

Book Medicine 2.0



The Creative Destruction of Medicine: How the Digital Revolution Will Create Better Healthcare

Eric Topol. Basic Books, 2012.
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Watch Eric Topol talk about *The Creative Destruction of Medicine* at <http://www.booktv.org/Watch/13279/The+Creative+Destruction+of+Medicine+How+the+Digital+Revolution+Will+Create+Better+Health+Care.aspx>

“One of our passengers needs medical attention. If there are any doctors on board, please ring your call button.” A doctor was quickly escorted to the passenger having chest pains. He pulled out his smartphone, but rather than making a phone call, he got the passenger to place his fingers on the sensors on the back of his custom iPhone that measures pulse; the real-time electrocardiogram displayed on the iPhone indicated a heart attack. The plane made an unscheduled landing and the patient lived. Science fiction? No. It’s already happened, and the doctor in question was influential cardiologist Eric Topol, Director of the Scripps Translational Science Institute.

In *The Creative Destruction of Medicine*, Topol argues that the digital revolution will fundamentally change the way medicine is practised. He proposes that the convergence of genomics (especially pharmacogenomics), with smartphones, biosensors, and other technologies will lead us to a near future where “medicine can and will be rebooted and reinvented one individual at a time”. At the heart of this vision is the need to move away from the current practice of treating people as populations to tailoring treatments to individuals.

Topol sees a future where genomics will help transform the way we test and administer drugs, individualising treatments on the basis of the specific characteristics of patients. It’s a scenario, he points out, that seems increasingly likely given the declining cost of sequencing an individual’s genome, which has dropped from about US\$1 billion 10 years ago to less than \$1000 today. Topol discusses the potential of genome sequencing to advance individualised medicine by, for example, identifying those people at high risk of the most aggressive type of prostate cancer; targeting which patients really need statins and

screening out those predisposed to rare but serious side-effects; and showing which patients cannot metabolise clopidogrel and convert it to an active drug. Topol suggests that such approaches would not only improve patient care but would also mean huge savings for the US health system. He does caution that “Currently the ability to sequence is way out in front of our ability to interpret the data”, and admits that genomics has not yet delivered the goods with regard to identifying disease susceptibility. But if genomics does start delivering as Topol predicts, this could greatly

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accelerate the penetration of the digital genomics revolution into medicine, empowering individuals to contribute successfully to improving their own health care. In the meantime, Topol makes a convincing case that pharmacogenomics is delivering now, increasing our understanding of which genes are responsible for interacting with prescription medications.

Looking to the future, Topol presents another scenario in which nanotech sensors could identify signature cells in the bloodstream of patients whose arteries are on the brink of failing. The biosensors could wirelessly send a warning signal to the patient’s phone, urging him to seek medical care before any physical symptoms of an impending heart attack, much like the “check engine” light on a car.

Topol’s account of the near future of digital medicine is part of this book’s appeal. *The Creative Destruction of Medicine* is also packed full of practical examples of how technology is already changing the way some physicians care for patients and patients can monitor

themselves. Physicians can use smartphones to monitor the continuous vital signs of patients living in different cities. A sophisticated smartphone app that uses a wireless sonogram sensor allows physicians to help spot leaky heart valves and other heart conditions that would traditionally require expensive hospital imaging. In his own practice, Topol uses this in place of a stethoscope, but points to its potential use for mammograms in breast cancer.

A lot of health information, such as vital signs, glucose levels, and other diagnostic data, can now be collected by individuals using wireless technologies that work on commercially available smartphones. One of my friends who recently had a jaw relocation for sleep apnoea was surprised to learn from Topol’s book that she could monitor her own brainwaves during sleep with her iPhone and a \$100 app. It produces a graph showing how much time she was in deep sleep, when she woke up in the night, and REM sleep cycles; the app even calculates a sleep score to quantify how well she slept. Another friend, recently diagnosed with diabetes, was intrigued to find out that she could wirelessly monitor and continuously record her glucose levels to get a more complete picture than with the fingerstick method she uses.

Topol thinks technological advances and a critical mass of consumers using smartphones will transform medicine, despite the conservative reaction of some in the medical establishment to digital medicine. I wonder if US insurance companies and politicians will incentivise this digital revolution? Topol’s arguments are compelling—at the very least, the smartphone gadgets he describes make this book a must read for patients and doctors alike.

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