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Hatching Medtech Progress in the Northeast

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Medtech labs and incubators in Massachusetts and New York are drawing investors to help spread their health solutions around the globe.

Nancy Crotti



“Boston is an incredible environment to run a laboratory,” says Jeffrey Karp, PhD, a bioengineer based at Boston’s Brigham & Women’s Hospital.

Where would the medical device industry be without Robert Langer, ScD? Since the 1980s, the MIT professor has made chemical engineering relevant to the life sciences. He has collaborated with scientists, professors, and a horde of graduate and postdoctoral students to research treatments for cancer, diabetes, heart disease, and schizophrenia, not to mention hair care products. The field of drug-delivery in particular has benefitted from his contributions. With his students and colleagues at MIT, and its teaching affiliate Brigham and Women’s Hospital, and other institutions, Langer has helped launch 29 companies and has 1080 patents issued or pending.

Langer’s story provides a great example of how labs and incubators have helped power Massachusetts’ medtech industry—and could do the same in New York if some in the Empire State have their way.

The Massachusetts companies Langer has helped start include T2 Biosystems Inc.

(Lexington), which makes disease diagnostic products; Arsenal Medical Inc. (Watertown) which is developing technology to stop internal bleeding; Momenta Pharmaceuticals Inc. (Cambridge), which makes a blood-clot fighting drug; Microchips Biotech (Lexington), which makes implants that can release drug doses for up to 16 years; and Living Proof Inc., a hair products company also based in Cambridge.

T2 and collaborator Sandoz won FDA approval in April for the drug Glatopa, a generic version of Israeli company Teva's Copaxone as a treatment for relapsing forms of multiple sclerosis

Newer launches include SQZ BioTech (Boston), which Langer described as "a company that can get anything into a cell by squeezing it appropriately."

Its technology includes a "CellSqueeze" chip, mounted onto an interface with reservoirs, to hold cells before and after squeezing. Microfluidic channels with cell deforming features are etched onto silicon chips and sealed with a glass layer, according to the company's website. The cells move through the chip under controlled pressure through the microfluidic channels.

Arsia Therapeutics aims to make less viscous injectable formulations of high-concentration antibody drugs that treat cancers, autoimmune disorders, and other chronic diseases in hospitals and infusion clinics. These drugs could be delivered subcutaneously, outside a hospital setting, Langer explained.

The Langer Lab is also working on a new type of self-healing hydrogel that could be injected through a syringe rather than what Langer considers cumbersome IVs. These gels, which can carry one or two drugs at a time, could be useful for treating cancer, macular degeneration, or heart disease, among other diseases, according to a statement by MIT.

The gel consists of a mesh network made of two components: nanoparticles made of polymers entwined within strands of another polymer, such as cellulose.

The Langer Lab does a lot of research on what Langer called “designer materials” and nanotechnology. “Nanotechnology is a huge area in terms of delivery and imaging and diagnostics,” he said. “There are a lot of cool things like that.”

In addition to launching products, The Langer Lab launches other incubators, such as The Karp Lab, founded by Jeffrey Karp, PhD. Karp, a previous postdoctoral fellow at the Langer Lab, now a bioengineer based at Brigham and Women’s Hospital.

Working in Cambridge, MA, Karp and Langer collaborated with Paris-based Christophe Bancel and Bernard Gilly to launch Gecko Biomedical, which is developing surgical glue that could be used to seal holes, and attach tissues together, affix devices potentially anywhere in the body,” Karp wrote in an email. “We see (the) biggest opportunity in minimally invasive surgery where current approaches to seal tissues are inadequate and have limited progress.”

Karp’s lab has about 25 people, including PhD students, postdoctoral fellows, a handful of undergrads, a couple of clinicians, and sometimes high school students. They are researching solutions to prostate cancer, inflammatory bowel disease, arthritis, multiple sclerosis and type-1 and type-2 diabetes.

Karp sees medtech and biotech research trending toward a combination of stem cell biology, nanotechnology, materials science, and medicine. “Innovation happens at the interface of disciplines,” he wrote.

Karp left The Langer Lab to go out on his own in 2007. But he didn’t go far, and here’s why.

“Boston is an incredible environment to run a laboratory,” Karp wrote. “You have the most remarkable people, experts in all areas and state-of-the-art tools and top model systems developed to test new medical technologies. ”

Langer agrees. “The whole area—MIT, Boston, Harvard – there’s so much going

on. It's a great infrastructure," he said.

It is little wonder, then, that the area is one of the largest medtech hubs in the United States. The Boston area has 18,893 medtech employees, according to Jones Lang LaSalle data cited by Minneapolis–St. Paul economic development group Greater MSP. Massachusetts brought in a staggering \$2.4 billion in National Institutes of Health funding in 2014, outstripping New York's \$2.1 billion.lopment group Greater MSP. Massachusetts brought in a staggering \$2.4 billion in National Institutes of Health funding in 2014, outstripping New York's \$2.1 billion.

Refresh your medical device industry knowledge at [BIOMEDevice Boston](http://biomeddevice.mddionline.com/?cid=arti.qmed.med903.newmarker.northeastregionalfocus) (<http://biomeddevice.mddionline.com/?cid=arti.qmed.med903.newmarker.northeastregionalfocus>), **May 6–7, 2015, or **MD&M East** (<http://events.ubm.com/event/2986/mdm-east/?cid=arti.qmed.med903.newmarker.northeastregionalfocus>) **in New York City, June 9-11, 2015.****

New York As a Medtech Up-and-comer

While the Boston is the biggest hub on the East Coast for medical technology innovation, New York City is hoping to give it a run for its money.

Forbes may have spoken too soon in 2012 in dubbing New York the epicenter of healthcare's reinvention. But the city certainly is making progress. In the digital health space, the state is already third for investments, with 24 deals worth \$289 million in 2014, according to seed and early-stage venture fund Rock Health (San Francisco), which has a New York City presence. Only California, with nearly \$2 billion in digital health investments, and Massachusetts, with \$394 million, brought in more.

The Big Apple is already home to a handful of medical technology incubators, including Jean-Luc Neptune's Blueprint Health. Blueprint takes existing companies

with a working product that's market-ready or has some initial fraction of the market, Neptune said.

Blueprint brings in two cohorts a year of startups from the United States and Canada, according to Neptune, who holds an MD and an MBA.

Blueprint provides a 200-member mentor network of industry executives, regular speakers from health and digital health fields, and a curriculum that covers fundraising, sales and marketing, hiring, and operations.

"We don't really offer 'classes.' Instead, we organize our program by 'class' or by 'cohort,' bringing in groups of companies to run through the program at the same time. The 'program' involves a set curriculum (of meetings and talks) as well as a variety of networking and consulting activities," Neptune said.

Rather than paying for this education, the startups receive \$20,000 in cash per month, the ability to co-work out of Blueprint's space, and discounts from Google and Rackspace for cloud storage. The program is worth about \$100,000 in products and services to each startup, and Blueprint gets 6% percent of the founders' stake in the company, according to Neptune.

Neptune says 85% of Blueprint's investments are still in operation, and 80% of those companies are generating revenue.

Trends Neptune is noticing include a move toward increased healthcare consumerism, with people making more of their own health purchasing decisions; a clear shift from fee-for-service to fee-for-value health care on the provider side; and the increasing importance of data, system interoperability, and data analytics

Blueprint's client roster includes:

- GlucoIQ, which makes a program that allows healthcare providers to analyze data coming from glucometers and other glucose-sensing devices;

- Limestone Labs, which has a hardware device that use ultraviolet lights to sanitize portable devices including mobile phones and tablets in clinical settings;
- Moving Analytics, which uses a mobile app that allows patients to do cardiac rehabilitation at home rather than at a hospital;
- Signifikance, which provides an automated research tool to laboratories working on genetic sequencing;
- TapGenes, which allows lay people to crowdsource their families' health history via social media so they can understand genetic risks of developing certain types of cancer, and other diseases.

New York City and the state of New York have invested millions into developing digital health innovations, according to Neptune. He considers New York City's healthcare establishment "low-hanging fruit" ripe for making its own investments into medtech and biotech companies.

"All those things together are making New York a hub for this," Neptune said.

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