

# 'Revolution is at hand' for breakthroughs in medicine

May 27 2011, By Marni Jameson

---

Someday soon, thanks to advances in medicine, a surgeon will operate on a patient who is not in the same room, but thousands of miles away.

Particles that are one-10,000th the thickness of a strand of hair will hurl through bodies on seek-and-destroy missions attacking tumors and stopping diseases in their tracks, while leaving healthy tissues unharmed.

Your one-of-a-kind genome will dictate your prescriptions.

These are only a few of the advances in medicine Americans can expect in the next 10 years, as new technologies change health care.

Revolutionize is not too strong a word.

Far from wishful thinking, these breakthroughs represent well-developed, well-researched and, perhaps most important, well-funded technologies that will make medicine more effective, less expensive and more tailored to individual patients.

And they're on their way to a [health-care provider](#) near you.

Remote surgery:

Already surgeons use robots by proxy to remove prostates, perform hysterectomies, ablate thyroid glands and open blocked arteries. Doing [robotic surgery](#) lets surgeons be more precise, make smaller [incisions](#) and it takes a load off their feet.

Rather than stand for hours over an operating table, surgeons performing robotic surgery sit at a video-arcade-like console, where their hands and feet drive robotic arms.

For now, they do all this while sitting just a few feet away from the patient.

However, the next frontier of robotic surgery will see surgeons operating on patients hundreds, even thousands of miles away, said Roger Smith, [chief technology officer](#) for the Nicholson Center for Surgical Advancements in Orlando, Fla. This means a world-class surgeon in Munich could perform a complex [heart surgery](#) on a patient in Miami.

Telesurgery also has great military applications, said Smith. Surgeons will soon use robots on battlefields or military ships to perform remote surgery.

To get there, computer scientists are working on more reliable connectivity and a shorter lag time between a surgeon's movements and what actually happens.

"Fast reaction is important anywhere a slight movement has a big effect," said Smith.

Genome-based medicine:

Notice: Your code is about to be cracked.

Now that scientists can sequence the human genome, one day everyone's genome will be sequenced, said Dr. Ranjan Perera, director of the genomics laboratory at Sanford-Burnham Medical Research Institute in Orlando.

"Doctors will then use our mapped genome not only for diagnosis, but also for prognosis - to see what diseases we're set up to get," he said.

"If we can identify what is going on in the body 20 or 30 years before disease develops, we can do much more to stop the progression."

Individual genetic blueprints also will allow doctors to customize medications based on what will work best in our bodies, Perera said.

This field - called pharmacogenomics - is available now on a limited basis, said Dr. Jane Barlow, vice president of clinical innovation for Medco Health Solutions, in Franklin Lakes, N.J. She anticipates patients will begin to broadly benefit from gene-based medicine over the next five years.

Small answers to big problems:

Thinking small, scientists specializing in nanomedicine are on the verge of using very small keys to unlock cures to the world's worst diseases.

Today's scientists work at the molecular and atomic level with nanoparticles, to harness these biomachines that detect and bind to diseased cells. The nanoparticle then fuses with that sick cell and delivers its cargo - drugs or imaging agents, said Dr. Jamey Marth, a researcher at Sanford Burnham's Center for Nanomedicine, in Santa Barbara, Calif.

Already, doctors are using nanomedicine to deliver targeted treatment to cure prostate cancer. "Being able to target a drug to the right place is one of the holy grails of nanomedicine," said Marth.

Nanomedicine is closing in on the ability to discover the origins of disease, diagnose it before symptoms appear, treat it early by delivering

drugs right to the tissues and lengthen life, he said. "In biology and medicine, a revolution is at hand."

Drugstore diagnostics:

Exhale. Soon that's all you will have to do discover if you have lung cancer - or don't.

Doctors at Cleveland Clinic, in Ohio, and Montefiore Medical Center, in New York, are among those researching a breath test to detect lung cancer, eliminating the need for more invasive biopsies.

Other health-test kits are also on the way so consumers can test themselves for a variety of illnesses.

"In 10 years, we can reliably count on a readily available exhale-risk test that assesses and accurately detects lung cancer," said Dr. Simon Spivac, chief of pulmonary medicine at Montefiore.

"The exhaled breath condenses and, when cooled, turns to liquid. We can study these droplets using sophisticated gene sequencers to see if they have biomarkers that indicate cancer," he said.

Meanwhile, at MD Anderson Cancer Center in Orlando, researchers are developing a urine test to detect bladder cancer. Currently, the only way to diagnose bladder cancer is to insert a camera up the urethra to look inside the bladder.

Like the lung cancer breath test, a bladder cancer urine test lets scientists analyze output from the organ, said Dr. Steve Goodison, director of the Cancer Research Institute at MD Anderson. The National Cancer Institute and the state of Florida are funding his research.

He estimates the bladder cancer test will be available to clinics within five years. The test would also yield "tens to hundreds of genetic biomarkers," which would let physicians know exactly what they're dealing with.

"As we detect cancers sooner, and have panels that allow us to treat cancers more accurately, we'll soon get to the point where cancer will become a chronic, manageable problem not a lethal disease," he said.

Wireless health:

However far you think wireless technology has come, it's still the Wild West as far as medical applications are concerned. "We have the whole frontier still ahead of us," said Thad Seymour, vice president of health and life sciences for the Medical City, in Lake Nona, Fla.

Soon wireless technology will play a major role in fixing health care's two biggest challenges: reducing costs and improving quality, he said. Devices in the works will allow more Americans to receive better care for less money.

Specifically, applications are on the way that will help society better manage chronic disease, prevent illness, improve fertility and help seniors age in place.

"A lot of chronic disease management hinges on compliance," said Rob McCray, president of Wireless Life Science Alliance, a non-profit trade association. "Doctors want to hear when a patient isn't complying, so they can intervene."

One way may be through a wireless radio pill made of organic food materials. Expected to cost about one cent each, the pill, when swallowed, starts transmitting data, starting with whether the patient

swallowed the radio pill. Then it logs when and whether the patient took his medicines.

Apps already exist to help the health conscious count calories or steps, and, for diabetics to track blood sugar. Soon integrated devices will bring all that together, and wirelessly download to your computer data about your activity, blood pressure, weight, calories in and out, and medications taken, providing you a portal into your behavior, and a tool to make healthy adjustments, said Seymour.

Women struggling with infertility can wear a wireless patch that will let them know the minute they're fertile. Technology also will help seniors stay in their homes longer thanks to motion detectors, video monitors and other devices that will help adult children check in on aging parents.

"Technology isn't holding us back," said Seymour. "Cost is."

(c) 2011, The Orlando Sentinel (Fla.).

Distributed by McClatchy-Tribune Information Services.

Citation: 'Revolution is at hand' for breakthroughs in medicine (2011, May 27) retrieved 25 April 2024 from <https://medicalxpress.com/news/2011-05-revolution-breakthroughs-medicine.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--