Prof., Dr. Helen M. Blau
Donald E. and Delia B. Baxter Foundation Professor for Stem Cell Biology

Most important awards, prizes and academies

Elected Fellow, American Association for the Advancement of Science (AAAS) (1991), Senior Career Recognition Award of WICB, American Society of Cell Biology (1992), President, Society for Developmental Biology (1994-1995), Elected to National Academy of Medicine (formally Institute of Medicine) (1995), Elected to American Academy of Arts and Sciences (1996), FASEB Excellence in Science Award (1999), Donald E. and Delia B. Baxter Endowed Professorship (1999), McKnight Technological Innovations for Neuroscience Award (2001), Honorary Doctorate, University of Nijmegen, Holland (2003), Rolf-Sammet Fonds Visiting Professorship, University of Frankfurt (2003), Elected, Harvard Board of Overseers (2004-2010), President, International Society for Differentiation (2002-2004), Fulbright Senior Specialist Award (Institut Pasteur) (2007), AACR-Irving Weinstein Foundation Distinguished Lectureship and Award for Outstanding Innovations in Science (2011), NIH Director's Transformative Research Award (2011-2017), Stanford Office of Technology Licensing Outstanding Inventor Award and Hall of Fame (2015), Glenn Award for Research in Biological Mechanisms of Aging (2015), Elected to the National Academy of Sciences (2016), Elected to Pontifical Academy of Sciences (2017), Li Ka Shing Research Award (2017); 2018 Honorary Doctorate, University of York, England; 2018 Honorary

Membership American Philosophical Society; 2019 Honorary Membership American Institute for Medical and Biological Engineering.

Summary of scientific research

Research in Dr. Blau's laboratory is focused on understanding principles of regenerative medicine. Her laboratory established that the differentiated state of specialized tissue-specific cells is not fixed and irreversible, but can be changed. This demonstration of cellular plasticity constituted a paradigm shift in our understanding of mammalian cell differentiation. Using muscle as a model, Blau's work provided the first definitive evidence that diverse cell types could be reprogrammed using non-dividing cell fusions. Her studies demonstrated that cell differentiation requires continuous regulation and that a shift in the stoichiometry of trans-acting regulators induces nuclear reprogramming. This body of work provided the scientific underpinnings for the induction of pluripotent stem cells. Blau applied this discovery to adult stem cell biology. She led the field with novel approaches to the isolation of muscle stem cells, maintenance of stem cell function on bioengineered platforms, and strategies for rejuvenating aged stem cell function. Her work provides the foundation for innovative stem cell based strategies to treat skeletal and cardiac disorders due to injury, disease or aging. Blau's research is at the crux of stem cell biology and regenerative medicine.

Main publications

Blau, H.M., Chiu, C.-P. and Webster, C. (1983) Cytoplasmic activation of human nuclear genes in stable heterokaryons. *Cell* 32:1171-1180; Blau, H.M., Pavlath, G.K., Hardeman, E.C., Chiu, C.-P., Si lberstein, L., Webster, S.G., Miller, S.C. and Webster, C. (1985) Plasticity of the differentiated state. *Science* 230:758-766; Dhawan, J., Pan, L.C., Pavlath, G.K., Travis, M.A., Lanctot, A.M. and Blau, H.M. (1991) Systemic delivery of human growth hormone by injection of genetically engineered myoblasts. *Science* 254:1509-1512; Gussoni, E., Pavlath, G.K., Lanctot, A.M., Sharma, K., Miller, R.G., Steinman, L. and Blau, H.M. (1992) Normal dystrophin transcripts detected in DMD patients after myoblast transplantation. *Nature* 356:435-438; Rastinejad, F. and Blau, H.M. (1993) Genetic complementation reveals novel regulatory role for 3' untranslated regions in growth and differentiation. *Cell* 72:903-917; Sacco, A., Doyonnas, R., Kraft, P., Vitorovic, S. and Blau H.M. (2008) Self-renewal and expansion of single transplanted muscle stem cells. *Nature* 456:502-506; Bhutani, N., Brady, J.J., Damian, M., Sacco, A., Corbel, S.Y. and Blau, H.M. (2010) Reprogramming towards pluripotency requires AID-dependent DNA demethylation. *Nature* 463(7284):1042-1047; Gilbert, P.M., Havenstrite, K.L., Magnusson, K.E.G., Sacco, A., Leonardi, N.A., Kraft, P., Nguyen, N.K., Thrun, S., Lutolf, M.P. and Blau, H.M. (2010) Substrate elasticity regulates skeletal muscle stem cell self-renewal in culture. *Science* 329(5995):1078-1081; Sacco, A., Mourkioti, F., Tran, R., Choi, J., Llewellyn, M., Kraft, P., Shkreli, M., Delp, S., Pomerantz, J.H., Artandi, S.E. and Blau, H.M. (2010) Short telomeres and stem cell exhaustion model Duchenne muscular dystrophy in mdx/mTR mice. *Cell* 143(7):1059-71; Cosgrove, B.D., Gilbert, P.M., Porpiglia, E., Mourkioti, F., Lee, S.P.,

Corbel, S.Y., Llewellyn, M.E., Delp, S.L. and Blau, H.M. (2014) Rejuvenation of the aged muscle stem cell population restores strength to injured aged muscles. *Nature Medicine* 20(3):255-264; Porpiglia E, Samusik N, Van Ho AT, Cosgrove BD, Mai T, Davis KL, Jager A, Nolan GP, Bendall SC, Fantl WJ, Blau HM. High-resolution myogenic lineage mapping by single-cell mass cytometry. *Nature Cell Biol.* 2017 May;19(5):558–567. PMCID: PMC5728993; Ho ATV, Palla AR, Blake MR, Yucel ND, Wang YX, Magnusson KEG, Holbrook CA, Kraft PE, Delp SL, Blau HM. Prostaglandin E2 is essential for efficacious skeletal muscle stem-cell function, augmenting regeneration and strength. *Proc Natl Acad Sci USA* 2017 Jun 27;114(26):6675–6684. PMCID: PMC5495271; Palla AR, Ravichandran M, Wang YX, Alexandrova L, Yang AV, Kraft P, Holbrook CA, Schürch CM and Blau HM. Inhibition of Prostaglandin Degrading Enzyme 15-PGDH Rejuvenates Aged Muscle Mass and Strength. *Science*. 2020 10.1126/science.abc8059. PMID 33303683.