



CAS Strategic Priority Research Project on Stem Cell and Regenerative Medicine Research in Progress

Lots of diseases, like congenital defects, aging, chronic diseases, metabolic disorders, and severe infectious diseases are among the major challenges to human health and modern medicine. With a large population, China faces the most serious situation in the world in terms of occurrences of tissue/organ disfigurement, failure or dysfunction. Traditional medical approaches, which are based on medication and surgery treatments, are far from enough to fulfill the large demand in the clinical setting. On the frontiers of current life sciences, stem cell and regenerative medicine spark new hopes for curing such diseases, through providing new regenerative sources for repairing damaged or injured tissues and therapies for diseases in the terminal stage. Regenerative medicine, based on the regeneration and replacement therapy abilities of stem cells, marks a new round of medical revolution following traditional medicines and surgery treatments, and will become one of the most promising frontiers to produce new landmark breakthroughs of current biology.

China is a latecomer in research of stem cells and regenerative medicine. Increasing clinical needs and relatively inadequate scientific studies call for collaboration and concentration on stem cell research and regenerative medicine around the whole country. To build up domestic innovation forces and finally establish a platform of excellence for stem cell and regenerative medicine research, a strategic priority research project was launched by CAS to address major scientific issues and break through critical technical hurdles in related fields, including stem cell regulation, mechanisms for stem cell therapies, and clinical translation.

By revealing the fundamental mechanisms underlying stem cell origination, development and regeneration of organs, as well as developing new techniques to control stem cell behavior for repairing pathological damages, this project is to promote clinical applications of stem cell therapies. It aims to understand basic biological

mechanisms including derivation, maintenance, differentiation and functioning of stem cells in both normal developmental and pathological processes of liver, nervous system and other important organs, integrating the establishment of stem cell resources, techniques of directed differentiation and acquirement of functional cells, generation of artificial organs, and strategies for stem cell applications. Led by Prof. ZHOU Qi with the CAS Institute of Zoology (IOZ), the team is striving to discover important mechanisms and methods of stem cell derivation and regulation, develop critical techniques to acquire functional cells, generate new drugs based on stem cells, and to establish a scientific, ethical and legal standard for future application of stem cells and regenerative medicine.

The project is based on the CAS network for stem cell and regenerative medicine research, which consists of four research centers respectively located in Beijing, Shanghai, Guangzhou and Kunming. Radiating from this network, the project also involves and integrates the main research forces from 17 CAS institutes majoring in life science, materials science, chemistry and biomechanics. Through optimized overall deployment of distributed R&D forces, the project aims to establish a systematic research network for this strategically important discipline, building a complete research value chain connecting different scientific phases from fundamental research to application and translation.

So far the team has made progress in fundamental studies, such as reprogramming of somatic cells, tissue repairing products and standardization of clinical applications of stem cells. Highlighted in this issue is two advances achieved by researchers based in Shanghai, both of which were elected into the top 10 scientific advances of China in 2011.

(Reported by SONG Jianlan based on materials from IOZ)