

# Adult stem cells carry their own baggage: Epigenetics guides stem cell fate

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Adult stem cells and progenitor cells may not come with a clean genetic slate after all. That's because a new report in the *FASEB Journal* shows that adult stem or progenitor cells have their own unique "epigenetic signatures," which change once a cell differentiates. This is important because epigenetic changes do not affect the actual make up in a cell's DNA, but rather, how that DNA functions. Epigenetic changes have been shown to play a role in a wide range of diseases, including obesity, and have been shown to be heritable from mother to child.

"Ultimately, we hope to be able to decipher the mechanisms of how stem cells renew themselves as well as how they differentiate," said George L. Sen, Ph.D., a researcher involved in the work from the Division of Dermatology, Department of Medicine, Department of Cellular and Molecular Medicine, Program in [Stem Cell Biology](#) at the University of California, San Diego. "This will in turn allow us to coax these cells to behave in ways that we want to potentially aid in the treatment of tissue degenerative disorders."

Sen and colleagues drew their conclusions by mapping the DNA and histone methylation patterns in stem/[progenitor cells](#) and comparing them to differentiated cells. They found DNA and histone methylation "marks" on the promoter regions of differentiation genes in stem cells that prevented the expression of differentiation genes. They also showed that when the proteins used to mark the DNA were removed, stem cells would spontaneously differentiate. In regenerated human skin, the loss of these marks (epigenetic factors) resulted in loss of the

stem/progenitor cells in the basal layer of the skin. Over time, the skin no longer regenerated and prematurely differentiated.

"Epigenetics has not replaced classical genetics. It has, however, provided the chemical and biological explanation for short-term, heritable changes that tell cells where their parents have been and where they themselves are going," said Gerald Weissmann, M.D., Editor-in-Chief of the [FASEB Journal](#). "This study shows that adult stem and progenitor cells, like many human adults, come with baggage from family history that affects how they behave."

**More information:** George L. Sen. Remembering one's identity: the epigenetic basis of stem cell fate decisions. FASEB J. July 2011 25:2123-2128; [doi:10.1096/fj.11-182774](https://doi.org/10.1096/fj.11-182774)

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