



Shinya Yamanaka



Date of Birth 4 September 1962

Place Higashi#saka, Osaka, Japan

Nomination 23 January 2013

Field Stem cell biology

Title Professor; Director of the Center for iPS Cell Research and Application; Nobel Laureate in Physiology or Medicine, 2012

Most important awards, prizes and academies

Awards and prizes: JSPS Prize, Japan Society for the Promotion of Science (2007); Robert-Koch Preis, Germany (2008); The Special Prize for Science and Technology, the Minister of Education, Culture, Sports, Science and Technology, Japan (2008); Selected as one of the "TIME 100", Time magazine's most influential people in the world, USA (2008); Medals of Honor from the Japanese Government ("Shiju Hosho", Medals with Purple Ribbon), Japan (2008); Canada Gairdner International Award, The Gairdner Foundation, Canada (2009); Albert Lasker Basic Medical Research Award, USA (2009); March of Dimes Prize in Developmental Biology, USA (2010); 100th Imperial Prize and Japan Academy Prize, The Japan Academy, Japan (2010); Person of Cultural Merit, Japan (2010); 26th annual Kyoto Prize in Advanced Technology, Japan (2010); Balzan Prize for Stem Cells, Italy (2010); BBVA Foundation Frontiers of Knowledge Award in the Biomedicine category, Spain (2010); King Faisal International Prize for Science (Medicine), Saudi Arabia (2011); Wolf Prize in Medicine, Israel (2011); Millennium Technology Award, Finland (2012); Nobel Prize, Physiology or Medicine, Sweden (2012). *Academies:* National Academy of Sciences, Foreign Associate; International Society for Stem Cell Research, Board of Directors President; The Japanese Pharmacological Society; The Japanese Society for Regenerative Medicine; The Molecular Biology Society of Japan; The Japanese Orthopaedic Association; The Japanese Society of Inflammation and Regeneration.

Summary of scientific research

Dr. Yamanaka's research focuses on ways to generate cells resembling embryonic stem cells by reprogramming somatic cells. He seeks to understand the molecular mechanisms that underlie pluripotency and the rapid proliferation of embryonic stem cells – they can become any type of cell in the body – and to identify the factors that induce reprogramming.

Pluripotent stem cells can be generated from adult mouse-tail tip fibroblasts and adult human fibroblasts by the retrovirus-mediated transfection of four transcription factors, Oct3/4, Sox2, c-Myc, and Klf4. Professor Yamanaka has designated these cells as induced pluripotent stem (iPS) cells. iPS cells are indistinguishable from embryonic stem cells in morphology, proliferation, gene expression and teratoma formation. When transplanted into blastocysts, mouse iPS cells derived from mouse fibroblasts can give rise to adult chimera mice, which are competent for germline transmission. These results are proof-of-principle that pluripotent stem cells can be generated from somatic cells by the combination of a small number of factors.

Professor Yamanaka demonstrated that not a single "master" transcription factor, but rather a combination of factors, are important for reprogramming of cell fate from one somatic lineage back to a pluripotent state. However, the molecular mechanism of its process remains unclear. Improving our understanding of this mechanism is essential to determine the best induction protocols for each downstream application of iPS cell technology, such as disease modeling, drug screening and cell therapy.

Latest publications

Shinya Yamanaka, MD, PhD – Fujishiro SH, Nakano K, Mizukami Y, Azami T, Arai Y, Matsunari H, Ishino R, Nishimura T, Watanabe M, Abe T, Furukawa Y, Umeyama K, Yamanaka S, Ema M, Nagashima H, Hanazono Y. Generation of Naive-like Porcine Induced Pluripotent Stem Cells Capable of Contributing to Embryonic and Fetal Development. *Stem Cells Dev.* 2012 Aug 13; Shinya Yamanaka, MD, PhD – Blanpain C, Daley GQ, Hochedlinger K, Passegue E, Rossant J, Yamanaka S. (2012) Stem cells assessed. *Nat Rev Mol Cell Biol* 13: 471-6; Shinya Yamanaka, MD, PhD – Tanaka T, Takahashi K, Yamane M, Tomida S, Nakamura S, Oshima K, Niwa A, Nishikomori R, Kambe N, Hara H, Mitsuyama M, Morone N, Heuser JE, Yamamoto T, Watanabe A, Sato-Otsubo A, Ogawa S, Asaka I, Heike T, Yamanaka S, Nakahata T, Saito MK. Induced pluripotent stem cells from CINCA syndrome patients as a model for dissecting somatic mosaicism and drug discovery. *Blood.* 2012 Aug 9; 120(6):1299-308; Shinya Yamanaka, MD, PhD – Isobe H, Shoji M, Yamanaka S, Umena Y, Kawakami K, Kamiya N, Shen JR, Yamaguchi K. (2012) Theoretical illumination of water-inserted structures of the CaMn₄O₅ cluster in the S2 and S3 states of oxygen-evolving complex of photosystem II: full geometry optimizations by B3LYP hybrid density functional. *Dalton Trans* 41: 13727-40; Shinya Yamanaka, MD, PhD – Kobayashi Y, Okada Y, Itakura G, Iwai H, Nishimura S, Yasuda A, Nori S, Hikishima K, Konomi T, Fujiyoshi K, Tsuji O, Toyama Y, Yamanaka S, Nakamura M, Okano H. (2012) Pre-Evaluated Safe Human iPSC-Derived Neural Stem Cells Promote Functional Recovery after Spinal Cord Injury in Common Marmoset without Tumorigenicity. *PLoS One* 7: e52787; Shinya Yamanaka, MD, PhD – Okita K, Yamakawa T, Matsumura Y, Sato Y, Amano N, Watanabe A, Goshima N, Yamanaka S. (2012) An Efficient Non-viral Method to Generate Integration-Free Human iPS Cells from Cord Blood and Peripheral Blood Cells. *Stem Cells*; Shinya Yamanaka, MD, PhD – Tanaka K, Isobe H, Yamanaka S, Yamaguchi K. (2012) Similarities of artificial photosystems by ruthenium oxo complexes and native water splitting systems. *Proc Natl Acad Sci U S A* 109: 15600-5; Shinya Yamanaka, MD, PhD – Yamana R, Iwasaki M, Wakabayashi M, Nakagawa M, Yamanaka S, Ishihama Y. (2012) Rapid and Deep Profiling of Human Induced Pluripotent Stem Cell Proteome by One-shot NanoLC-MS/MS Analysis with Meter-scale Monolithic Silica Columns. *J Proteome Res*; Shinya Yamanaka, MD, PhD – Yamana R, Iwasaki M, Wakabayashi M, Nakagawa M, Yamanaka S, Ishihama Y. (2013) Rapid and Deep Profiling of Human Induced Pluripotent Stem Cell Proteome by One-shot NanoLC-MS/MS Analysis with Meter-scale Monolithic Silica Columns. *J Proteome Res* 12: 214-21; Shinya Yamanaka, MD, PhD – Yamanaka S. Induced pluripotent stem cells: past, present, and future. *Cell Stem Cell.* 2012 Jun 14; 10(6):678-84.