

(For JSPS Fellow)

Form B-5

Date (日付)

18/07/2012 (Date/Month/Year: 日/月/年)

**Activity Report -Science Dialogue Program-**  
(サイエンス・ダイアログ事業 実施報告書)

- Fellow's name (講師氏名): Stefania Pagliari (ID No. P-11788)

- Participating school (学校名): Takezono High School

- Date (実施日時): 12/07/2012 (Date/Month/Year: 日/月/年)

- Lecture title (講演題目): Stem Cells and Tissue Engineering: the tools of Regenerative Medicine

再生医療のツール:細胞と組織工学を食い止める。

- Lecture summary (講演概要): Please summary your lecture 200-500 words.

The aim of Regenerative Medicine is replacing defective tissue with functional tissue in order to heal patients through a broad spectrum of strategies such as stem cell-based therapy and tissue engineering. Stem cells are unspecialized cells with the ability to produce copies of themselves and give rise to different tissue cell types. Stem cells can be divided in four major groups: 1) embryonic stem cells; 2) induced pluripotent stem cells (iPS), a recent extraordinary success of a Japanese research team; 3) adult stem cells; 4) umbilical cord blood-derived stem cells.

Stem cell –based regenerative medicine consists in harvesting stem cell from patients, expand them in laboratory and then implant them back into the same or another patient (autologous or allogenic implant, respectively). An example of successful current stem cell therapy is bone marrow transplant to cure a number of diseases such as leukemia and lymphomas.

Nowadays it's pretty clear that to control stem cell fate and behavior the stem cells should feel like at home, meaning that in laboratory they have to be grown into environments which are as much as possible similar to the body tissues. This natural microenvironment is a complex array of strictly controlled biochemical and physical stimuli. In an attempt to reproduce them, Tissue Engineering concept has emerged. Tissue Engineering is an interdisciplinary research field in which scientists from different research fields and with different competences collaborate to the development of functional substitutes for damaged tissues. The general aim of Tissue Engineering is to restore damaged or diseased organ function by combining living cells (e.g. stem cells), biodegradable scaffolds (natural and synthetic) as supports for growing cells and

bioactive molecules (e.g. growth factors), in order to build a three-dimensional living construct that functionally, structurally and mechanically mimics the tissue that is to be replaced. On this purpose, scaffold materials have to exhibit some important features including: 1) biodegradability; 2) biocompatibility; 3) ability to release stimuli able to guide the growth of stem cells as well as their spatial organization and transformation in all cell types found in the native tissue. Langer and Vacanti carried one of the first examples of Tissue engineering in 1993. More recently, the possibility to grow organ or organ parts in the lab has been successfully demonstrated by the development and application of a number of tissue engineered-constructs, such as skin grafts, engineered bladder tissue and synthetic trachea transplants.

- Language used (使用言語): English

- Lecture format (講演形式): PowerPoint Presentation

◆Lecture time (講演時間) 40 min (分), Q&A time (質疑応答時間) 15 min (分)

◆Lecture style (ex.: used projector, conducted experiments)

(講演方法 (例: プロジェクター使用による講演、実験・実習の有無など))

a projector has been used to show a PowerPoint presentation and a short video; hard copies of the lecture have also been prepared for students

◆Interpretation (ex.: assistance by accompanied person, provided Japanese explanation by yourself) (通訳 (例: 同行者によるサポート、講師本人による日本語説明))

assistance by accompanied person

◆Name and title of accompanied person (同行者 職・氏名)

Sara Romanazzo, PhD student

◆Other note worthy information (その他特筆すべき事項):

- Impressions and opinions from accompanied person (同行者の方から、本事業に対する意見・感想等がありましたら、お願いいたします。):

In my opinion, students were very interested on the topic of Dr. Pagliari's lecture. They appeared to be captured and followed with no difficulties the presentation that was held in English. At the end of her presentation, Dr. Pagliari showed a video about her actual work, showing laboratories and some of the staff that collaborate with her. I think that this video was really helpful for students to understand in practice how a typical researcher life is held.