

## ***Self-Tracking Pills: Medical Adherence in the Twenty-First Century***

Mike Reaves

Keywords: medical adherence, surveillance, pharmacological ethics, autonomy

### INTRODUCTION

What if your prescription pill contained a microchip inside of it?

Yes, a microchip *inside* of a pill.

A piece of silicon, magnesium, and copper no more than one millimeter wide. A combination that creates an electrical circuit when exposed to stomach acid. Within minutes of reacting to gastric acid, the microchip relays electric pulses to a stick-on patch attached to the patient's navel. The patch wirelessly syncs to the patient's mobile device and the data is automatically transmitted to the physician. In essence, a doctor can now track a patient's medical adherence electronically.

### ANALYSIS

Self-tracking pills will no doubt improve the ability of medical professionals to monitor patients and their prescription use, an effort that has failed in recent history. In the United States, 50 percent of all prescriptions are not taken as prescribed by the physician.<sup>1</sup> Nonadherence has been a problem in primary and secondary healthcare; individuals with chronic issues such as diabetes or high cholesterol are at a higher risk of developing serious health complications if they take prescriptions irregularly. Furthermore, some populations with mental illness are more likely to hurt themselves or others if they do not abide by their prescription regimen.<sup>2</sup>

Proteus Digital Health, the developer of the self-tracking pill and patch, has set its sights on combating medical nonadherence with the release of Proteus Discover, which gained patent approval in 2012.<sup>3</sup> Proteus insists that using this new technology will cut costs and reduce waste in the healthcare industry. A doctor who knows whether his or her patient is taking the correct dosage will be able to diagnose and treat that patient more efficiently. Improving tracking efforts will allow preventative and secondary care to become more seamless for both the patient and physician.

Not futuristic enough for you? Try pill #2.

The US Patent and Trademark Office is reviewing a new patent submitted by inventor and Chairman

of New York College, Donald Spector. So what is different about Spector's magic pill? Similarly sized micro-tracers are placed inside of the pill. However, when digested, these tracers transmit the exact blood concentration of a particular drug in the patient's system directly to nearby supercomputers. No intermediary device or patch is required with Spector's pill, unlike that of Proteus Discover. The exact science behind these microprocessors and how they transmit the data on the digestion of drugs has not yet been released to the public, as it is still pending approval in 2016.<sup>4</sup> Spector has also filed patents to monitor the state of individuals via a biological sensor attached to the wrist. In this way, a remote receiver can track the health status of an individual and send alerts to various entities in the case of an emergency.<sup>5</sup>

The most prolific living inventor you have never heard of, Spector holds patents in hundreds of products in areas ranging from toys and crafts to telecommunications and healthcare science. He has resources at his disposal as well, filing inventions under New York College's Intellectual Property (IP) policy. Spector believes that the introduction of this technology will greatly reduce both death attributed to nonadherence as well as instances of violence in susceptible populations. As he stated shortly after the Newtown tragedy of 2012, "Everyone mourns in their own way; for me, I find hope in trying to change the future and prevent these kinds of tragedies. The massive problems of our society in medicine, economics, and energy are not going to be solved by politicians; they will ultimately be solved by science."<sup>6</sup>

However, how the public and politicians receive this health advance will determine the scope of its impact. Will pill-tracking become a staple in primary and secondary care, or is something about these technologies ethically troubling? Medical paternalism is one concern that appears to stand out. Technology such as this can be implemented into state monitoring programs to ensure medical adherence. Some bioethicists, such as Arthur Caplan of NYU, believe there are valid concerns regarding the use of systems like Proteus or Spector's super pills. In an interview with ABC in 2013 that covered the filing of Spector's patent, Caplan presented a slippery-slope argument for why acceptance of the practice may lead to ethical violations.<sup>7</sup> Using this technology for conditions like heart disease and diabetes are incredibly valuable, but what about other conditions in which the patient and the public will benefit? What are the limits? Caplan contends that this technology may be used to target individuals with a criminal past, a history of violence, or who are mentally ill. These practices, he contends, may lead to an encroachment on the civil liberties of privacy and confidentiality. Keeping tabs on ex-convicts or those with a mental illness may be beneficial to society, but enforcing an individual to take a pill seems to go against the traditional concept of patient autonomy. Furthermore, invasion of privacy may discourage patients from being compliant in their medical care and may encourage distrust between a patient and medical professional.

## CONCLUSION

While Caplan's points are well taken, there are legal protections guarding citizens that assuage many of his concerns. A majority of patients who will end up taking advantage of this technological advance will do so voluntarily after giving informed consent. Additionally, it would require a court order to force any patient who is non-adherent to follow a prescription regimen. Public opinion may be swayed on this topic when instances of violence take place in society. For example, the public is likely to favor legislation requiring those who exhibit signs of violence to adhere to their prescription regimen after a tragedy or mass shooting.

Donald Spector believes that his patents will be utilized to the extent that public policy allows. It is not up to him, he believes, to decide the limits of his innovations. As he notes, "Who the supercomputer

delivers that information to is more going to be the result of legislation rather than the invention."<sup>8</sup> As these advances in healthcare science become more prevalent, public perception and reception, along with the help of those trained in medical ethics, will decide the limits of these technologies.

---

<sup>1</sup> Brown, Marie T., and Jennifer K. Bussell. "Medication Adherence: WHO Cares?" *Mayo Clinic Proceedings* Vol. 86 (4): 304–314 (April 2011). Mayo Foundation for Medical Education and Research. Doi: <http://dx.doi.org/10.4065/mcp.2010.0575>.

<sup>2</sup> Fazel, Seena, Johan Zetterqvist, Henrik Larsson, Niklas Långström, and Paul Lichtenstein. "Antipsychotics, Mood Stabilizers, and Risk of Violent Crime." *The Lancet* 384.9949 (2014): 1206–214.

<sup>3</sup> Body-associated Receiver and Method. Proteus Biomedical, Inc., assignee. United States Patent #8114021. February 14, 2012. <http://patents.justia.com/patent/8114021>

<sup>4</sup> Stuart, Hunter. "Pill-Tracking Device Could Monitor Whether You're Taking Your Medication." *The Huffington Post*. [http://www.huffingtonpost.com/2013/01/24/pill-tracking-device\\_n\\_2535466.html](http://www.huffingtonpost.com/2013/01/24/pill-tracking-device_n_2535466.html)

<sup>5</sup> "SENSOR WITH REMOTE COMMUNICATIONS CAPABILITY." US Patent Application for Patent Application (Application #20130241728, Issued September 19, 2013). <http://patents.justia.com/patent/8823512>

<sup>6</sup> "Following Newtown Tragedy, Inventor Takes Aim at Controlling Violence From Mental Illness." December 20, 2012. PRNewswire. <http://www.prnewswire.com/news-releases/following-newtown-tragedy-inventor-takes-aim-at-controlling-violence-from-mental-illness-184252131.html>

<sup>7</sup> Lupkin, Sydney. "Invention Would Track Meds in Mentally Ill Patients, But Is It Ethical?" ABC News. ABC News Network, January 21, 2013. <http://abcnews.go.com/blogs/health/2013/01/21/invention-would-track-meds-in-mentally-ill-patients-but-is-it-ethical/>

<sup>8</sup> Stuart, Hunter. "Pill-Tracking Device Could Monitor Whether You're Taking Your Medication." *The Huffington Post*. [http://www.huffingtonpost.com/2013/01/24/pill-tracking-device\\_n\\_2535466.html](http://www.huffingtonpost.com/2013/01/24/pill-tracking-device_n_2535466.html)