

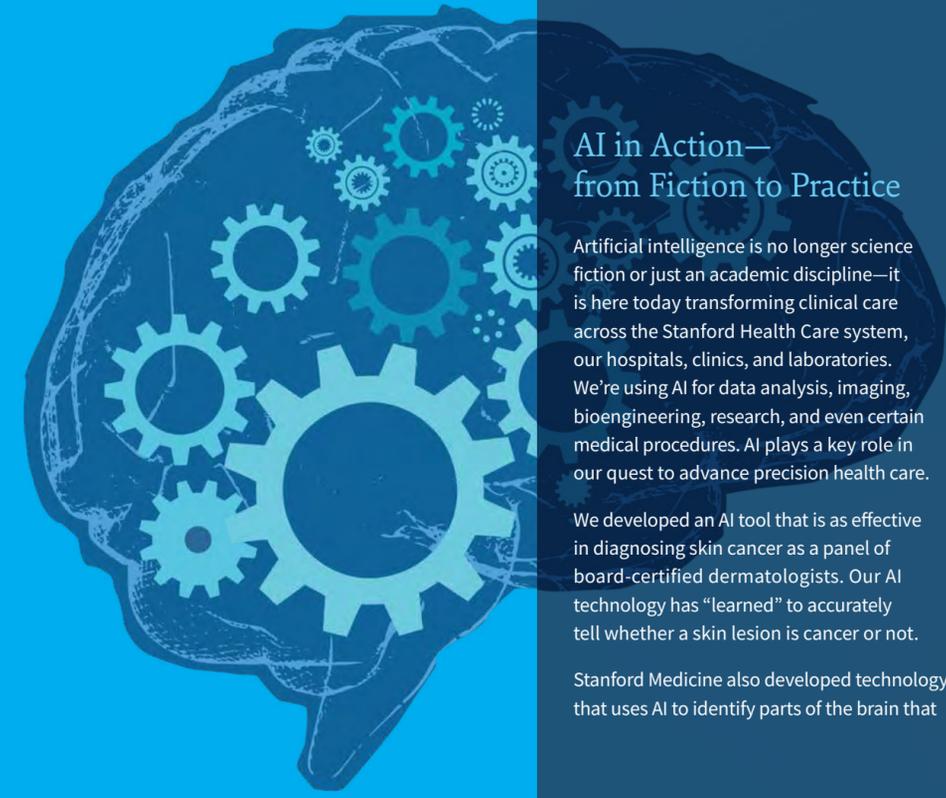
# Advancing Precision Health Takes Real Smarts—Artificially Speaking

## The Stanford Program for AI Health Care

Where is the intersection of man and machine—health care and artificial intelligence? Artificial intelligence (AI), machine learning, and data-driven technologies are becoming part of medicine. Yet we believe that medicine must remain fundamentally an endeavor of humans caring for other humans. Stanford Health Care established the Program for AI Health Care to look at these issues and ways to improve people’s lives with AI. Our mission is to bring machine learning and AI to the clinic safely and responsibly.

It is fitting that major advances in the applications of artificial intelligence to precision health care are taking place at Stanford Health Care. We were one of the original sites where the use of AI in medicine began in the 1980s.

Today, four core activities help us fulfill our mission:



## AI in Action— from Fiction to Practice

Artificial intelligence is no longer science fiction or just an academic discipline—it is here today transforming clinical care across the Stanford Health Care system, our hospitals, clinics, and laboratories. We’re using AI for data analysis, imaging, bioengineering, research, and even certain medical procedures. AI plays a key role in our quest to advance precision health care.

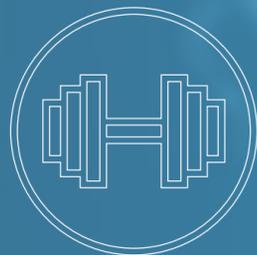
We developed an AI tool that is as effective in diagnosing skin cancer as a panel of board-certified dermatologists. Our AI technology has “learned” to accurately tell whether a skin lesion is cancer or not.

Stanford Medicine also developed technology that uses AI to identify parts of the brain that

can still be saved up to 24 hours after a stroke. This quadruples the window of opportunity for treatment, which until now had been only six hours. Following this breakthrough, the American Heart Association announced a change in treatment guidelines reflecting this significant development for people who suffer a debilitating stroke.

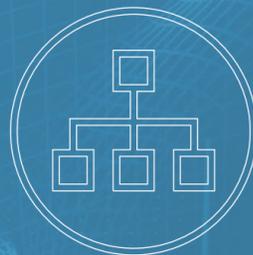
AI shows much promise to work alongside doctors and researchers. A machine may never take the place of the trained human eye, but it enables us to see things we never knew possible: strategies to be more effective and efficient in preventing illness and helping people stay healthy, instead of merely treating them if they get sick.

We believe that taking a leadership role in precision health care requires also taking a leadership role in AI. At Stanford, we embrace the opportunity to lead on both fronts.



### TRAINING

To train people to plan and implement AI health care projects, we run the “Boot Camp for AI in Health Care” in partnership with the Department of Computer Science. Students take a deep dive into cutting-edge research in radiology, pathology, electronic health records, mental health, and public health. We also train clinicians, particularly Clinical Informatics fellows, on our Clinical Informatics Consult Service.



### DEPLOYMENT

We set up the necessary infrastructure and procedures, so we can act on predictions and gain actionable insights on data. As an example, we have a petabyte-scale searchable repository of annotated, de-identified medical images, linked to genomic and electronic medical record information for use in the creation of AI-related systems. We’ve also built a HIPAA-compliant platform to support research applications built on smartphones.



### COLLABORATION

We work with leading technology companies to help expedite our discoveries and their deployment. For example, we are using the power, security, and scale of Google Cloud to support precision health and more efficient patient care. We also hold symposia surrounding humans and machines in medicine, and an annual research meeting on machine learning that connects computer scientists who have expertise in AI and machine learning with clinicians and medical researchers.



### STUDY

Before writing the first line of code for an AI algorithm, we study the system and ask several questions, such as: If you had a prediction, what action would you take, how often, on how many people, and what would it cost? Based on the answers, we figure out the minimum performance measures a model must have to be useful. This design analysis upfront is done before building any potential solution. Currently, AI project teams are looking at improving palliative care with deep learning, making predictions for length of stay, and identifying patients who may have undiagnosed genetic disorders.