Xconomy.com

T2 Biosystems: Can a Who's Who of Local Biotech Change the Way Disease is Diagnosed?

Rebecca Zacks, 2/8/08

For a journalist I'm pretty bad with names, but I had no problem recognizing the ones on T2 Biosystems' roster. The founders of the Cambridge, MA-based medical diagnostics startup, which sprung from research at MIT and Mass General Hospital, are pretty much local legends. Take Tyler Jacks, the director of MIT's Center for Cancer Research and one of the central figures in the effort to unravel the genetic underpinnings of cancer. Then there's Ralph Weissleder, who directs MGH's Center for Molecular Imaging Research and is one of the pioneers of that field. And there's the not-so-secret sauce for biomedical startups around here: MIT Institute Professor Robert Langer, founder of umpteen companies and guru of drug delivery, tissue engineering, and other fields at the intersection of chemical engineering and biomedicine.

Those three joined with MIT's Michael Cima, Analog Devices' W. David Lee, and MGH's Lee Josephson—no slouches themselves—to found T2 in 2006 with $5.5 million in Series A funding from Flagship Ventures, Polaris Venture Partners, and IDG Ventures. And it was that combination of a "class A venture capital group" and founders with "an extremely strong historical track record of innovation" that attracted brand-new CEO John McDonough to the company.

McDonough, who joined T2 last month, told me with evident pride that between them the company's founders have almost 2,000 scientific publications and well over 700 issued or filed patents. McDonough himself is no stranger to notable numbers. In his last job, he was the president of the development division of Marlborough, MA's Cytyc, a maker of diagnostics, imaging tools, and treatments all aimed at the women's health market. In that role, McDonough helped Cytyc to acquire five companies together worth over $1 billion—and then, last October, to be acquired itself by Bedford, MA's Hologic (NASDAQ: HOLX) for a whopping $6.2 billion.

So where, exactly, is T2 aiming all that scientific and managerial momentum? The idea is to build small, portable devices that bring the diagnostic power of traditional medical lab machines into ambulances, rural doctors' offices, battlefields, cruise ships, and the like. And T2 is pursuing the same trifecta of advantages that others have sought in such point-of-care diagnostics: smaller, cheaper, faster. As in, handheld instead of appliance-sized, a few thousands of dollars a pop instead of maybe a quarter of a million, and producing test results in minutes instead of days or weeks. "We're well on our way to developing what I truly believe will be a disruptive set of instruments," McDonough says.

Of course not everybody is sold on the POC vision. (One basic question being, how many medical tests are really critical to have right away, on the spot?) And many an effort to develop a portable diagnostic device has been stymied by, among other things, a technologi-

cal strategy that's too complicated and finicky to make work in varied real-world settings. On the first point, McDonough says that the demand for POC tools is real, citing estimates that peg that particular slice of the $35 billion diagnostics market as one of the fastest-growing—at about $3 billion now and increasing some 10 percent a year. On the question of technological complexity, well, T2's system is actually pretty simple. Rather than trying to miniaturize and combine all the steps of traditional testing—including sample preparation, separation of components, in some cases culturing of cells, and so forth—the startup eliminated them.

T2's system uses specially engineered nanoparticles as a sort of a magnetic dye; each particle has an iron core and a polymer coating, and is studded with molecules that bind to whatever it is you're trying to detect, be it a virus, a cancer cell, or a particular protein. These nanoparticles can be thrown directly into a sample of blood or urine, say; if the target cell or molecule is present, the particles wind up clustering together as they stick to it. That aggregation can be detected by the portable reader device, using magnetic resonance. It's the same basic technology as is used in magnetic resonance imaging—except since the device doesn't need to generate the copious amounts of precise data necessary to construct an image it can be built with penny-sized magnets, instead of the massive, expensive ones required for an MRI scanner.

McDonough says that T2 should have 8 x 11 inch prototype of the reader in hand in a month or two. And the startup is in the midst of deciding just what test or tests it will try to bring to market first. With a staff of just 13 people—mostly scientists and engineers—it's important not to get pulled in too many different directions, McDonough says. But he adds that T2 is ripe for partnerships in such areas as water testing, drug development, testing for illegal drugs: "We can measure anything and we can do it quickly."

Oh, and one more thing because I know Bob will want to know even if you don't. T2's name, in turns out, comes not from the second Terminator movie but from the signal that results when the nanoparticles cluster together. I think I can remember that.■