

# **HABILITATION THESIS**

## **ABSTRACT**

### **FROM BENCH TO BEDSIDE – EXPERIMENTAL SURGICAL RESEARCHES AND CLINICAL APPLICATIONS**

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The present habilitation thesis brings together the results of the experimental and clinical post-doctoral research which I have carried out at the "Iuliu Hatieganu" University of Medicine and Pharmacy, the Department of Transplantation of the Sahlgrenska Academy (University of Goteborg, Sweden) and the Emergency County Clinical Hospital of Cluj Napoca. This activity has continued my doctoral research, focusing on 3 primary domains: the improvement, refinement and promotion of techniques in vascular microsurgery, research in transplantology, regenerative medicine, bioengineering and stem cell research, as well as the interaction between the the immune system and the tumor microenvironment.

Advanced studies in transplantology use complex experimental models carried out on small animals (mice and rats). Advanced vascular microsurgical techniques are required in order to validate these models due to the small size of the arteries and veins which must be anastomosed. Several personal post-doctoral studies concerning this aspect are described in the habilitation thesis, demonstrating the international impact and recognition of the expertise in the domain of microsurgery.

As a natural evolution of the experimental doctoral studies in the domain of transplantation, the post-doctoral research has progressed towards other experimental models which analysed the immune mechanisms involved in organ

rejection, as well as the clinical application of novel techniques, such as monitoring small bowel organ rejection through laser Doppler flowmetry in patients receiving small bowel or multivisceral transplantation. Although transplantology is an innovative and relatively recent branch of medicine, it will probably disappear in the future. Bioengineering, biotechnology and the application of stem cells may lead to the creation of new organs and tissues through tissue engineering techniques.

The present habilitation thesis also includes experimental research in regenerative medicine, bridging the gap between studies concerning organ substitution through transplantation and studies concerning tissue engineering through biomaterial/stem cell complexes.

Immune mechanisms play a fundamental role in both the post-transplantation reaction, as well as the defence mechanisms of the host which combat cancer cell aggressiveness. The post-doctoral studies which were carried out focused on understanding the immune response and the role of the various cellular and humoral components involved in neoplastic diseases. The main goal of the applied clinical research was the improved adaptation of the treatment to the corresponding stage of the disease and the development of new treatment methods. The studies included in this chapter represent clinical research concerning the interaction between the immune system and the tumor microenvironment in breast cancer and rectal cancer.

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