

## Management of Bioartificial Heart

Proposal of Martin Pešl, M.D.

### Background

The project of the International Centre of Clinical Research (ICRC Brno) creates an optimal environment for cooperation of Czech scientists with the world-renowned - Mayo Clinic and the University of Minnesota (UMN). ICRC Brno is a strategic project of the Czech Republic in medical research, healthcare and education. It is based on the cooperation of top academic institutions and industry in advanced medical research.

A part of this cooperation is a cardiology research project which focuses on basic and preclinical research complemented with drug, instrument and technology development. Recently, major efforts focus on stem cell therapy. St. Anne's University Hospital and Masaryk University where I have been participating in research projects since 2005 is a leading Czech center in stem cell clinical research and treatment. We treated over 60 patients and regular follow-up is still active. Meanwhile, new possibilities arose and became the center of my professional interests.

I have been involved in research dealing with genetic background of cardiovascular diseases and later became involved in novel ultrasound diagnostic tools as pregraduate researcher. In 2007 I shifted my main interest to stem cells and ultrasound diagnostics. In 2006, Prof. Meluzin offered me a research post in his team. The suggested thesis of my PhD research was autologous transplantation of mononuclear bone marrow cells in patients with acute myocardial infarction. In 2008 the team of Prof. Doris A. Taylor from University of Minnesota presented new possibilities in recreating whole new blood vessels or organs by implanting a patient's own cells into a matrix derived from a donor organ. This approach ought to bypass the problem of organ rejection because the matrix, being devoid of cells, shouldn't provoke an immune response. Prof. Tomas Kara suggested, University of Minnesota to become the key partner of Mayo Clinic in the academic area and proposed blueprints for cooperation. We contacted the team of the stem cell institute at UMN. My objective is to get involved in the coordination process and combine my professional knowledge and management skills.

I am convinced that healthcare professionals need more than medical knowledge to complete successfully their research projects. Since 2006 I have been a member of Young project manager group (YPMG)- the project management training. This represents advanced planning, dealing with resources and coordination of temporary teams. After theoretical training we organized international meeting of project managers, conference Project Friendly 08. After passing international exams in April 2008 I became a certified project manager associate, recognized by International project management association ([www.ipma.ch](http://www.ipma.ch)). Nowadays I am in the charge of the organization YPMG. I would like to apply and further develop my project management skills in the area of research and clinical coordination.

I also have participated in academic activities. I was recently elected as a representative of the Medical Faculty of Masaryk University in the Higher Educational Institutions Council of the Czech Republic, i.e. advisory board of Czech ministry of education in area of tertiary education. It is related to my previous two years as student representative and chair of commission for research and education in the student body of the same organization. I am one of the youngest members of the board. I continue my work as a member of Eurodoc, European doctoral candidates association, responsible for career development.

I believe that gaining experience and insight in the conception of the stem cell institute with long term experience with this kind of education will enhance my knowledge, bring the innovation and coordination skills and thus improve the overall quality of research at my home institution. One of my goals is to improve the transfer of knowledge in research management and taking part in future establishment of an educational program for research assistants, position that is now missing in Czech educational system.

## **American Partners**

University of Minnesota / Mayo Clinic – Minnesota partnership cluster

Researchers from the Stem Cell Institute UMN are working in collaboration with researchers in the Departments of Medicine, Cardiovascular Surgery and Biomedical Engineering, as well as researchers associated with the Lilliehei Heart Institute. Objective of the Stem Cell Institute is to promote our understanding of the potential of stem cells to improve human and animal health. In recognition of the seemingly unlimited potential of stem cells in the treatment of human and animal diseases, the University of Minnesota established the Stem Cell Institute and has provided the Institute with nearly \$15 million of initial capital. Prof. Doris Taylor is the director of the University's Center for Cardiovascular Repair and a principal investigator on the study with bioartificial heart. As the Medtronic-Bakken Chair in Cardiac Repair, Dr. Taylor blends research using stem cells, genes, and devices to develop novel cardiac and vascular technologies --ones to prevent, treat, and hopefully one day, cure heart ailments. She is involved in both laboratory and clinical studies using cell therapy to treat disease. Recently her team was considered the nation's leaders in the field of stem cell research. Institute researchers are making great strides in this emerging field of stem cell biology. The proposed internship program is the best way to get insight of managing and leading research team and to follow strategies used there.

The Mayo Clinic plays a key role especially with its large program of regenerative medicine. The clinical research seeks the possibilities to bring stem cell therapy to patients. Our partner is Dr. Andre Terzic, Research Associate in cardiovascular diseases cardioprotective and cardioregenerative medicine, and he leads also research in genetics of cardiac disease and stress tolerance and bioenergetic signaling, nucleocytoplasmic communication and ion channel biology. He represents a contact on the clinical part of regenerative medicine - regenerating damaged tissues and organs through reparative techniques that stimulate previously irreparable organs into healing themselves.

### **Objectives:**

- To get insight into the management and coordination of stem cell facility, learn advanced transferable techniques in the research and applied clinical practice;
- To join HESC training and laboratory work in the international group; and
- To establish a link between the Stem Cell Institute of UMN and ICRC - Cardiology of St. Anne's University Hospital of Masaryk University.

### **Detailed Description**

To establish a working link between the Stem Cell Institute of UMN and Cardiology of St. Anne's University Hospital is very important. So is to develop my professional network with staff of the Stem Cell Institute and observers from other countries.

The training course, offered only a few times a year, provides hands-on training in the culture of human embryonic stem cells (HESC). Participants are offered written training materials, laboratory instruction and practice, as well as lectures from experts in stem cell research and its clinical applications. Participants are instructed in evaluating the HESC morphology, as well as colony size and density. Instruction in passaging, freezing, thawing and banking of HESC is provided. The importance of regular HESC characterization is discussed and methods in monitoring HESC cultures by karyotype, stem cell marker expression and pluripotency assays are demonstrated.

The executive training should start with the official "UMN hESC Training Program: Essentials of Human Embryonic Stem Cell Culture (HESC) Techniques"-mentioned above-and similar seminars at the Stem Cell Institute. The training takes approximately a week and is considered necessary for the adequate participation during the lab work. The intership itself should take place at the Center for Cardiovascular Repair, UMN, where I will seek possibilities of getting in to effective management and coordination of laboratory and applied research work. Last but not least is part at Mayo Clinic represented by me getting

into the program on regenerative medicine. The observership itself in the last period will merge theoretical, clinical and scientific training. I should attend clinical discussions at conferences, lab meetings and teaching sessions. Both parts should last 5-6 weeks.

### **Organization and Time Schedule**

The theoretical part at UMN will take place in the Autumn of this year, exact timing for the HESC training will be available during May 2009. Proposed day of the beginning of the training is 21<sup>st</sup> September. Immediately after the course on 1<sup>st</sup> October will intership continue in the Cardiac repair facility and finally after 6 weeks I will move from Minneapolis to Rochester for the clinical part of the intership app. 6 weeks. Estimated comeback is 20<sup>th</sup> December.

### **Program Benefits**

I am convinced that medical and research professionals with American experience could change the thinking in research and healthcare management at home. Minnesota lab and clinical fellowships and internships offer valuable educational opportunities in a medical center dedicated to research, care, and education. My attendance to the observership program could enhance already established cooperation between the ICRC and the Mayo. Such cooperation will surely lead to new joint research projects and publications in scientific journals with impact factors and application of new ideas into a healthcare management in the Czech Republic. I would like to transfer knowledge in research management and take part in future establishing of an educational program for research assistants, the position that is now missing in Czech educational system.

### **Risks**

The risk of this project I am aware of is the implementation of the research management in the meaning of starting new study program that could not be started without wide strong support from the whole university. In this case I would like to implement at last new study course subject for PhD. students – Research Management.