

Report of the 3rd Royan Summer School in Tehran, Iran (14th July–19th July 2012)

Andreas Nüssler · Natalia Tapia · Esmail Jabbari

Published online: 8 February 2013
© Springer Science+Business Media New York 2013

Abstract From the 14th to the 19th July 2012, the 3rd Royan International Summer School took place at the Royan Institute in Tehran, Iran. This year's topic was "Stem Cells and Developmental Biology for Regenerative Medicine". The course, which covered essential concepts of stem cells, pluripotent stem cells, adult stem cells, tissue engineering and ethics, was attended by more than 400 students from all over Iran and from the Middle East.

Keywords Royan Institute Summer School · Iran · Stem cells · Developmental biology

From the 14th to the 19th of July 2012, the third Royan International Summer School took place at the Royan Institute in Tehran, Iran, which was founded in 1991 as an infertility treatment clinic. This year's topic was "Stem Cells and Developmental Biology for Regenerative Medicine". Prof. Hossein Baharvand, the Director of the Royan Institute for Stem Cell Biology and Technology (RI-SCBT), described the 2012 edition of the Summer School as a series of interactive lectures which were based on questions from the audience.

A. Nüssler (✉)
BG Trauma Center, Eberhard Karls Universität Tübingen,
Schnarrenbergstraße 95,
72076 Tübingen, Germany
e-mail: andreas.nuessler@gmail.com

N. Tapia
Max Planck Institute for Molecular Biomedicine,
Röntgenstraße 20,
48149 Münster, Germany

E. Jabbari
Department of Chemical Engineering, University of South
Carolina, 301 Main Street,
Columbia, SC 29208, USA

Like in the two previous editions, the talks were given by Iranian as well as by international experts: The structure of this year's program allowed for an ideal combination of theory and practice, as each day was dedicated to a specific subtopic. In the morning, the central terms and concepts of the topic of the day were presented in several lectures, and in the afternoon, the participants were able to apply their newly acquired knowledge in practice-driven workshops (Fig. 1).

The 2012 edition of the Royan Summer School was attended by more than 400 participants from universities all over Iran, which encompassed undergraduate and postgraduate students as well as postdoctoral researchers, as well as by students from other countries in the Middle East, who received explanations in English during the practical workshops.

In order to enable the Iranian participants to gain a more thorough understanding of the central concepts of this year's topic, the morning lectures were held in Farsi, the official language of Iran, by members of Iranian research centers, in the first days. On the first two days, the participants received an overview over the following concepts: pluripotent stem cells, mesenchymal stem cells and their differentiation, cellular reprogramming, cancer stem cells, stem cells and regenerative medicine, and finally tissue engineering. In the afternoon, they attended a practical workshop on flowcytometry.

The first lecture of the following day centered on the gene manipulation of pluripotent stem cells. Then, the necessity of the repair of the nervous system with stem cells was explained, while the third talk dealt with the differentiation of oligodendrocytes. After the morning break, the neural differentiation of pluripotent stem cells was described. The topic of the last lecture was the isolation and expansion of neural stem cells, which was also the subject of the afternoon workshop.

Then, the international speakers took the stage and henceforth the lectures were held in English. On the third



Fig. 1 Students at the Summer School observing pluripotent stem cells

day, all speeches dealt with pluripotent stem cells: The first lecture provided an overview of the different methods that can be used for reprogramming a somatic cell to a pluripotent state, centering on the advantages and disadvantages of each method in therapeutic applications. Next, the different methods for the generation and characterization of iPS cells in vitro and in vivo were presented.

The first talk after the morning break dealt with the aging of stem cells, focusing on the mechanisms of aging, epigenetics and aging, stem cells and aging, and lastly, the epigenetic modification of aging. During the following talk, the challenges that need to be overcome before the iPS technology can be translated into clinical applications were discussed. Finally, the recent reports on direct reprogramming between differentiated cells without de-differentiating them to a pluripotent state were discussed.

The following day was dedicated to adult stem cells: At the beginning, the fundamental role of adipose-derived mesenchymal stem cells in drug discovery was explained, and then, the role of mesenchymal stem cells in organ regeneration was presented. After the morning break, the individual characteristics as well as the advantages and disadvantages of the different types of stem cells were portrayed. During the last lecture, the use of cell therapy in the framework of kidney

regeneration was explained. Subsequently, mesenchymal stem cells were also the topic of the afternoon workshop.

The topic of the penultimate day was scientific writing and ethics: At the beginning, four lectures on business correspondence, oral presentation, class management and poster presentation were given by members of the Royan Institute. Then, a talk on scientific writing and data presentation took place. In the afternoon, the attendants of the Summer School took part in a practical session on immunostaining. In the evening, a gala dinner took place, during which the lecturers talked with the students about their reasons for choosing a career in science.

The topic of the final day was tissue engineering. During the first lecture, the growth factor delivery and the presentation of proteins to the growing cells were discussed. After the morning break, a workshop on scaffold fabrication was held.

In the afternoon, the Summer School ended with an official closing ceremony. Several prizes were awarded to the student participants for their contributions and responses to the questions that were asked by the lecturers during their talks. The winners were chosen by the lecturers and the prizes were provided by the International Society for Developmental Biology (ISDB) and the Royan Institute. Altogether, the 2012 edition of the Royan Summer School was very successful and enabled many exchanges between the international experts and the participants.

Acknowledgments The authors would like to thank Prof. Hossein Baharvand and the staff of the Royan Institute for Stem Cell Biology and Technology for providing them the opportunity to participate at the 2012 Edition of the Royan Institute Summer School and for the perfect organization of the event.

Furthermore, they would like to thank Mr. Luc Koster from the Eberhard Karls Universität Tübingen (BG Trauma Center) for revising and editing the accounts on their respective lectures

Conflict of interest statement All three authors declare that they have participated as speakers at the 2012 edition of the Royan Summer School, and that all the incurred expenses for their stay in Tehran were covered by the Royan Institute.