, embedded Translational Departments at the NKI, FIMM, the Curie Institute, or the Experimental and Clinical Research Center on the MDC campus create a collaborative atmosphere between basic scientists and clinicians. Recently, MDC and Charité–Medical Faculty Berlin created a shared research space and joined forces in the Berlin Institute of Health. Such colocation in 'clusters' helps to bring different disciplines together.

Box 1. Seven recommendations for policy-makers and funding agencies to stimulate translational research

(i) Provide interdisciplinary training to basic and clinical scientists.
(ii) Protect research time for clinicians.
(iii) Create specific evaluation and reward systems for scientists engaged in translational research.
(iv) Fund schemes for joint basic–clinical research projects.
(v) Foster continuous interactions between basic and clinical scientists, as well as between academia and industry.
(vi) Promote cultural change among all actors in translational research.
(vii) Facilitate cross-border partnerships.

Measure 2. Collaborate to identify and address unmet clinical needs

Once clinicians and scientists speak the same language, they can identify unmet medical needs in the fields of diagnosis, prevention, or treatment of a disease, guided by the daily experience of clinicians with patients. These efforts can be further stimulated by 'twinning' schemes or seed-funding to reward translational research projects involving both researchers and clinicians. Ultimately these should lead to relevant translational research programs enabled by progress made in fundamental research and advances in technologies. Such initiatives should bring the best and most urgent ideas forward.

Measure 3. Nurture international translational research

Having teams of excellent research groups with complementary expertise improves high-quality translational research. Increasingly, these involve cross-border partnerships, and geography should not be a barrier to progress. We must have mechanisms to identify relevant cross-border expertise-matching collaborations and engage with national and international stakeholders including academic centers, hospitals, and biotech and pharma companies. EU-LIFE is an example in which academic centers capitalize on each others expertise and experience to link basic research findings to drug discovery programs, clinical trials, and ultimately new diagnostic and therapeutic products. Last, but not least, such international partnerships are only efficient when legal and regulatory issues about clinical trials, data protection, exchange of

data and human samples, and intellectual property are harmonized.

Measure 4. Create shared research resources

Translational research requires shared resources because one group or one institute cannot recruit enough patients for trials in a reasonable period, have sufficient data to perform important analyses, or have in-house all the research facilities and expertise to execute the research. Most EU-LIFE partner institutes incorporate Core Facility Programs with high-end infrastructure that benefit all. Notably, the EU-LIFE partners have all benefited from long-term strategic public and private support, and this has allowed them to make sustainable, long-term investment to facilitate their exploratory and translational activities.

Measure 5. Stimulate a cultural change

Cultural change at the individual and organizational level is crucial to support translational research. Awareness and motivation is needed from all staff and groups (not only basic researchers and clinicians) including managers, nurses, and other groups. More combined efforts and 'exposure' to translational research will educate about the benefits and possibilities. Fostering interactions with hospitals, industry, entrepreneurs, and other relevant stakeholders will enable faster progress to benefit patients. Schemes to facilitate cultural change, better dialog, and working together are needed. Some examples include joint appointments with hospitals, Advisory Boards with representatives from industry, and visiting professorships for researchers from industry. Activities and environments that facilitate 'mingling' further enable interactions; for example, shared cafeteria and shared offices, tandem basic scientist–clinician seminars, and science networking events. Promotion of entrepreneurship, such as start-up 'incubators' attached to academia, strengthens cross-sector interactions and encourages research that can be commercialized to benefit patients. No matter what efforts are made, financial support to foster interactions is crucially required, for example seed funds for proof-of-concept studies and emergent translational research projects. Perhaps the biggest cultural change has to come from the fact that translational research is really a team effort. This requires a different mechanism for appraisal and recognition of researchers.

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