Beating Cancer by 2030: Mission Impossible?

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Workshop Report

Beating Cancer by 2030: Mission Impossible?

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Abstract

Cancer has been for many years the second leading cause of mortality right after cardiovascular diseases, representing 25% of all the deaths reported yearly and this tendency is expected to increase. Although the recent public health emergency caused by COVID-19 pandemic diverted much of the attention of policy makers, the public opinion and even researchers from other important, economical relevant and deadly diseases, cancer still remains as one of the major healthcare issues. Moreover, recent studies revealed the negative effects of COVID-19 pandemic on the increase of avoidable cancer-related deaths. It is then the perfect time to bring back the spotlight onto the topic of cancer.

The aim of this paper is to share the outcomes of the workshop organized by the COST (European Cooperation in Science and Technology) Association, bringing together sixty participants representing a broad variety of stakeholders, to discuss a holistic approach on how to beat cancer by 2030.

The conclusions of this workshop are highly relevant for the community and are supporting the work being undertaken by the EU Mission Board on Cancer. This report lays down the main conclusions and recommendations agreed by the workshop participants, focusing on different aspects such as better stakeholder collaboration, citizen education, innovative therapies, and patient-centric care.

Keywords

Cancer Prevention and Treatment, Science Policy, Research Roadmap

Date and place

21st to 22nd May 2019, COST Association, Av. Louise 149, 1050 Brussels, Belgium

Contributions

The conclusions and recomendations of this paper are the result of the discussions and ideas from all the workshop participants (full list in supp material 1: *Booklet of the Workshop - Beating cancer by 2030: mission impossible*?).

Disclaimer: Dr Wolfgang Burtscher, Deputy Director General at DG Research and Innovation (EC) and Dr Sanja Damjanovic, Minister for Science in Montenegro, attended the workshop as invited guests and gave presentations for the benefit of the participants. They were not active participants and therefore, the conclusions and recommendations reported in this paper shall not be associated with their opinion nor the position of the institutions they represented.

Description, Agenda and Participants

See Suppl. material 1 - *Booklet of the Workshop - Beating cancer by 2030: mission impossible*?

Opening Remarks

The recent COVID-19 pandemic overshadowed the importance of other major health issues such as cancer (Sarpless 2020). Although the importance on investing resources in the fight against COVID-19 is recognised, cancer is still a deadly and economically relevant disease. Moreover, recent studies have highlighted the negative effects of the COVID-19 pandemic on the increase of avoidable deaths in four major tumours (Maringe 2020) and experts have shown the need to prioritizing the various aspects of cancer care to mitigate these negative effects in the management of cancer patients (Curigliano 2020) .

The COST Association organised a COST Connect event entitled “Beating cancer by 2030: mission impossible?”. This paper shares the conclusions and recommendations of this event to help refocus attention to this important issue.

Introduction

In 2015, cancer caused around 1.320.000 deaths in the European Union (EU), constituting the second leading cause of mortality second only to cardiovascular diseases, representing 25% of all the deaths reported (OECD and European Union 2018).

Considering the worldwide, exponential population increase and the average life expectancy, cancer is now identified as one of the major causes of death (first or second leading cause of death before 70 years of age in 91 countries). Noteworthy, cancer currently accounts for 20% of all deaths occurring in Europe every year (3.9 million new cases and 1.9 million deaths yearly), and is expected to stand out as the major leading cause of death worldwide during this century (Bray 2018). The deadliest cancers in Europe are those affecting lung, liver, stomach, breast and colorectal tissue. Analysing the pan-European average 5-year survival statistics, males diagnosed with cancer in the age 45-54 have almost one-third less chance of survival (average 50.22%) compared to females (average 74.06%). This discrepancy however is reduced significantly in males and females diagnosed in the age range 65-74 (52.06 and 55.76 % respectively) and almost no differences are observed in people with more than 75 years (41.96 and 41.04 % respectively) (European Commission/JRC. Data Explorer. *Estimates of survival, by country and cancer site*).

The main preventable causes of cancer in Europe reside in unhealthy lifestyles, which include excessive alcohol consumption, tobacco use, inappropriate diet, obesity, and lack of physical activity. In fact, as a result of the westernization of the lifestyle, changes in the profile of the most common cancer types are more striking in emerging economies, where a displacement of infection-related and poverty-related cancers by those cancers more frequently reported in developed countries is taking place (Bray and Soerjomataram 2015, Maule and Merletti 2012). The difference of cancer profiles between regions remains crystal clear, highlighting the geographic diversity and the persistence of specific risk factors according to the different phases of socio-economic transition.

The economical sustainability of cancer management in national health systems remains a major concern. Paralleling the epidemiological cancer data, the costs of cancer care are increasing, likely as a result of the development of new diagnostic imaging techniques and new innovative therapies. Importantly, in European countries, up to 30% of total hospital expenditure arises directly from oncology-related expenses and the costs spent on new drugs which is exponentially rising is expected to continue increase (Pramesh 2015, Luengo-Fernandez 2013). Between 1995 and 2014, estimated cancer-related expenditure in the EU increased 133% (from €35.7 billion to €83.2 billion, respectively) (Jönsson 2016). However, these values might be underestimated since cancer costs in EU were reported to reach €126 billion in 2009. It is noteworthy that approximately 40% of these expenses (€51

billion) were related with health care costs, while productivity losses because of early death, lost working days and informal care represented a cost of €42.6 and €9.43 and €21.3 billion, respectively (Luengo-Fernandez 2013). Across the EU member states, a high discrepancy is observed regarding health care costs (average cost of €102 per person), ranging from € 16 per person (Bulgaria) to €184 per person (Luxembourg). Although such differences are observed, the costs related with non-pharmacological management of cancer are stable whilst cancer drugs are known to markedly contribute for the increased costs experienced in cancer management. Overall, despite all the differences in cancer therapeutics among the EU members, burdening health systems with all these fast-growing costs is unsustainable and if the trends continue in this direction, cancer care might be significantly compromised in the future.

All this data reinforces the need for strong efforts in European cancer research to invest money, create infrastructures, and distribute knowledge with the final goal to beat cancer by 2030. In this regard, the European Cooperation in Science and Technology (COST - www.cost.eu), an EU-funded programme, enables researchers and innovators to set up COST Actions, interdisciplinary research networks in Europe and beyond to timely address scientific and societal challenges. COST also organises highly interactive COST Connect events aiming at bringing together representatives of the funded networks with the wider scientific communities, stakeholders and policymakers working together. Such events aim at creating synergies and reducing research fragmentation in the field, initiating future research cooperation. They actively promote the COST Actions strategic research roadmaps, identify new funding opportunities and priorities for Horizon Europe.

The aim of this paper is to share the outcomes of the workshop organized under the COST Connect series on cancer research: “Beating cancer by 2030”. This workshop provided a multidisciplinary platform where researchers, policy-makers, cancer patient organisations and industry discussed the challenges in cancer research, aiming at an improved coordination at European level. The event and this report come at a crucial time, providing pan-European input into the ongoing Horizon Europe discussions, as cancer has been identified as one of the future missions in the next Framework Programme for Research and Innovation.

Methods

The methodology of the workshop is based on the concept of the Pro-Action Café, which is an interactive yet simple facilitation methodology for creative, inspirational, and relevant conversations.

The event has no set agenda and starts with short “setting-the-scene” presentations aiming at providing a general overview of the challenges and activities of the different actors in the field. In a Pro-Action Café, discussion topics are proposed by the participants themselves and selected by the audience, ensuring a maximum engagement and relevant outcomes.

After agreement of the discussion topics, participants invite the audience to define strategies to overcome a specific identified challenge. This is achieved by three rounds of conversation in café style, each guided by a few generic questions to help deepen and focus the conversations. In each round, a new set of participants join the tables, benefiting from the collective intelligence present during the event.

Structure of the workshop

The detailed program of the workshop is given in Suppl. material 1. *Booklet of the Workshop - Beating cancer by 2030: mission impossible*?

The workshop focused on possible strategies to beat cancer. The discussions were supported by presentations from policy makers who presented the current state of affairs in the policy arena (Fig. 1). During the workshop short presentations from stakeholders and COST Actions' representatives were also given to support framing and fostering the discussions (Fig. 2).

Figure 1. doi

Dr Wolfgang Burtscher, Deputy Director General at DG Research and Innovation (EC) (L) opened the event presenting an overview of the state of play of current Horizon Europe negotiations and the planned Mission in the field of Cancer. Dr Sanja Damjanovic, Minister for Science in Montenegro (R), presented the roadmap for establishing The South East European International Institute for Sustainable Technologies (SEEIIST), which aims developing Hadron Cancer Therapy and Biomedical Research with Protons and Heavy Ions.

From the Stakeholder side presentations focused on their activities in the field: Dr Manola Bettio presented ECIS - European Cancer Information System from the Joint Research Centre (EC); Dr Chrissie Brierley presented the view of the JPI Healthy Diet for a Healthy Life. Industry initiatives were presented by Dr Alexandre Ceccaldi (European Technology

Platform on Nanomedicine). The views of the patients were presented by Ms Antonella Cardone (European Cancer Patient Coalition). The need and potential for data sharing services was presented by Dr Ashley Woolmore (IQVIA - CODE).

Figure 2. doi

COST Actions representatives and Stakeholders short presentations on their activities in Beating Cancer.

Representatives of selected COST Actions presented the achievements of the different networks in different aspects of cancer research: Dr Christof Krafft on Raman-based applications for clinical diagnostics (Raman4clinics; BM1401); Dr Daniel Ortega: on Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy (RADIOMAG; TD1402); Prof. Sven Brandau on European Network of Investigators Triggering Exploratory Research on Myeloid Regulatory Cells (Mye-EUNITER; BM1404); Prof. Stefano Alcaro on Multi-target paradigm for innovative ligand identification in the drug discovery process (MuTaLig; CA15135); Dr Georgia Pennarossa on In vitro 3-D total cell guidance and fitness (CellFit; CA16119); Dr Puri Fortes on Delivery of Antisense RNA Therapeutics (DARTER, CA17103); Dr Richarda De Voer on Identifying Biomarkers Through Translational Research for Prevention and Stratification of Colorectal Cancer (TRANSCOLONCAN; CA17118).

The workshop participants agreed to focus on some important topics which were discussed among them following a Pro-Action Café methodology (Fig. 3).

The conclusions and recommendations presented in this paper are the result of such discussions on the following topics:

I. Translational research and precision medicine: How to improve translational cancer research? How to make precision medicine real in diagnosis and treatment?

II. Cancer prevention: How to achieve widespread healthy lifestyle choices for cancer prevention and survival?

III. Patients: How to evaluate the quality of cancer care that patients and their carers are receiving across Europe?

IV. Low-hanging fruits: How to improve cancer treatment approaches in cancers with the most urgent needs by 2030?

V. Strategy: How can we build a process to crosstalk and coordinate between the different stakeholders (academia, patients, industry, healthcare providers) in the field of cancer to get the most value for maximising efficacy and beating cancer?

Figure 3. doi

Participants discussing in small groups during the Pro-Action Café.

Key outcomes and discussions

I. Translational research and precision medicine: How to improve translational cancer research? How to make precision medicine real in diagnosis and treatment?

Moving novel cancer targets from bench to bedside is always a priority but also a big challenge; the translation efficiency and speed depends on multiple factors such as the ability to prioritize targets and accelerate their validation, the presence of solid infrastructures to link basic and clinical science, the ability to create academic spin-offs and a solid collaboration pipeline with pharmaceutical companies. So, what is missing to

improve research translation in Europe? The working group identified several potential action points, summarized here below:

1. **Improvement of pre-clinical studies quality**: the failure rate of clinical trials is high (Fogel 2018). A major reason for this is the poor pre-clinical validation of the cancer targets; mainly because cell lines or the animal models used are not predictive on what will happen in the clinical context. We need to invest more resources to develop better pre-clinical cancer models which allow basic scientists to select more rigorously their targets and will improve success rates in the clinical context.
2. **Access to translational grants**: one of the biggest hurdles for an academic lab willing to move its targets into an industrial setting, such as an academic start-up, is to find sufficient funds to further validate the targets and the platform in order to get Venture or Angel capital seed investments; there is the need to increase enterprise funds for academic labs.
3. **Initiation of a European Translational Forum (ETF) that can be developed into a European Translational Network (ETN)**: two key hurdles that hinder rapid and successful translation of research findings are the difficulty to form efficient larger teams and consortia to execute the translational research and the difficulty for such consortia to obtain initial funding in a reasonable time frame. An innovative funding and networking format, termed ETF, could overcome this. ETF would be a networking event/conference, which is associated with a dedicated budget. During the ETF translational consortia must be formed to be eligible for the funding call. After the ETF consortia formed during the event (and only those) have the chance to apply for the translational grants. It is anticipated that such an initiative would be highly attractive for those study groups interested in direct translational research. The aim of this network would be to give basic and clinical scientists, stakeholders, and regulatory entities a platform, with a budget, to access to grants specifically designed to move a specific project from pre-clinical to clinical validation. This network would allow the comparison of relevant targets for drug development, to gain access to technology and standardization platforms, to create a centralized interpretation of clinically actionable variants.

II. Cancer prevention: How to achieve widespread healthy lifestyle choices for cancer prevention and survival?

As stated in the introduction most cancers in Europe are caused by tobacco, alcohol consumption and general unhealthy lifestyles; therefore, it is easy to hypothesize how many cancers could be avoided if a healthier lifestyle would be adopted. The quest behind this mission is not easy to solve however, because making European citizens aware of the risk associated with certain behaviours and enabling them to live healthier lifestyles is not so straightforward. This working group discussed widely why people choose unhealthy lifestyles over healthier alternatives; several discussion points emerged, including the easy access to cheap unhealthy options compared to good ones, the confusion that arises from the available amount of, sometimes misguiding and contradictory, information, socio-economic disparities in different European countries. What is missing to improve cancer

prevention in Europe? The working group identified several potential action points, summarized here below:

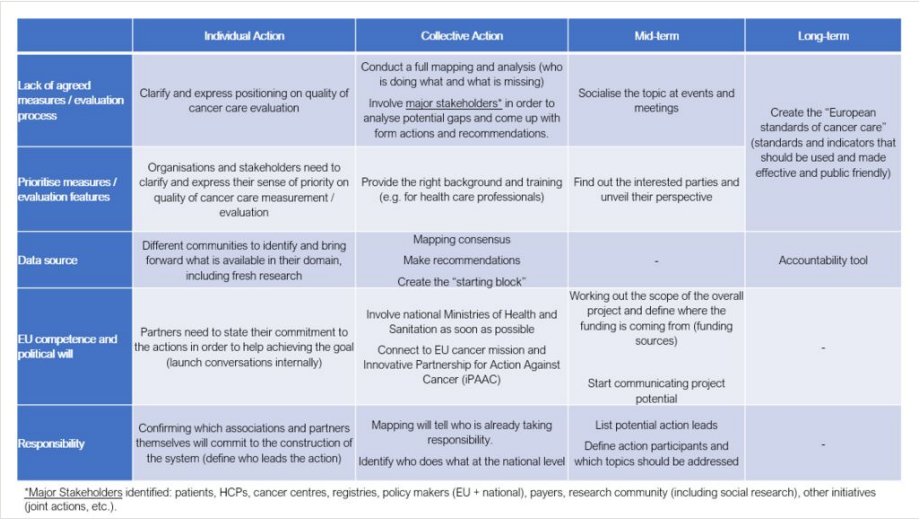
1. **European science media centre and public engagement program**: in order to fight the spread of medical fake news and the adoption of unhealthy lifestyles we need to change the way we interact with society; the European Union should invest money in the creation of a reliable and interactive science media centre (online, papers, television programs) for its citizens. The communication strategies to be used need to take inspiration from the big brands, which utilize very powerful communication techniques to sell their products; scientists need to team up with journalists, graphic designers, publicists, movie directors, web influencers so that each individual group could synergize to communicate our message. We need to introduce the concept of "pop" science, where correct information is offered in an appropriate and accessible way. This would promote promotion the idea of RRI (Responsible Research and Innovation), in which all sorts of different stakeholders, including citizens, are part of the entire research process This would dramatically reduce the gap between science and society and reduce significantly the spread of fake news. We need to invest most of our efforts in the young generations of European citizens, to improve their knowledge on cancer prevention.
2. **Improvement of current research practice**: as basic scientists we recognize that there is the need to produce more solid data on the effect of unhealthy lifestyles on cancer; we need to invest more resources in developing more physiological animal models. We also need to invest more in behavioural/psychological science. Even if we have some indications of which lifestyle factors increase the risk of cancer we still do not know that much yet about why people make certain choices, and how they can be supported to make healthier choices. We need to invest in socio-economic research studies which could calculate how much money and lives we could save if we positively influence the adoption of healthy lifestyles within the European community.
3. **Efficacy of prevention/policy measures**: The importance and efficacy of cancer prevention should be better addressed. Relevant stakeholders and policy makers should be more actively involved in the implementation of cancer prevention measures as there is a need for more funds.

III. Patients: How to evaluate the quality of cancer care that patients and their carers are receiving across Europe?

One major issue that is of extreme importance and should be taken into consideration is patient's welfare and quality of life from the perspective of the patient. Somehow, it is imperative not only to focus on cure by itself but also drive our efforts into patient's care. Noteworthy, cancer patients are stigmatized in society and for instance, once cured, they do not get any insurance and/or help to get a job. Therefore, is it enough to focus only on cancer treatment? One major question that was raised is: how can we evaluate the quality of cancer care that patients are receiving across Europe?

Health benefits are usually measured in quality-adjusted life years saved. Cost-usefulness analysis is widely used to assess the efficacy of different clinical regimens by quantifying the changes in prognosis (survival rates, time to recurrence, etc.) and corrected by the quality of life. As such, quality of life is also a mean to address inequalities between patient's treatment and welfare worldwide. Currently, the existing data systems are challenging and EU initiatives, such as European Cancer Information System (European Commission/JRC. European Network of Cancer Registries: *European Cancer Information System (ECIS)*), which is included in the European Network of Cancer Registries (ENCR) and constitutes a web-based tool that aims to promote awareness on cancer burden and to report/disseminate cancer burden indicators (incidence, mortality and survival), have a lot of space for improvement. Furthermore, considering that this topic is somehow complicated to evaluate and there is a lot of diversity, it is not totally clear which sources have the most trustful information. Consequently, getting the "right" indicators is key. Quality of life consists of a very complex and broad issues, including:

- Access to a full range of health care professionals (HCPs; specialists, nurses, psycho-oncologists, etc.) and to treatment innovations;
- Access of patients to full information, allowing them to choose among the therapeutic options;
- Self-care and primary care, along with support from the carers;
- Patient's safety and how to deal/act in response to therapy adverse effects;
- Follow-up care and survivorship;
- Discrimination against cancer survivors



	Individual Action	Collective Action	Mid-term	Long-term
Lack of agreed measures / evaluation process	Clarify and express positioning on quality of cancer care evaluation	Conduct a full mapping and analysis (who is doing what and what is missing) Involve major stakeholders* in order to analyse potential gaps and come up with form actions and recommendations.	Socialise the topic at events and meetings	Create the "European standards of cancer care" (standards and indicators that should be used and made effective and public friendly)
Prioritise measures / evaluation features	Organisations and stakeholders need to clarify and express their sense of priority on quality of cancer care measurement / evaluation	Provide the right background and training (e.g. for health care professionals)	Find out the interested parties and unveil their perspective	
Data source	Different communities to identify and bring forward what is available in their domain, including fresh research	Mapping consensus Make recommendations Create the "starting block"	-	Accountability tool
EU competence and political will	Partners need to state their commitment to the actions in order to help achieving the goal (launch conversations internally)	Involve national Ministries of Health and Sanitation as soon as possible Connect to EU cancer mission and Innovative Partnership for Action Against Cancer (iPAAC)	Working out the scope of the overall project and define where the funding is coming from (funding sources) Start communicating project potential	-
Responsibility	Confirming which associations and partners themselves will commit to the construction of the system (define who leads the action)	Mapping will tell who is already taking responsibility. Identify who does what at the national level	List potential action leads Define action participants and which topics should be addressed	-

*Major Stakeholders identified: patients, HCPs, cancer centres, registries, policy makers (EU + national), payers, research community (including social research), other initiatives (joint actions, etc.).

Figure 4. doi

Actions proposed to improve cancer patients care.

An important question that was raised by the working group to understand what is currently missing is: what is patient's perspective on quality of life? All the parameters related with quality of life are differently measured across Europe and unfortunately, there are some

issues that are not well-discussed and measured. Therefore, there is as urgent lack of agreements/agreed measures/consensus across EU on baseline requirements on quality of life and data discussion is imperative. Parameters, prioritisation is also pivotal. When facing cases where it is impossible to address all the parameters, which ones are the most important? Data sources are very heterogenous across Europe and between different sectors (e.g. hospital *vs* community) and public availability should be revised.

Taking all these into account, the working group proposed several actions that might be implemented to improve the cancer patients care (Fig. 4).

IV. Low-hanging fruits: How to improve cancer treatment approaches in cancers with the most urgent needs by 2030?

Although there are several therapeutic approaches currently available for cancer patients, an important question was raised: how can we improve cancer treatment approaches in cancers with the most urgent needs by 2030? To efficiently address this point, some questions were discussed.

- First, is it possible to identify druggable targets? To do that, it is imperative to perform a better and extensive characterization of cancer types. This will allow the development of new targeted therapies that might counteract cancer development.
- New therapies should be effective, safe (with the lowest side effects), allow a relatively good quality of life and an easy adhesion to therapeutics. Furthermore, innovative formulations to reach an efficient delivery of the drugs should be envisioned.
- Facilitate early clinical trials to evaluate the potential and efficacy of these new molecules/drugs should be considered. Also, to get more accurate results when evaluating new drugs on trials, patient stratification should be considered to avoid unnecessary treatments for patients who will probably not respond. On a general point-of-view, what is missing? The working group identified that the most important factor that is crucial to improve cancer treatment is to stratify patient populations.
- In addition, it is also important to identify “neglected” cancers. How is this possible? And should we prioritize some cancers? If so, how can we perform it? According to which parameters? Should we take into consideration prevalence (rare cancers) or mortality rates? Or even both? As a direct consequence of this prioritization, moral and social problems emerge, and it is widely known that the main driver of cancer therapeutics is currently the available resources (cost-benefit evaluation).

Taking these questions into consideration, the working group proposed some concerted actions that might be applied in the future to advance these topics:

1. **Identify the barriers to treatment, including**: Proper identification of the targets; Optimize delivery to the target; Improve detection and diagnosis; Improve knowledge transfer;
2. **Develop new treatment strategies, addressing**: Clinical trial design for less frequent cancers and rare targets; Create a database of reproducible failures;

Invest in new drugs that were less explored by the industry; Exploit new combinations of multi-drugs;

3. **In the testing of the treatments and in the analysis, we should consider**: Clinical stratification with regimen; Changes in lifestyle of patients and integration on the treatments in the patient's and families' daily routine;
4. **Enable easy knowledge and data sharing at European level**: In this respect, COST Actions can play a critical role by coordinating joint efforts within and across the different networks. However, the EU Mission on Cancer will be critical for a successful advancement of this action point.

V. Strategy: How can we build a process to crosstalk and coordinate between the different stakeholders (academia, patients, industry, healthcare providers) in the field of cancer to get the most value for maximising efficacy and beating cancer?

A coordinated and efficient collaboration between the different stakeholders is one of the most important and determinant factors that might contribute to beat cancer. However, it is well-known that these relationships are not easy and should be extensively improved. Therefore, an important question was raised and discussed: how can we build a process to cross-talk and coordinate between the different stakeholders (academia, patients, industry, healthcare providers) in the field of cancer to get the most value and for maximizing efficacy and, therefore, beating cancer? This question has been under debate for many years and has not a simple question. Still, the working group identified potential and important missing facts that should be considered in the future.

Firstly, the lack of trust between the different stakeholders comprises an important drawback in this process. For instance, basic researchers usually do not fully trust pharmaceutical industries. A problem-solving approach in the development of the research agenda as well as creating specific and efficient cooperation tools might also help in ending this gap and create some cohesion between all the involved entities.

Considering all the bureaucratic paperwork and process in this cross-talk, the development of a simplifying administrative process for projects under development is urgently needed. Furthermore, it will be important to include experts and stakeholders in process design with strategic knowledge that will make this process easier for all involved parties.

Cross-sectional calls should be envisioned that might involve all the stakeholders and be inter- and trans-disciplinary as much as possible. This may imply that some funding calls might need to be revised and adapted, which calls also for a change of mindset within the research and innovation funding agencies.

Last but not the least, academic and research institutions need to adopt a mission-oriented research. This will facilitate the collaboration and joint efforts with other stakeholders.

The working group highlighted what should be done in the next years to overcome this problem:

1. Define a clear outcome and timeframe for the cancer mission;

2. Establishing mechanisms of coordination between the Cancer Mission and Member States Cancer Plans.
3. Mapping the current state-of-the-art of cancer research and treatment in Europe;
4. Reinforce current instruments for networking (research infrastructures, COST-Actions, etc.) to align with the cancer mission for 2030;
5. Introduce innovative funding tools with high levels of plasticity to improve efficiency;
6. Foster or recommend the development of cancer missions-oriented plans between research and health industries;
7. Create advisory/dialogue stakeholders to provide ideas and feedback to the mission-control body.

Conclusions

The COST Connect workshop raised important aspects which have to be considered if we really want to achieve the important goal of beating cancer by 2030. In summary these below are the main conclusions and recommendations:

Strategy. We need to connect all the stakeholders (academia, patients, industry, healthcare providers) and policy makers to build a strong relationship based on trust and productive cooperation. **The main recommendation would be**:

- **to reinforce current instruments for networking**;
- **t o introduce innovative funding tools with high level of plasticity to improve efficiency.**

Education. We should invest our time and resources to prevent cancer by creating European science media centres and public engagement programs to reduce the gap between science and society and to improve people knowledge on cancer prevention. We also need to produce more data on the potential positive impact of prevention measures on the European budgets and better understand the reasons behind unhealthy lifestyles. **The main recommendation would be**:

- **to create European science media centres**;
- **to invest money in research to prove the efficacy of prevention measures**;
- **to invest money in behavioural/psychological science to better understand why people decide to adopt unhealthy lifestyles.**

Therapy. The translation process of novel cancer targets into the clinic is too inefficient and expensive, too many clinical trials fail due to poor pre-clinical validation of targets. **The main recommendation would be**:

- **to invest more resources to develop better pre-clinical cancer models**;
- **to facilitate early clinical trials and to improve patients' stratification**;
- **the initiation of a European Translational Forum (ETF) whose main goal is to form translational consortia funded by specific translational grants.**

Patients. We should not only focus on treatment but also on the quality of life of patients under cancer treatment and patients who, once cured, are stigmatized in society. **The main recommendation would be**:

- **to standardize the parameters used to assess the quality of life across European countries**;
- **to create the "European Standards of Cancer care**";
- **to improve data source curation and accessibility.**

Author contributions

Lucas Cassetta and Pedro Rodrigues coordinated and led the writing of this paper and share first authorship. The remaining authors of this paper were involved either in coordinating the workshop, leading the discussions, or summarising the conclusions.

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Supplementary material

Suppl. material 1: *Booklet of the Workshop - Beating cancer by 2030: mission impossible*? doi

Authors: COST (European Cooperation in Science and Technology)
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