PRESS RELEASE

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SINGAPORE SCIENTISTS FIRST TO PERFORM GENOME-WIDE STUDY OF HUMAN STEM CELLS

Landmark identification of key human stem cell genes paves the way for future stem cell research

1. A team of scientists from Singapore led by the Genome Institute of Singapore (GIS) and the Institute of Molecular and Cell Biology (IMCB), two biomedical research institutes of Singapore's Agency of Science, Technology and Research (A*STAR), have discovered the most important genes in human embryonic stem cells (hESCs), a crucial breakthrough in discovering how human stem cells work. Their research, published in top scientific journal Nature, is the first ever genome-wide study of human stem cells on such a massive scale, and its results are crucial in understanding how stem cells may one day be used to treat debilitating conditions such as Parkinson's disease and traumatic spinal injury.

2. GIS Senior Group Leader for Stem Cell and Development Biology and Associate Director for Biology Dr Ng Huck Hui, and IMCB Principal Investigator Dr Frederic Bard combined the strengths of their teams to investigate the 21,000 genes in the entire human genome to find those which regulate the two characteristic properties of hESCs – the capacity to turn into any type of cell in the human body (pluripotency), and the ability to retain that capacity indefinitely. Out of the several key genes they identified, a particular gene known as PRDM14 was discovered to make it easier to turn a type of human cell (fibroblasts) into pluripotent stem cells. The discoveries contribute to a fundamental understanding of the nature of stem cells and helps efforts to improve techniques to turn mature adult cells into hESCs.

3. In addition, the scientists found that PRDM14 played a key role in hESCs, but not in mouse ESCs. This significant new finding highlights the fundamental differences between stem cells from different species, and highlights the greater need to use human cells in stem cell research.

4. “Very little is known about the molecular machines that drive stem cell states or the transcriptional profiles of hESCs. Our study helps to build a better understanding of hESCs and this will help in the development of technologies to further the utilities of these cells such as their potential to be used for clinical and medical purposes.”
Therapeutic applications," said Dr Ng. “Dr Bard’s scientific expertise was invaluable in helping us crack another piece of the stem cell puzzle. I definitely look forward to collaborating with him on more projects that aim to peel away the mysteries surrounding stem cells” he added.

5. Dr Alan Colman, Executive Director of the Singapore Stem Cell Consortium, said, “Huck Hui Ng and his colleagues continue to keep Singapore at the top table of countries plundering the secrets of human embryonic stem cell regulation. This time they have deployed the first genome-wide functional screen to identify factors that maintain ‘stemness’ in these cells and yet again reveal major differences between mouse and human embryonic stem cells in the control of this important property.”

6. Senior Scientist at the Developmental & Stem Cell Biology Program, The Hospital for Sick Children, Dr Janet Rossant added, “The unprecedented scale of this screen has added considerable new information to our understanding of pluripotency and will help efforts to improve reprogramming of adult cells.”

7. Professor Lee Eng Hin, Executive Director of the Biomedical Research Council, A*STAR, applauded the discovery and said, “This is an exemplar of a great cross institutional collaboration. The combined strength of stem cell and genomics experts has led to a great piece of world-class work. I hope to see more of such valuable partnerships in the future.”

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Notes to the Editor:

Research publication:
The research findings described in the press release can be found in the 17 October, 2010 advance online issue of Nature under the title “A genome-wide RNAi screen reveals determinants of human embryonic stem cell identity”.

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About the Genome Institute of Singapore

The Genome Institute of Singapore (GIS) is an institute of the Agency for Science, Technology and Research (A*STAR). It has a global vision that seeks to use genomic sciences to improve public health and public prosperity. Established in 2001 as a centre for genomic discovery, the GIS will pursue the integration of technology, genetics and biology towards the goal of individualized medicine. The key research areas at the GIS include Systems Biology, Stem Cell & Developmental Biology, Cancer Biology & Pharmacology, Human Genetics, Infectious Diseases, Genomic Technologies, and Computational & Mathematical Biology. The genomics infrastructure at the GIS is utilized to train new scientific talent, to function as a bridge for academic and industrial research, and to explore scientific questions of high impact.

For more information about GIS, please visit www.gis.a-star.edu.sg

About the Institute of Molecular and Cell Biology (IMCB)

The Institute of Molecular and Cell Biology (IMCB) is a member of Singapore’s Agency for Science, Technology and Research (A*STAR) and is funded through A*STAR’s Biomedical Research Council (BMRC). It is a world-class research institute that focuses its activities on six major fields: Cell Biology, Developmental Biology, Genomics, Structural Biology, Infectious Diseases, Cancer Biology and Translational Research, with core strengths in cell cycling, cell signalling, cell death, cell motility and protein trafficking. Its achievements include leading an international consortium that successfully sequenced the entire pufferfish (fugu) genome. The IMCB was awarded the Nikkei Prize 2000 for Technological Innovation in recognition of its growth into a leading international research centre and its collaboration with industry and research institutes worldwide. Established in 1987, the Institute currently has 35 independent research groups with more than 400 staff members.

For more information about IMCB, please visit www.imcb.a-star.edu.sg
About the Agency for Science, Technology and Research (A*STAR)

A*STAR is the lead agency for fostering world-class scientific research and talent for a vibrant knowledge-based and innovation-driven Singapore. A*STAR oversees 14 biomedical sciences, and physical sciences and engineering research institutes, and nine consortia & centres, which are located in Biopolis and Fusionopolis, as well as their immediate vicinity.

A*STAR supports Singapore's key economic clusters by providing intellectual, human and industrial capital to its partners in industry. It also supports extramural research in the universities, hospitals, research centres, and with other local and international partners.

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