

OPINION

Happy birthday, genome

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This June marks ten years since two independent teams of geneticists unveiled the first draft of the human genome.

After years of bitter rivalry, **Francis Collins**, then the director of the **US National Human Genome Research Institute**, and **Craig Venter** together made the announcement from the East Room of the White House.

Then-president Bill Clinton predicted that the feat, which cost billions of dollars and took more than a decade, would "revolutionize the diagnosis, prevention and treatment of most, if not all, human diseases."

We're clearly not there yet. So what exactly have we gained from knowing the sequence of 3 billion base pairs?

Collins, Venter and two heavyweights in cancer genetics — **Robert Weinberg** and **Todd Golub** — each tackle that question in editorials published today in *Nature*.

Collins, now head of the National Institutes of Health, writes that although the decoding of the genome has led to many scientific advances — notably, a better understanding of how species, including humans, evolve — its progress in the clinic has been much more modest. Genetic tests can predict, for example, whether someone will **develop certain types of breast cancers**, or respond well to **hepatitis C treatment**. But studies comparing genomes of sick and healthy people have failed to find genetic causes for common diseases.

Venter's view of clinical genetics is similarly sobering. He points out that although human genome sequencing costs continue to plummet — from \$300 million in 2003 to **less than \$5,000 today** — researchers don't know how to interpret most of that glut of data. The key, Venter says, is to match an individual's genomic readout with rigorously characterized clinical symptoms, family medical histories and lifetime environmental exposures.

Autism researchers are just beginning to think about **sequencing the entire genome** — or even the protein-coding part, called the exome — of individuals with the disorder. The decoded genome may very well hold answers to the mysteries of autism — but only if we can figure out how to interpret it.