The promise of genomics to revolutionize medicine and to transform our understanding of life itself is one of the great opportunities of our time. We imagine a future in which genomic data is a tool for fighting diseases—from childhood cancer to late-life dementia—and for saving species on the brink of extinction.

From the imagining of the Human Genome Project to today’s effort to create international protocols for sharing and interpreting genomic data that respect individual rights and societal goals, UC Santa Cruz brings trusted leadership. We are creating a truly public and shared genomics information exchange for medicine, biology, and society.

We invite your support and collaboration.

Scott Brandt  
Vice Chancellor for Research, UC Santa Cruz

David Haussler  
Scientific Director, UC Santa Cruz Genomics Institute
The UC Santa Cruz Genomics Institute provides the framework for the next great leap in genomics to benefit both the individual and the planet.

Building on three decades of pioneering genomics research and deep commitment to public service, the UC Santa Cruz Genomics Institute unites the university’s efforts to unlock the world’s genomic data to accelerate breakthroughs in health and evolutionary biology.

We are developing an open-source genomics platform for unlocking the most challenging medical and scientific issues of our time, from decoding cancer to species preservation.

Our pioneering work includes assembling the first-ever working draft of the human genome sequence. By posting it on the Internet on July 7, 2000, we ensured our genetic heritage would remain for all time in the public domain, free to researchers everywhere.

Following this we built the UCSC Genome Browser, a resource used by more than 130,000 researchers worldwide. We receive more than 1.2 million web page requests a day and are cited in 15,000 scientific publications each year. Researchers tell us it would be impossible to do their work without this one-of-a-kind resource.

Cancer, autoimmune diseases, congenital abnormalities, and neurological disorders are among health threats with significant genomic components, all now more decodable using the UC Santa Cruz Genomics Infrastructure. Each year, 1.6 million new cancer cases are diagnosed in the U.S.—and each year it claims the lives of 600,000 people. Finding cancer’s patterns requires new strategies and a new scale of investigation made possible by big data. Decoding cancer is a major focus of the institute.

Scientific director David Haussler, a distinguished professor of biomolecular engineering, has led UC Santa Cruz to global prominence in genomics.
Just as genomics promises to revolutionize medicine, it raises questions surrounding privacy, consent, social justice, and use of medical resources. Advances must address both scientific and societal questions: we are determined to lead on both fronts. In the UC Santa Cruz tradition of forging collaborative innovations across disciplines, the institute integrates the work of genome scientists with that of scholars in the social sciences, arts, and humanities.

UC Santa Cruz co-founded the Global Alliance for Genomics and Health, a coalition of 250 organizations in 27 countries that has emerged as a new global authority on data standards, Internet protocols, and social policies for sharing genomic and clinical data.

A trusted partner in genomics research and with health care institutions, UC Santa Cruz operates separately from any one medical facility. This neutrality makes us an attractive center of collaboration in a landscape filled with competing information silos.

We are the premier institute for handling big data in genomics research. We are unmatched in storing, cataloging, assembling, validating, and analyzing huge volumes of genomic data.

Our work has been supported by more than $150 million in extramural research funding. Private investment in the UC Santa Cruz Genomics Institute will leverage that. It will allow us to radically expand the bank of information available for research and speed the benefits of discoveries that improve and save lives.

**DECODING CANCER**

At UC Santa Cruz, cancer genomics research is yielding new understanding of cancer's inner workings, which is leading to new treatment options for adults and children.

**Fighting for the youngest**

Cancer kills more children in the US than any other disease—and most therapies are at least 30 years old. The Treehouse Childhood Cancer Project at the Genomics Institute is committed to changing that dynamic. Cancer survivor Aurora Learned has been an inspiration to the Treehouse team, which includes her mother.

*Right, Aurora with her father.*
GLOBAL RESOURCE

More than 130,000 researchers all around the world use the UCSC Genome Browser, an unmatched tool for understanding the human genome and how it relates to other species.

Changing odds for 1 in 10

Josh Stuart of the UC Santa Cruz Genomics Institute is co-founder of the pan-cancer initiative of The Cancer Genome Atlas, which brings together genomic information for research. In a major collaborative study originating at UC Santa Cruz, researchers discovered that 1 in 10 cancers are misclassified—dramatically changing the odds for 10 percent of cancer patients.
VISION AND GOALS

Changing how the world thinks about genomics

Mapping the human genome revolutionized the world’s understanding of the molecular machinery of the body. This next phase will revolutionize how the world thinks about evolutionary biology, health, and medicine—and what it means to be human.

The UC Santa Cruz Genomics Institute will

- Enhance the power of the global research community to solve today’s intractable health problems
- Lead the national and international effort to break down institutional silos where genomic information is now isolated
- Enable the secure sharing and open-source analysis of genomic data on a global federated network
- Tackle head-on the most fundamental societal questions evoked by the advent of a universal genomics technology

As always, all that we learn and create we will openly share with the world. We are a public institution dedicated to creating a healthier world and a healthier society.

GENES, GENOMES, GENOMICS

Passed down from parents to children, the human genome constitutes a record of human genetic history forged by evolution. It comprises a sequence of approximately 3 billion component parts, called nucleotides, organized into the famous DNA double helix.

Just four nucleotides—represented as A, C, G, and T for adenine, cytosine, guanine, and thymine—serve as the alphabet for the language of life.

While genetics is the study of the role of individual genes, genomics is the study of the whole genome, including the impact of mutations in our genetic instructions.
BACKGROUND

Uniquely positioned and trusted in the highly competitive arena of genomics research

UC Santa Cruz is globally respected for its impartiality, openness, collaborative ethos, and prowess in genomic data analysis. Our unique expertise in genome interpretation, molecular pathway analysis, comparative genomics and evolution, and genomics data visualization has been transformative in biomedicine.

In 1985 Robert Sinsheimer, a highly distinguished biologist and UC Santa Cruz chancellor, convened a group of leading scientists to discuss the feasibility of sequencing the human genome. That historic workshop on our campus planted the idea for what became the Human Genome Project, the international effort to decipher the entire set of genetic instructions for human life. That vision became reality 15 years later when the UC Santa Cruz team led by David Haussler pieced together the DNA of the first human genome and posted it on the Internet. Key to that breakthrough was computer code written by then-graduate student Jim Kent. This was the precursor to the UCSC Genome Browser, which Kent designed and directs. In the past decade, research based on the genome has increased exponentially, due in large part to the UCSC Genome Browser, a dynamic tool and gateway for scientific discovery. In 2012 the National Cancer Institute selected us to house the data for its genomic programs. The resulting UC Santa Cruz Cancer Genomics Hub was the first Trusted Partner of the National Institutes of Health for distributing patient genomics data that require restricted access due to privacy concerns. It is the world’s largest distributor of patient genomics data for scientific research.

Software engineers and bioinformatics scientists at UC Santa Cruz are now designing and building the next-generation global platform for sharing genomic data. The platform includes open-source application programming interfaces, privacy and security protocols, and innovative genome analytics.

UNCOVERING THE HISTORY OF LIFE

Species conservation

Paleogenomic scientist Beth Shapiro studies ancient DNA to understand how modern species evolved—including how we can bring them back from the brink of extinction and what that means for human health.

Evolution of humanity

By sequencing ancient DNA, Ed Green discovered in an award-winning study that human ancestors who migrated out of Africa interbred with Neanderthals, and that their descendants still carry some of that Neanderthal DNA.
WE INVITE YOU TO JOIN US ON THIS GREAT FRONTIER OF SCIENCE AND HUMANITY.

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