

[Michael D. West \(1953- \)](#) ^[1]

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Michael D. West is a biomedical entrepreneur and investigator whose aim has been to extend human longevity with biomedical interventions. His focus has ranged from the development of telomerase-based therapeutics to the application of human [embryonic stem cells](#) ^[5] in [regenerative medicine](#) ^[6]. Throughout his eventful career, West has pursued novel and sometimes provocative ideas in a fervent, self-publicizing manner. As of 2009, West advocated using human [somatic cell nuclear transfer](#) ^[7] techniques to derive human [embryonic stem cells](#) ^[5] for therapeutic practice. Through his testimonies before the US Senate, articles, and even controversies generated by his own research and claims, West has played an important role in shaping the public debate over human [cloning](#) ^[8] and [embryonic stem cell research](#) ^[9].

Born in Niles, Michigan, on 28 April 1953, West grew up in a wealthy family that ran a profitable automotive leasing business. West's scientific predilection was discovered and cultivated early in his childhood, when he could enjoy a laboratory-like set-up in a storage area above the family's garage. After entering Niles Senior High School, West became interested in a broad range of philosophical questions such as the meaning of life. These interests led him into an amateur but persistent study of philosophy, theology, mythology, and folklore for about ten years, during which he also managed to teach himself Greek and Hebrew.

The intellectual development of West, although initiated somewhat precociously, took a most circuitous path. In 1971, West entered Rensselaer Polytechnic Institute in Troy, New York, to pursue a degree in psychology. While at Rensselaer, West found himself increasingly drawn to fundamentalist Christianity. After graduation in 1976 West returned to Niles and helped run the family business. Years of soul-searching, however, culminated in West's decision to study paleontology at Andrews University, a Seventh-day Adventist institution in Berrien Springs, Michigan, in an attempt to defend creationism scientifically. In the course of in-depth study, West came to realize that, for him, creationism was a losing ground—almost all the data he could draw on favored the theory of [evolution](#) ^[10]. Upon graduation with an MS in 1982, he completely gave up the notion of creation together with the Christian faith, fully embracing the idea of [evolution](#) ^[10].

Contemplating the inevitability of death, West found his calling in the search for a biological basis of immortality. He undertook this self-assigned mission by studying the biology of aging. In 1982, West joined the lab of [Samuel Goldstein](#) ^[11], a molecular gerontologist at the University of Arkansas, Little Rock. There he started to use modern molecular biology techniques as tools to tackle the problems of aging. However, an irreconcilable clash between West and Goldstein sprang out of a series of experiments through which West demonstrated that the results Goldstein had published in *Cell* were merely experimental artifacts. West consequently transferred to the lab of [James Smith](#) ^[12], another molecular gerontologist, at Baylor College of Medicine in Houston and finished his PhD in 1989.

West then embarked on medical school at the University of Texas at Dallas, where he undertook an independent research project in a lab co-organized by cytologists [Woodring E. Wright](#) ^[13] and [Jerry Shay](#) ^[14]. Having worked on [cellular aging](#) ^[15] in his own PhD research, Wright was considering experiments to investigate the association between [telomere](#) ^[16] biology and the aging process. After convincing himself about the rationale of [telomere](#) ^[16] research he embarked on his vocation as a biotechnology entrepreneur. He quit medical school and started to raise funds for a biotechnology company that would market telomerase as an anti-aging treatment. West eventually insinuated himself into the world of venture capitalists and acquired the start-up capital he sought, including \$7.5 million from Kleiner Perkins Caufield & Byers. As a result, [Geron Corporation](#) ^[17] was founded in 1992. By providing private research funding, West recruited dozens of university scientists into collaboration with Geron. In the competitive field of [telomere](#) ^[16] biology during the early 1990s, West organized Geron's research programs so that it secured its place by first obtaining the genetic sequence of the catalytic component of human telomerase (or human telomerase reverse transcriptase, hTERT), which was deemed by some as an elixir of human life.

Amid initial research successes in Geron, West nevertheless began to recognize the tremendous technical difficulty involved in delivering telomerase to human tissues as well as the potential risks of such therapy. He began to consider human embryonic stem cell based therapy as a more practical and safer approach. After several conversations with Roger Petersen, who directed the [in vitro fertilization](#) ^[18] clinic at the University of California, San Francisco, West initiated an embryonic stem cell project at Geron. He subsequently managed to provide partial funding for the research of [James Thomson](#) ^[19] and [John Gearhart](#) ^[20], so that Geron could jointly patent potential products from their stem cell researches. West's investment paid off when [Thomson](#) ^[21] and Gearhart successfully derived human [embryonic stem cells](#) ^[5] in 1998. The managerial contributions of West to stem cell

research, however, were not well appreciated by his colleagues at Geron. As Geron shifted its goal towards the development of a telomerase-inhibitor-based cancer therapy, human [embryonic stem cell research](#)^[9] came to be regarded as a mere distraction. This situation was only exacerbated by several instances of personnel frictions, all of which precipitated West's departure from Geron in 1997.

Beginning in 1998, West advocated for "therapeutic [cloning](#)^[8]." He was intrigued by the research of [James Robl](#)^[22], then president of [Advanced Cell Technology](#)^[23], Inc. (ACT), a biotechnology company specializing in agricultural animal [cloning](#)^[8]. Further communications led to the appointment of West as the new chief executive officer of ACT. From there, the research in ACT was redirected towards the development of stem-cell-based therapeutics. Together with [Jose Cibelli](#)^[24], an animal [cloning](#)^[8] expert, and [Robert Lanza](#)^[25], a tissue engineering scientist, West initiated research programs on cross-species nuclear transfer and [artificial parthenogenesis](#)^[26], both targeting the isolation of [embryonic stem cells](#)^[5] without producing and destroying actual human embryos. Under West's leadership, this team later began to pursue human [somatic cell nuclear transfer](#)^[7] (hSCNT). What was interpreted as a six-celled human embryo was produced through this research in 2001. Although it could not be utilized to generate any [pluripotent progenitor stem cell lines](#)^[27] due to its early developmental stage, the existence of the embryo was publicized by West as the first human clone, and resulted in much public attention. Scientists criticized the public announcement and questioned West's interpretation of the cell aggregation as a human clone.

West's ardent advocacy for human somatic nuclear transfer and human [embryonic stem cell research](#)^[9], two of the most controversial subjects of research at the beginning of the twenty-first century, placed him at the epicenter of public debate. West wrote several articles with his colleagues to dispute ethical concerns about their research, including a letter published in *Science* in 2001. The letter, which had the support of eighty Nobel laureates, called for federal money for [embryonic stem cell research](#)^[9]. West gave testimony before the US Senate and articulated arguments representative of scientific community when most scientists were still reticent about the issue.

In 2007 West was appointed the chief executive officer of BioTime, Inc., located in Alameda, California. BioTime is a biotechnology company, a subsidiary of which is building a commercial database designed to provide information on gene expression patterns of human embryonic cells from different lineages. This database is dubbed a map of the "embryome."

As of 2009, West's compassionate and charismatic public persona, combined with the self-promotion of his research, continues to evoke doubt and criticism, as well as attract acclaim from his investors, followers, and friends.

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