March 12, 2015

Medical Innovations of the Future

Last month’s Emerging Issues Forum, “Innovation Reconstructed,” featured keynote speaker Ray Kurzweil, one of the world’s leading inventors and futurists who boasts a 30-year record of remarkably accurate predictions. Kurzweil got the attention of participants by predicting, among other things, profound transformation in health and medicine over the next two decades. Kurzweil asserted, for example, that medical science will begin adding one net year to human life expectancy annually by 2030. His biotech forecasts include 3-D printing to create food, including meat.

Ray Kurzweil at the 2015 Emerging Issues Forum. (Photo credit: [Featured Image])

Featured Report

Engaged citizens = stronger communities. Read the new “2015 NC Civic Health Index” report.

Featured Video

How IBM Watson is changing the healthcare industry.

Featured Challenge

Best ways to reconstruct innovation in NC? Share your ideas.
Nanotechnology is one key to Kurzweil’s vision of the future. He expects that by 2030 we’ll see computers the size of blood cells reaching the neocortex through our capillaries. In one sense, this is already happening with some Parkinson’s disease patients, who receive through the nasal passage nanoparticles carrying a gene capable of rescuing dying neurons in the brain.

Indeed, in many ways the “future of medicine” is already upon us. In keeping with the spirit of the Forum, I want to highlight a few medical innovations that are already underway, in progress, or on the very near horizon.

Underway: The Curation of Medical Information

The volume of recorded medical information is, by some estimates, now doubling every three years. IBM Watson, a cognitive computing technology made popular via an appearance on TV’s “Jeopardy” game show, is now being applied to oncology. At Memorial Sloan Kettering, staff are working with IBM Watson to help oncologists identify evidence-based and individualized treatment options. The goal is to improve the quality and effectiveness of healthcare decisions. Meanwhile, IBM Watson is also helping to improve healthcare efficiencies in more routine fashion by enhancing supply chain management and helping hospital administrators make better purchasing decisions.

In Progress: 3-D Printed Pharmaceuticals

Researchers at England’s University of Central Lancashire (UCLAN) are patenting a technique that allows a 3-D printer to “print” a tablet of medicine. The printer can replicate certain prescription medications already currently available in pharmacies. Most exciting, however, is the notion that we will soon gain the ability to tailor medicines to a patient’s individual needs. The UCLAN technique is able to maintain dosage form properties, using software to accurately adjust dosage as needed. The project’s researchers predict that pharmaceutical firms and hospitals will use this technique within five years and that patients will have access within a decade.

On the Horizon: At-home Diagnostics

The ability to diagnose ourselves at home is not a new notion. Patients have been able to measure their
blood pressure, detect a pregnancy, or even administer a paternity test at home for years. It’s only a matter of time before these diagnostic tools become smaller in size and far more sophisticated. In fact, Google has already begun testing a smart contact lens that can measure glucose levels in tears. It contains a miniaturized glucose sensor and tiny wireless chip embedded between two layers of soft contact lens material. The sensor and chip notify the wearer when glucose levels pass certain thresholds, creating a whole new way to monitor and manage diabetes. At-home diagnostics innovations are being applied to many other diseases, as well.

Preparing for the New Healthcare Landscape

As with every great opportunity, medical innovations force trade-offs. How can we make sure the information we feed cognitive technologies is accurate enough to inform reliable decision making? That pharmaceuticals are not printed and used illegally? Or that we can rely on the accuracy of diagnostic sensors in critical situations? How can rules and regulations keep pace to stay relevant in a time of accelerated innovation? How can we be more aware and civically engaged about these important issues?

As resilience researcher David Woods noted at the Forum, “In adaptive systems, yesterday’s solutions produce today’s surprises that become tomorrow’s challenges.” As the pace of innovation picks up, so do the challenges. The key, Woods said, is to leverage the adaptive power of human systems. In healthcare, disturbances are frequent and potentially severe. But healthcare systems are also tremendously resilient, capable of dealing with unexpected events on small and large scales every day. I’m optimistic that as health innovations progress, so too will our capacity to build systems that adapt successfully to these new challenges.