MEDTECH INSIGHT
CITELINE COMMERCIAL

22 Sep 2023 | **Interviews**

Getting Personal With Tom Miller: CEO Turned VC On Ethical Bets In Diagnostics

by Marion Webb

Medtech Insight talked to GreyBird Ventures founder Tom Miller about his investment philosophy, ethical filter in selecting diagnostics-focused start-ups, the future of diagnostics such as at-home home-testing and AI, and his life-long passion for motocross racing.

Tom Miller, founder of Concord, MA-based GreyBird Ventures, LLC, has had more than his share of lumps and broken bones over five decades of passionate motocross racing.

You wouldn't know it from his spryness, and something of the same fearlessness and high-octane performance required for dusty, off-road motorcycling can be seen in his professional career trajectory.

GREYBIRD VENTURES FOUNDER TOM MILLER

After earning a master's degree in medical physics from the Harvard University/MIT Health Sciences and Technology Program, Miller worked at Massachusetts General Hospital as a research associate in radiation biophysics, as well as the Swiss Institute for Nuclear Research, before jumping to the medtech sector, where he has held CEO roles at companies including *Siemens AG*, Carl *Carl Zeiss AG* and *Analogic Corporation*.

He founded GreyBird Ventures in 2013 out of frustration that the lion's share of VC funding was going to therapies, not diagnostics, which he believes offer outsized opportunity for changing health care for the better.

Source: GreyBird Ventures

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"There's nothing worse to do to a patient than to treat them for a disease they don't have with a treatment that might not work or with an application that may actually cause them harm, Miller said.

He estimates that roughly 30% of therapies given to patients are not required, are wasteful, or even harmful.

GreyBird Ventures wants to back technologies that accurately identify patients who will or will not respond to costly therapies, generating value for all stakeholders involved.

The firm's focus is on early-stage investments in the diagnostics space, with seven companies in its portfolio at present – Angstrom, Platomics, JF Healthcare, Genetika+, Hummingbird Diagnostics, GNA Biosolutions, Atlas5, Ceres Nano. Miller says that is one more than he prefers, as he and his business partners, Michael Delvin, an attorney and investment professional, and Scott Gazelle, a Harvard professor and physician-scientist, make robust commitments to mentoring their entrepreneurs.

"We typically start with an investment that is $2 to $5m, Miller said. "We typically don't do seed. Our preference is an A round, and we expect that there is at least some analytical validation or some proof of concept that the technology works and maybe some preliminary clinical knowledge. A lot of what you're trying to do is retire risks over time, and once you retire all the risks, there is nothing left but success."

In a panel discussion on diagnostics at the LSX Congress USA conference in Boston, Miller told the audience he is looking for companies that solve "serious problems." If it's at-home testing, he wants the decision and behavior change from that test to be simple and without too much ambiguity. He worries a lot upfront, because the average time for a diagnostic company to exit is 12 years, and much can happen in that time. (Also see "*Medtech DEI Experts Talk Shop: 'It's Going To Transform Businesses'*" - Medtech Insight, 19 Sep, 2023.)

GreyBird prides itself on its strong ethical filter when it comes to selecting companies. He is leery about certain types of at-home testing, particularly as diseases become more numerous and

specific and diagnostics becomes more technically challenging.

In this interview with *Medtech Insight*, Miller discusses the company's philosophy and investment strategy, AI, the FDA, and trends good and maybe not so good in the diagnostics sector and broader health care. The following has been lightly edited for length and clarity.

Q **Medtech Insight: What was your first investment?**

A Tom Miller: Hummingbird was our first investment in January 2016, and we now have invested a total of $18m in the company. Hummingbird is trying to do early-stage lung cancer diagnostics. There are lots of people with hundreds and hundreds of millions of dollars that are trying to solve that problem. We believe that the company has better and more advanced clinical validation data than anyone on the market, with better performance and probably at 1/10 of the investment. We are thrifty, we look to make sure our companies are capital-efficient.

One thing that can kill a company very rapidly is to get valuations and expenses too high at an early stage, and then you get a big down round where you can't raise money and you get in trouble. We're trying to be very disciplined about making sure that the amount of money correlates to the progress that's been made. Another one of our companies, Ceres Nano, solves a fundamental problem in diagnostics, which is always that the biomarker that is most specific to disease at early stages will be low in abundance.

Let's say you just got infected with a disease and you have a tiny tumor, and you give blood. Well, the tiny tumor isn't going to give off a biomarker. Ceres makes nano-traps that capture, concentrate and preserve analytes of interest, such that you increase the concentration in your sample. They are the world leader in technology that enables wastewater testing for virus, and that is driving their revenues. They are about to launch follow-up products for liquid biopsy, proteomics, and many other things.

Q **What is your investment strategy and criteria?**

A Miller: Our strategy is the opposite of what I like to demean as "spray and pray." We don't just throw money around and hope that something sticks. We only have seven companies in our portfolio. I would prefer six. And the reason is we are the largest investor in every one of the companies. We hold at least one if not two board seats and always board chair in all the companies, and we get deeply involved. Money is not a limitation to our investment; it's our time. When we find a company, we stick with it and keep going.

Q **Greybird Ventures says its "ethical filter" is a moral and financial asset.**

A Miller: The ethics issue comes from my past. I was involved with being one of the four or five executives in the world who drove the start of the magnetic resonance imaging business. MRI initially was used to a large extent to look at the spine. If you image someone my age [66] who does my sport, you see bulges in the spine. And if I have some pain in my back and you see bulges in the spine, some enterprising neurosurgeon will say, 'Look at this, we have to operate.' And much of that is unnecessary.

And yet MRIs were used, quite a lot, to justify what I think is unnecessary surgery. Meaning MRI was sensitive, but not specific. It's sensitive in that it detects bulges in your spine. It's not specific and telling you that those bulges will be corrected by surgery or causing you pain or anything other than being there. There is a famous paper, which was published I think 2013 in the New England Journal of Medicine, which showed a skyrocketing incidence of thyroid cancer in South Korea. There was no epidemic of thyroid cancer. It was the use of thyroid ultrasound during a general exam and finding little spots on the thyroid. It wasn't thyroid cancer.

Another example, the number of prostatectomies that happen because PSA is up is just outlandish when the real issue is not, 'Do I have prostate cancer?' I can give you a free-of-charge test for prostate cancer diagnostics. Are you over 65? Are you a male? Do you still have your prostate? You have prostate cancer. I am 100% sensitive for the disease – costs you nothing!

There was an article today about whole-body MRIs – talk about the dumbest thing possible. If I image you from head to foot, I'll find something inside you, which is often referred to in radiology as an incidentaloma, which is equivalent to some little thing on some little organ, which is likely nothing.

But if I see an incidentaloma, I want to do something about it. It makes sense for certain sub-groups of high-risk individuals, but for someone like me who is healthy, absolutely not.

Q **You said in the panel that you ask any prospective investment about specificity and sensitivity, and they better know this stuff 'cold' and be assured of doing no harm.**

A Miller: We look at the sequelae of the test. If I have a specificity or sensitivity that is possible for a test, which then leads you to do things that could result in harm to patients, because you are overidentifying cancer, misidentifying another disease, and this sequelae is harmful like a lung biopsy, then you have to make sure you're matching the performance of the test with what you're going to do to the patient afterward. ... We have turned down companies because we think what they do would lead to abuse.

Q **Will companies with questionable ethics find investors elsewhere?**

A Miller: Of course they do. I can [think of] two companies that raised a bunch of money and I'm quite certain will come to market with their diagnostic technology and be approved by regulators and lead to poor outcomes for patients.

Q **So what in your view is the ethical responsibility of regulators?**

A Miller: I'm a big fan of US FDA. Most business people hate regulatory agencies, but I think it is one of the best-run agencies on the planet. I really mean it. That said, the question of where their role ends and where the ethical principles of a physician begin is tricky. I am very happy not to be in a position to decide where one ends and where the other one starts. (Also see "*Representatives Press CMS On Coverage Of*

Innovative Devices" - Medtech Insight, 20 Sep, 2023.)

Take the whole issue of artificial intelligence in medicine. There are studies right now that basically demonstrate that an AI looking at mammography films will beat a team of really good physicians. If they beat really good physicians, what do they do with a single mediocre physician? It's a very difficult question. It's a question that has to be wrestled with, and the FDA has done this. Do I think they [FDA] could do more? Yes, I think in the areas like nutraceuticals and other things that I call sham medicine they can do more, but I think they do an excellent job. (Also see "*German Nutraceuticals Market Growth Slows In 2022 But Vitamin C Remains Popular*" - HBW Insight, 23 Mar, 2023.)

Q **Do you think there needs to be more regulatory oversight when it comes to AI in medicine?**

A Miller: The answer is clearly yes. The question is, does that mean they are being too stringent or not stringent enough? I'm not sure. I only know that there will be two opposing forces and one will be AI. Could be a lovely means to lower the cost of care and make it more accessible. But if done in the wrong way, it could lead to the worst case, you know, malpractice. (Also see "*Siemens Healthineers, GE HealthCare Race To Develop Next-Gen AI Solutions For Personalized Care*" - Medtech Insight, 8 May, 2023.)

My fundamental belief is people talk about big data problems, right? We can identify and capture all the data around the patient and try to identify if the patient needs extra care during a hospital stay, etc. I look at little data problems. So, the issue, for example again, reading a mammography. It's a very confined problem that you put in a box, and even then, it's really hard to solve. If I were the FDA, I would focus on the little data problems where you can make a lot of headway, reduce costs, increase access, and even increase quality without having to run clinical trials that might need 100,000 patients to get the complexity in there.

Q **Since the pandemic, a lot of testing has moved into the home. How do you see that progressing?**

A Miller: It'll start with the first one. The world of diagnostics is getting harder, not easier. If you want to determine if a diagnostic test performs well, you want to get a group of people without the disease and a similar group of people with the disease. The size of the cohort is determined by two things: a) how good the performance of your test is, and b) the incidence of the disease in the cohort. If the incidence of the disease is 1 in 100, you don't need that many patients. If it's 1 in 1,000, you need a lot more patients, if it's 1 in 10,000 you need a lot more. During my career, from the time I graduated from school, ICD system had 1,600 diseases in it. Last year's ICD had over 55,000 diseases in it. If we're splitting diseases into more and more finer structures, each of which have an individual therapy, that means the incidence of any given disease has just gone down.

If incidence goes down, clinical trial size has to go up. All of a sudden now we're faced with the fact that we're trying to detect disease at earlier stages, meaning we have an abundance problem. You're trying to get the specificity to reach the real nature of what specific disease do you have, and it means the entire process of inventing a new diagnostic just became harder. The tailwind is we have all these technologies – next-generation sequencing, nanopore sequencing, AI – but the headwind is our knowledge of medicine is deconstructing these diseases into ever-more finer groups. It's important to tell one from the other, because to simply say you have leukemia is insufficient. I can only do something with it if I know exactly what it is.

So diagnostics has gotten more difficult and more technically challenging, which means the horse has left the barn, which is home-testing. Once home tests for COVID became widely available, the number of people that decided they needed a PCR test plummeted despite that the performance of the home tests were significantly worse.

Q **What does that mean for the future of home testing?**

A Miller: I say the same thing about home-testing as I say about AI, let's try to do the simple stuff. COVID, STDs, pregnancy are black and white whereas I'm cautious about the idea of genetic testing in which you are giving subjective probabilistic interpretations which are hard even for professionals to deal with. And now you're

asking someone at home to do something with it and you simply may be creating a population of the worried-well. The other thing I worry about, home testing is the idea that one will need to create demand.

When I watch TV – which I don't do very often – I see commercials for pharmaceuticals and think to myself, 'This is horrible.' You can talk to any European that comes here and they see this, and they go crazy. You're pitching a cancer drug where in the disclaimer they talk about what genetic alterations you must have to be a candidate and you're doing this on national television. Really? Is that the place for it? So how the information is conveyed to the patient is critical. And often there is a tension between conveying it in the most impactful way to drive sales and in the most ethical way to get patients to behave well. And I worry a lot about that.

Q **Tell me about your hobby, motocross.**

A Miller: I started racing when I was 15. I'm now 66. I actually got an award last year for racing at the same racetrack for 50 years. I have been doing this for a long time and have 10 broken bones in my body to prove it. It's what I do for fun. My wife keeps telling me I should stop, but after 42 years of marriage she should know that's not happening.