



Biotech Daily

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Daily news on ASX-listed biotechnology companies

Dr Boreham's Crucible: Micro-X

By **TIM BOREHAM**

ASX code: MX1

Market cap: \$125.6 million; **Share price:** 38.5 cents; **Shares on issue:** 359,341,753

Chief executive officer: Peter Rowland

Board: Patrick O'Brien (chair*), Mr Rowland, Yasmin King, Dr Alexander Gosling, David Knox, Jim McDowell**

* Mr O'Brien will step down in favor of Mr Knox in early 2021; ** Mr McDowell rejoins the board on January 1, 2021. He was a director from September 2017 to August 2018, but resigned to be the chief executive of South Australia's Department of Premier and Cabinet

Financials (September quarter 2020): receipts \$1.9 million, operating cash outflows \$2.5 million, cash balance \$15.54 million, quarters of available funding: six***

*** The company has a \$3 million loan facility with the South Australian Government Financing Agency, fully drawn and a half-drawn \$10 million convertible note facility with Thales AVS France.

Identifiable major holders: Perennial Value Management 12.2%, Tiga Trading/Thorney Investments 7.3%, Regal Funds Management 6%.

For smug non-Croweaters who claim the closest Adelaide has got to technical innovation is a pie floater: shame on you.

In the medical device sphere, Adelaide-based LBT Innovations is taking on the world with its automated Petri dish sampling, while Ellex Medical Lasers refined ophthalmology devices.

Now, Micro-X is striving to do the same with its bonsaied x-ray imaging devices that are lighter and more portable than the current standard-of-care.

Based on its patented cold cathode know-how, Micro-X is also pursuing airport security, stroke detection and explosives detection applications - all from its Tonsley HQ and a toiling staff of 23 engineers and scientists.

Micro-X's mobile medical X-ray device, the Carestream DRX Revolution Nano, is already approved and sold in 14 countries, with sales surging this year because of the pandemic.

At the behest of the Australian Defence Force (ADF) the company also developed a "ruggedized" variant, the Rover, aimed at military applications such as mobile army hospitals. The next step is a lightweight computerized tomography (CT) brain scanner for in-ambulance diagnosis of strokes in the crucial first hour when damage can be minimized.

"We are the only cold cathode x-ray technology company in medical devices in the world," says chief executive Peter Rowland. "We have products in the market, we have revenue and multiple new product lines in design and massive addressable markets."

We can do it better

Micro-X was founded nine years ago based on technology acquired from Xinray, a University of North Carolina spin-off company. Originally, the product was to be developed by Xinray but progress was slow - partly because of the different mindset of the academic-oriented Xinray camp versus Micro-X's manufacturing-oriented engineers.

So Micro-X decided to make its own carbon nanotubes (CNTs), focusing on mass producing them with consistent quality.

"Three years ago, we started a research study in Adelaide with some very clever people and got to the bottom of how the carbon nanotubes really work - and it was nothing like in the published material," Mr Rowland says.

Micro-X listed on the ASX almost five years ago, to the day, on December 21, 2015.

Apart from being a proud Scotsman, Mr Rowland is the former chief executive of the aforementioned Ellex and among other positions was business development head of BAE Systems.

Micro-X tech explained ... sort of

X-rays still sound science fiction-y but the underlying technology is little changed since Germany physicist Wilhelm Rongen's accidental brainwave in 1895: a heated filament cathode that generates electrons in a vacuum tube.

These electrons are then accelerated by high voltage on to a tungsten anode target to produce x-rays on impact.

In short, the process is inefficient because a lot of waste heat is produced and the electrons don't all move in the right direction.

Micro-X's cold cathode technique is based on an array of four-nanometer wide carbon tubes, under an electrified fine mesh structure.

While standard CT scanners use only one x-ray source to rotate around an object, these electronically-controlled x-ray tubes enable x-ray beams to be fired from different angles and with no moving parts.

The upshot is the tubes can be made substantially smaller and 95 percent lighter - one kilogram compared with 20 kilograms.

As well as perfecting the tubes themselves, the company is well progressed with engineering work for a high voltage generator, the other key component of an x-ray kit.

"In the old days you would have an x-ray source and a high voltage power supply and you would connect the two with a cable," Mr Rowland says.

With Micro-X's future ultra-light design the generator will be integrated with the device.

Good boy, Rover

Rover is a variant of the Nano, a cart-and-detector package for remote and military use.

As with the Nano, the Rovers weigh 95kg compared with 350-600kg for a standard mobile x-ray unit and are more durable and maneuverable.

The Australian Defence Force helped fund Rover's initial development, while Mr Rowland reports "really good progress" with the US military.

"They are waking up to the fact the dream they thought they could never have - full acute x-ray performance in a light unit - is now achievable."

The company won US (510k) device approval for the Rovers in July.

The Australian Defence Force recently tendered out its entire mobile hospital function. The \$300 million turnkey contract was won by Saab Australia, which subbed out the radiology component to Micro-X.

The quantum of the deal is modest – low seven figures – but 'official supplier to the ADF' status will help the company's North America sales efforts.

In September this year, the World Health Organisation bought \$1.4 million of Rovers for relief work in remote Pacific island locations.

Airport screening

Of all the company's planned products, Mr Rowland says self-service airport screening has the most public resonance because almost every flyer has been inconvenienced by a lengthy scanning queue.

"The idea is that travelling life will be more pleasant and that really grabs people."

The airport security push is spurred by the US Transportation Security Administration and its parent agency the US Department of Homeland Security.

In November, the latter agreed to fund Micro-X up to \$US1.5 million (\$A2 million) to design a self-service baggage scanner. Separately, Micro-X is being funded up to \$US2.5 million to design a self-service security portal, in an alliance with Melbourne company Elenium Automation and the Monash University (Monash Art Design & Architecture).

There are more benefits at stake than avoiding the spectacle of beltless and shoeless passengers getting the once-over by over-eager security guards: the TSA spends \$US3.8 billion a year on security staff, so if it can even halve this number that's a couple of billion more to prop up the nation's creaking budget.

The company also won two contracts with the British Government's transport department, under its Future Aviation Security Solutions program. These deals pertain to funding the development of lightweight x-ray imaging for detecting explosives hidden in consumer devices.

Stroke me, stroke me

Called Tomo, the ring-shaped stroke imaging device would be small and light enough to be standard kit in ambulances.

"The brain [device] is the singularly most exciting thing we are doing," Mr Rowland says.

"It's going to be such a simple product to have a CT scanner rugged and small enough and cheap enough to be fitted in every ambulance."

He notes that if stroke victims don't get treated within the first hour - dubbed the Golden Hour by medicos - they will end up with some permanent disability.

Micro-X's challenge was to replicate the imaging performance of the current standard of care, an eight-slice helical, or spiral, CT scan.

"We have managed to do that and we think we can do one better, with ability to diagnose a one millimetre bleed in the hardest place in the brain to find it," he says.

The federal government's Medical Research Future Fund (MRFF) funded the initial concept development phase.

The company is now “breathlessly waiting” to see if it will receive full development funding from the Australian Stroke Alliance, ultimately funded by the MRFF’s second phase of its Frontier Medicine Program.

Mr Rowland envisages each machine would cost \$100,000, which compares with the potential \$150,000 cost to the health system of treating a stroke patient with high permanent disability resulting from delayed diagnosis.

“If you save one person from a high-level disability you are ahead for the year,” he says.

And in some (non) exclusive news ...

Micro-X attributes its early sales momentum to its tie up with its worldwide distributor, Carestream Health Inc (formerly Kodak Medical Imaging).

Carestream and Micro-X struck a five-year exclusive agreement in 2016, but in November this year the deal was modified to allow Micro-X to sell directly or via other agents. The philosophy behind this is that the radiology profession is conservative and resists change, so if more parties are trying to sell novel devices it will help to raise awareness to the benefit of everyone.

“A lesser company would have hung on to exclusivity for as long as they could,” Mr Rowland says.

A five-year head start

Mr Rowland says that while the company is the clear leader in cold cathode x-ray tech, potential rivals are nipping at its heels.

Probably the closest is the Nasdaq listed Israeli company Nano-X Imaging, which soared to a \$US3 billion market valuation after its August debut initially valued the stock at \$US200 million. Nano-X is also developing a stationary CT imager, but Micro-X has disputed Nano-X’s claim that it was the first company to perfect a cold cathode x-ray technology.

Mr Rowland reckons Micro-X has a five-year head start.

Finances and performance

Micro-X chalked up \$3.8 million of Nano sales in the year to June 30, 2020, with \$3.3 million of other income from grants and research and development tax refunds.

The Nanos proved popular during the pandemic because they allow for bedside imaging, which reduces the risk of infection resulting from patients being moved from ward to ward.

The company has raised \$31.5 million of equity over the last 12 months: \$16.5 million from a placement in December last year and \$15 million from a placement and rights issue in April and May this year.

The company has a circa \$15 million cash balance, enough to last into 2022.

Since listing Micro-X shares have traded between 56 cents (December 24, 2015) and 10 cents (March 24, 2020).

Any other bright ideas?

Micro-X envisages a product for door-to-door imaging - ideal for aged-care facilities and avoiding the need for patients to go to hospital outpatient clinics.

The company also sees strong prospects in the small animal veterinary market, because vet clinics tend to use the antiquated film-based equipment discarded by hospitals.

The US Army recently invited the company to tender for a vet opportunity - veterinarian, not veteran - pertaining to the x-ray healthcare of bomb-sniffing canines.

The army employs a vast, er, army of dogs for the task. But they have a low attention span and can only work effectively for an hour or so, which means thousands are needed and they're expensive to train.

The company is also developing an imaging camera for one sided-viewing of suspected improvised explosive devices. In 10 seconds, the device can determine whether a backpack contains a bomb or a mouldy sandwich.

The company has just got back its initial test results.

"The images were absolutely spectacular, better than we ever thought," Mr Rowland says.

Dr Boreham's diagnosis:

The company's outgoing chairman Patrick O'Brien describes 2020 as a "truly remarkable year" for the company, which in effect has graduated from a tech developer to a commercial business.

But while Micro-X shares have gained traction in recent weeks, the stock is still off its 50 cents listing price.

One explanation is that in taking its tech in-house, the company has incurred costs not envisaged in its original plans.

"On the other hand, our security is a lot higher because we now own and control the manufacturing process and our patents," Mr Rowland says.

“We are a much better investment proposition as a result of all of those challenges.”
In the mid-term, Micro-X will focus on building Rover sales, securing more regulatory approvals and executing the Saab military contract.

Mr Rowland says the company has reached an “inflexion point” in its development, which is terrific.

It also means Micro-X has no excuses for not racking up meaningful revenue, hopefully before its rivals catch up.

Disclosure: Dr Boreham is not a qualified medical practitioner and does not possess a doctorate of any sort. As a Melburnian he has always been nice to Adelaidians but my they do talk funny, especially when they are going on about Stobie poles and pie floaters.