2020 King Faisal International Prize for Science and Medicine

The King Faisal Foundation in Riyadh, Saudi Arabia has awarded the 2020 King Faisal International Prize for Medicine (Topic: Haemoglobinopathies) to Stuart Holland Orkin. The haemoglobinopathies encompass all genetic diseases of haemoglobin and are responsible for significant morbidity and mortality all over the world[1]. The Science prize in the field of biology is awarded to Xiaodong Wang. The prize comprises a 24-carat gold medal, weighing 200 g; and a cash award of 750 thousand Saudi Riyal (USD 200,000).

Orkin was born in 1946 in New York, USA. He is the David Gordon Nathan Distinguished Professor of Pediatrics at Harvard Medical School, Harvard University, Boston, Massachusetts. He is an Investigator of the Howard Hughes, Maryland, USA. He received an MD (1972) from Harvard Medical School. He completed pediatric haematology training at Children's Hospital and the Dana Farber Cancer Institute, Boston. Then, Orkin went on to work in the laboratory of the renowned geneticist Philip Leder at the National Institutes of Health, Maryland. Consequently, Orkin has the combination of a physician and a researcher. His research focuses on the development and function of the blood system, the control of stem cells and the molecular basis of inherited blood disorders[2]. In the 1970s, a technique had been developed to draw blood directly from a foetus during the second trimester using a fine needle. Orkin made use of the samples of the amniotic fluid and the foetal blood, he received from other researchers for a DNA analysis. It had to be confirmed, if the unborn child was suffering from beta-thalassemia, an inherited blood disorder that reduces the production of haemoglobin. Orkin's DNA-based diagnosis was confirmed by the results from the foetal blood cell analysis. The study marked the first prenatal screening for any heritable disorder using genetic material from foetal cells[3]. Orkin discovered the mutations responsible for beta-thalassemia. Orkin and his collaborators were the first to use positional cloning to identify a gene for a human disease. Their approach to mapping mutations has since been used in similar studies of other genetic disorders. They characterized the molecular switch from foetal to adult haemoglobin and how this switch is regulated, solving a long-held problem in the field.

Wang was born in 1963 in Wuhan, China. He received a BS (1984) in Biology from Beijing Normal University, Beijing, China and a Ph D (1991) in Biochemistry from the University of Texas Southwestern Medical Center, Dallas, Texas, USA. In the same university, he held the George L. MacGregor Distinguished Chair (2001–2010) in Biomedical Science. Since 2010, he is serving as the Director of the National Institute of Biological Sciences at Beijing.

The research of Wang focuses on the process of cell death through apoptosis at the molecular level. Apoptosis is one of the main types of the programmed cell deaths, which enables to maintain the balance of cells and is particularly important in the immune system. Necrotic cell death is a form of cell injury which results in the premature death of cells caused due to the external forces such as trauma. The understanding of this process is vital to the understanding of several diseases in which the apoptosis malfunctions. Cancer and autoimmune diseases can sometimes occur when apoptosis is blocked (enough cells fail to die). Conversely, neurological disorders and paralysis due to disease or trauma can occur when the apoptosis is undesirably turned on (too many cells die). In 1996, Wang and colleagues identified the unsuspected complex role of the mitochondria in mammalian cell apoptosis[4]. Wang and colleagues found that the mitochondria release a set of proteins including cytochrome c, Smac, and EndoG from their intermembrane space during apoptosis. The release of these proteins is regulated by the Bcl-2 family of proteins, that have roles in tumorigenesis[5]. Insights into the programmed cell deaths have the promise to find treatment of cancer and age-associated organ deterioration.

Out of 119 KFIP Science/Medicine Laureates, 21 are Nobel laureates[6,7]. Mudumbai Seshachalu Narasimhan is the only Indian to have received the KFIP science prize (for mathematics in 2006) and the only Asian to have won it for mathematics[8]. Sajeev O. John, now based in Canada and Vamsi Krishna Mootha, now based in the USA are the other two, who received the Science prize in the category of physics (2001) and biology (2016) respectively. Among the 119 KFIP science/medicine, there are 4 women laureates (3.36%). This is marginally higher than that for the Nobel Prize: just 20 women (3.24%) are among the 616 Nobel prize winners in the fields of medicine/chemistry/physics[9]. The other notable science prizes established in the Middle East are the Mustafa Prize for Science from Iran[10] and the UNESCO Sultan Qaboos Prize for Environmental Preservation from Oman[9]. For the year 2021, the topic for the Medicine prize is 'Regenerative medicine in neurological conditions' and the Science prize is in the field of physics (http://kingfaisalprize.org/).

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