## **Editorial**

## Impactful health research

Why do we do research? It is important to define the reason why we do research before we talk about how to develop impactful scientific work. I personally believe that we should do research to improve the health and the quality of life of those around us. In my humble opinion, this simple and fundamental principle should always be the compass that guides our research efforts. However, many times research is done for other reasons. People do research to graduate, to get a job or be promoted, to travel to a conference, to get a good score from the funding agency, I am not here to point fingers, judge or criticize. Rather, the point I want to make is that to be truly successful in research, we have to do it for the right reason, *i.e.* to improve the health and quality of life of others. Other things (e.g. promotion, travel, graduation) are secondary albeit welcomed consequences, but should never be the primary reason to do research. Assuming that we agree with this principle, now let's talk about how to perform meaningful research and publish impactful papers.

Impactful health-related research is the one that builds on existing knowledge and moves the field forward. Research should always be supported by a strong scientific premise, which is the body of knowledge (evidence) that is already existent in the field and that leads to the new hypothesis that we will test. As such, one really has to take the time to get to know the literature before embarking in any new project. To "reinvent the wheel" is certainly not a good use of anyone's time and resources. Taking the time to know the literature will minimize the risk to do the same work that somebody else has already done. This takes me to the next point that I would like to make. We no longer have time and resources for "horizontal research". Horizontal research is the one that is limited to corroboration of what is already known. Rather, we should strive to perform "vertical research", *i.e.* research that takes the field forward. This is the type of research that is impactful and that is published in the best journals. As such, my suggestion is that before we start any new project we define the scientific premise and formulate a new hypothesis that is somewhat risky and exciting, and that has the potential to drive progress in the field. Successful research guided by such premises is the work that ends up published in the best scientific journals.

Can successful research be done alone in one laboratory? Not anymore. Impactful research is highly collaborative and based on teamwork. There is no way one investigator can have all the expertise to do a full research project all by herself/himself. One has to collaborate, one has to share knowledge and receive knowledge in return, one has to give and take science to be able to be successful today. This requires trust. This also requires self-confidence that is based on strong training and deep knowledge. An impactful publication typically involves a combination of *in vitro* and *in vivo* studies, the use of multiple complementary approaches to address the same experimental question, and the independent repetition of the same experiment several times to confirm the reproducibility of the data. This typically can only be done by a team of investigators that understand the overall goal of the project and that are committed to the execution of unbiased studies at the highest level of ethics and technical skill.

So, how successful research collaborations are developed and maintained? Typically successful team research starts with the understanding of a common goal. Investigators get together to speak openly about their science. They recognize that they have a common objective for their work while having different skills and experiences that can be brought together to enable the generation of new knowledge. They get excited about the work and decide to do it together because they realize that the final product of the joint project will be more impactful than the sum of each effort individually, *i.e.* synergy.

However, these relationships are frequently challenged by many factors. Who gets the credit? Who is the first author? Who will travel to present the paper? The best time to make these decisions is before we start working on the project. Indeed, the secret to maintain long lasting research collaborations is to have a candid and thoughtful conversation about who gets the credit and who is responsible for the work before the work starts. It is actually not that hard to make these decisions. The first author is whoever did the most hands-on work and wrote the first draft of the paper. In health sciences, the last author (also called correspondence author, or senior author) is whoever developed the novel hypothesis, mentored the project and "paid the bills", *i.e.* applied for and received the funding to support the costs of the project. The first author (typically a student, post-doctoral fellow, or junior faculty) should be the first one to present the work in a scientific meeting. This is critical for the development of her/his scientific career. After the first

author had the opportunity to receive the credit and enjoy the "limelight", then the mentor (senior author) will have the opportunity to present the work in lectures and scientific conferences. All of these things should be discussed and agreed upon before any work is done. Doing so will avoid unpleasant surprises and enhance the chances of having fruitful and long lasting collaborations within and across laboratories. The same is true for collaborations involving established investigators. The more these collaborations are defined and agreed upon in the beginning, the more chances they have to last a long time and be impactful to the field.

In conclusion, those of us who have the privilege to do health research are entrusted with resources that have been generated through sacrifice of people who worked hard, paid taxes, and generated the funds that pay for research. It is of utmost importance that we use these resources with integrity, knowledge, hard work, and with the highest ethical standards. Further, it is critical that these resources are used to drive the field forward through vertical research. I respectfully submit that our research should always be a meaningful building block that contributes to the improvement of the health and the quality of life of those around us. This is research worth doing! This is research worth publishing! This is indeed impactful research!

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