Surgery from experimental research to clinical application and vice-versa

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Producing knowledge is of fundamental importance and disseminating knowledge is a moral and ethical task that must not be neglected, especially by those who belong to a university institution strongly committed to teaching, research and patient care. The words science, technology and research denote three highly complex concepts of human activity. In medicine, and in surgery in particular, this complex triad is extremely important when it acts as an effective way of obtaining direct progress in surgery in a medical school, with a significant influence on the well-being of the patients.

Research and clinical practice

We have always considered the involvement in the production of knowledge to be an absolutely necessary component for those with professional ties to the University as teachers. In addition, we believe that the extrapolation of attitudes and practices concerning scientific work to the remaining fields of academic work contributes to the improvement of teaching, of the extension of services to Society and of the administration of the University itself. Professional competence in research is not incompatible with technical-surgical competence^{1,2,3}. There are countless examples of surgical investigators who execute well both activities. In particular, we believe that the two skills complement each other and should definitely be practiced in a continuous manner. The involvement in research activity on a day-to-day basis, in addition to fulfilling its major objective of contributing to the generation of knowledge, in our opinion, can and should have a relevant influence on other areas of professional activity.

Training people

The first area concerns the training of people in graduate courses, in projects of scientific initiation, in post-graduation *stricto sensu*, in Master's or Doctoral investigations, and also in post-graduation *sensu lato*, i.e., in medical residency^{4,5}. Engaging in a research project may have an important impact on the acquisition of attitudes and skills that will be favorable in any area of professional activity, thus justifying the inclusion of research in any educational or training program^{2,3,4,5}.

Condition of research work

Another contribution of scientific research is the creation of conditions that will permit a person or a group

of investigators to carry out work of their interest by applying functioning methods. Thus research is an essential instrument for the creation of a Group with natural vocational diversity and with broad experimental and clinical training. I would like to mention in particular the interaction with several Departments of the Faculty of Medicine of Ribeirão Preto and with other Institutions inside and outside the University of São Paulo, developed over a period of decades and of fundamental importance for reaching the goals proposed^{5,6}.

Application of the methods created

Another repercussion of any type of scientific investigation is related to the development of specific functional methods that, after appropriate standardization, start to be used in health care, in diagnostic evaluation and in the therapeutic definition of special cases⁷. Examples of the interpretation of these research activities are the recent studies on the effect of hyperbaric oxygen therapy on hepatic regeneration⁸ and their clinical application to patients with hepatic artery thrombosis and primary hepatic dysfunction post-liver transplantation⁹. Similarly, in our Group the use of photodynamic therapy for the treatment of tumors is gaining space in the field of the therapeutic possibilities for gastroenterology, especially regarding tumors of the liver and of the esophagus. We may also mention the use of laser fluorescence spectroscopy, which is already being used for patients with tumors of the liver, pancreas and esophagus. This method, developed and refined in collaboration with the Institute of Physics of São Carlos, University of São Paulo, permits not only a diagnosis of the tumor, but also the level of the safety margin for tumor resection. Another application of laser fluorescence, already routinely used in our unit, is the systematic study of liver graft viability during the various steps of liver transplantation^{10,11,12}. To conclude, the objective of this professional activity in scientific investigation is to contribute to the generation of new knowledge that, once disseminated, can be used in the production of further knowledge or in the improvement of other human activities. Over a period of two decades we were able to advance from research to clinical application on the basis of experimental and clinical concepts, in our belief that these two activities cannot be dissociated. Obviously surgeons confront unique logistical problems when they are learning research methods and when they are attempting to practice research. Since excellence in surgery requires a high level of performance both in clinical judgment and technical application, the

problem of integrating scholarly activities and clinical practice is usually more difficult for the surgeon than for academic physicians in other disciplines. However, personal discipline and dedication to the university permit reaching excellence in these activities which function, above all, as a form of personal growth that influences the scientific, teaching, assistance and administrative performance.

The thematic supplement

In view of the above considerations, Prof. Dr. Ajith Kumar Sankarankutty and myself decided to compile a series of studies conducted within the Division of Surgical Gastroenterology and publish them in a special issue in the form of a thematic Supplement, in order to disseminate our activities in clinical and experimental research in the area of surgical hepatology. The journal chosen was *Acta Cirúrgica Brasileira* because of its credibility as a vehicle and because of the credibility of its founder and Editor, Professor Saul Goldenberg, as the person who maintains the academic-scientific credit of the journal. This time we chose the liver as the central topic around which a series of studies were compiled, most of them carried out by members of the Surgical Gastroenterology Division itself and essentially representing the production of knowledge, of reflections about current questions based on personal experience and on the literature, demonstrating the scope of our university function and ultimately reflecting the strong relationship existing between the research laboratory and the hospital.

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