J Orthop Sci (2013) 18:685–686
DOI 10.1007/s00776-013-0440-z

EDITORIAL

Pleasure of discovery: why we love research

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Published online: 14 August 2013

Why do we study hard? There are many reasons, such as, perhaps, to obtain a high-grade education and pursue a successful career, to become an intellectual, and/or just for self-fulfilment. When I was a high school student, a young teacher of mathematics asked us in class why we were studying mathematics. I remember well my answer: "Because it's interesting." With a little embarrassment, the teacher, in his fourth decade, said: "I believe that the reason why we study mathematics is to acquire the ability to judge objectively whether or not things are going right." It was just before the entrance examinations to universities, and the students were studying hard to gain admission. Probably, the teacher had tried to explain to us that the purpose of studying mathematics was not simply to pass the examination; he was absolutely correct. However, I think my answer was right, too. Even now, I believe that our motivation to study is basically our interest in finding answers to challenging, unresolved problems.

Why do we do medical research? Each researcher surely has an individual reason. Although 37 years have passed since I graduated from medical school–and I obviously have more experience in life than when I was a high school student–my belief has changed little from the one I had about studying mathematics: I do medical research because it is interesting. The ultimate motivation in science is to discover. When a person achieves his or her scientific aim, he or she feels supreme pleasure. In medical science, discovery may directly lead to human welfare through improved disease diagnosis, treatment, and/or prophylaxis or health promotion. The contribution may seem small, but the outcome associated with it may prove to be invaluable and the pleasure experienced by the researcher immense. All medical research has clinical relevance or an objective. Of course, it is not always easy to predict final outcomes, especially in basic science. Further, it may be difficult to determine the true value of findings from contemporary viewpoints. However, I firmly believe in clinically oriented basic studies and that it is important we do not lose the ultimate objective of such study.

So let us ponder the unique system of medical research, especially in basic science in Japan. Throughout Japan's medical history, knowledge and techniques developed in other countries have been invaluable to our work. Our medical system developed with the aid of such support, and we, in turn, contribute to world science. To continue this contribution, we have a unique system in which many physicians—who well understand clinical problems—are also doing research. An excellent example is Dr. Shinya Yamanaka, initially an orthopedic surgeon, who—along with fellow researcher John Gurdon—received the 2012 Nobel Prize in Physiology or Medicine "for the discovery that mature cells can be reprogrammed to become pluripotent."

My institution, Chiba University, was founded in 1874, and the Department of Orthopedic Surgery was established in 1954. Since then, a significant number of works related to orthopedic issues have been reported from our department. Similar contributions have been made throughout Japan by highly motivated physicians who have an excellent understanding of clinical problems. These "physician scientists" are the fuel of Japan's research engine. Medical research provides a deeper and more objective

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understanding of clinical issues from a broader viewpoint. In this sense, I strongly recommend that young doctors join in academic activities while they are mentally and physically in their prime. Also, with the huge amount of scientific information available today, it is sometimes difficult to determine which facts are truly valuable for a given situation, and the knowledge gained from personal experience in research may help clinicians decide upon the most appropriate approach to a difficult clinical issue. .

I now address the key requirements for fruitful research. Needless to say, originality is vital. However, it is also true that there is no stand-alone work without preceding studies. Therefore, a thorough review of related papers is the first step in research. Prior to beginning the study, its design should be formulated and documented in as much detail as possible, with its objectives and clinical relevance clearly defined, even in basic science done by the physician scientist. To reach a scientific breakthrough, collaboration is indispensable; discussion among scientists with different backgrounds will significantly promote the study. Sometimes, negative findings based on high-quality experiments are more valuable than positive findings: if results are inconsistent with those previously reported, the study may open a new perspective in the research area. Even if the anticipated results are not obtained in a new scientific field, the study may still be as valuable as the one that provides positive results. Of course, ethical consideration is extremely important in any medical research. Publication of the study in a journal is the supreme final step of research; this is the scientist's responsibility. Repetitive elaboration of the contents would make the paper a truly valuable one.

I will serve as the president at the 28th Annual Research Meeting of the Japanese Orthopaedic Association. The meeting will be held on 17–18 October in Makuhari, Chiba City. As the president, I adopted the following phrase as the main theme: "Pleasure of discovery: for the new orthopedic practice." This phrase expresses my opinion that "we should contribute to the progress of orthopedic science to promote human welfare through scientific discovery, and the process will surely bring paramount pleasure to the researchers." Although the meeting was initially founded for basic science related to orthopedic problems, without mentioning translational research, it is rather meaningless to discriminate between basic and clinical studies today.

Why do we love research? It is simply because the process itself is delightful. This is especially true in medicine, as research can lead to the well-being of the people. At the same time, the experience of research also enriches the life of the physician. Finally, the value of research should not be evaluated by its impact factor nor by journal ranking but by the excellence of study itself.