

## 2012 Award, Italy



### Gel with stem cells for regenerative medicine

by Fabiola Munarin

#### Theme

Bio engineering and stem cells: ideas for life

Stem cells are recognised by the international scientific community for their use in maintaining and renewing vital tissues (blood, muscles, skin, etc.). The study of these cells also helps improve our understanding of how the organism develops and contributes to the treatment of a range of illnesses (cardiac, diabetes, lymphoma). However, numerous other uses are still to be studied. The Altran Foundation in Italy therefore wished to reward a project aimed at improving our understanding of the growth of stem cells, creating innovative therapeutic instruments using these cells and optimising information systems for storing cells and their related data, etc.

#### Laureate

### Gel with stem cells for regenerative medicine

In Italy, Fabiola Munarin, a determined and young researcher from the Politecnico di Milano, was awarded for her project "Gel with stem cells for regenerative medicine". It aims to enhance the quality of life of patient suffering from lipoatrophy, a severe loss of subcutaneous fat tissue causing disfigurement. Lipoatrophy occurs after repeated injections of drugs for patients affected by diabetes or by autoimmune or metabolic pathologies. It has a strong impact on patient's morale. The project addressed the issue by creating an injectable pectin gel loaded with stem cells to regenerate soft tissue damaged by lipoatrophy. The developed gel can be used as a prospective support and as a vehicle for cells.

Today, there is a lack of satisfying solutions to address lipoatrophy issues. For the most severe forms, the self-transplant is not possible, due to the lack of adipose tissue in other body parts. Plastic surgery and aesthetic procedures are scarcely employed because of problems of mobilisation of the silicon prosthesis and mid-term absorption of the injectable fillers.

Fabiola Munarin's project represents an alternative solution to heal the damaged tissues reducing the side effects of open surgery, such as the risk of infections, the cost and time of the treatments.

#### Altran's support

The Altran Italy technological support team has worked on the mathematical simulation of the gel reaction when in contact with the skin, on the business plan and on the fund raising strategy to help Fabiola Munarin move her project forward.

## Jury

**Giuseppe Novelli**

Professor of Genetic Medicine, Faculty of Medicine, University of Rome "Tor Vergata"

**Maria Cristina Tanzi**

Professor of Industrial Bioengineering in the Department of Bioengineering at Ecole Polytechnique in Milan

**Gianna Milano**

Author and journalism teacher at the Higher International School of Advanced Studies in Trieste

**Ernesto Reverchon**

Professor and Director of the Department of Chemical Engineering at the University of Salerno

## Finalists

**An automated medical device for stem cells based therapies****Giacomo Cattaruzzi**

VivaBioCell's aim is to make a number of specific regenerative medicine therapies become available "in every hospital". The scope of the project submitted to the Altran Foundation is to validate, automate and clinically test the application of adult stem cells derived from fat tissue for both 1) the production of customized bone implants for oral and maxillofacial surgery (current target) and 2) the treatment of osteoarthritis in humans (novel target).

**SQPR: Squeeze Pressure Bioreactor****Serena Giusti**

The system SQPR (squeeze pressure bioreactor) is a device for cell culture capable of applying a pressure hydrodynamic cyclic without direct contact with the sample.

The project's scope is the use of the system SQPR to influence and guide the differentiation of multipotent adult stem cells through the generation of appropriate physical stimuli, combined with specific environmental control (temperature, pO<sub>2</sub>).

**Identification, production, and in vitro expansion of stem cells ovogoniali mammalian****Massimo De Felici**

Recent results suggest that the mammalian ovary contains stem cells capable of forming oocytes and follicular cells. Furthermore, numerous studies are in progress that have the purpose of producing germ cells from stem cells. The experimental plan and the main objectives of this project can be summarized in four points: 1. Identification, isolation and characterization of stem cells ovogoniali (CSOs) from the ovaries of rat and human, 2. Production of OSC cells from mouse embryonic stem (MESC) and induced pluripotent stem cells (iPS) from mouse and human, 3. Propagation of CSOs in culture; and 4. Production starting from the OSC of oocytes in the follicles.