

with renowned plastic surgeon Michael Flint, exploring how tissue structure could influence wound healing and scar formation from severe burns. (Flint remained a lifelong friend and mentor until his death in 1993.)

Joining the department of anatomy at Auckland University, Merrilees turned his attention to blood vessels and the role of proteoglycans, which bind and trap cholesterol in the artery walls – the trail that led him to V3.

Thomas Wight, whose team has collaborated with Merrilees for the past 13 years, is now seeking funding through federal agencies in the US to develop clinical trials. The initial discovery that V3 helped lay down new elastin was made while Merrilees was on sabbatical with Wight in Seattle.

The potential applications for V3 in cosmetic surgery are huge, but Wight isn't targeting the industry's deep pockets. "I'd like to say we're interested in curing skin wrinkles, but there are a lot more devastating diseases to deal with."

A professor of pathology at the University of Washington for 25 years, he describes Merrilees' strength as the ability to see things other people don't. "Not a lot of other folks are out there targeting the matrix as Merv and I have," says Wight. "It's exciting to uncover something quite unique and I don't think either of us could have done it alone. We're both incredibly passionate; to some extent we're carved from the same mould. It's been a fun journey."

Brent Beaumont, a former Auckland University research technician who worked closely with Merrilees on the cholesterol trials, believes it's possible a V3 therapy could one day be used to vaccinate people against heart disease. "People will build on his idea," he says. "The foundation is laid; now someone has to pick up and run with it."

Supporters say Merrilees has always stayed true to his science instead of tailoring his research to the easy money – even when funding ran so low he lost staff. But millions of dollars of investment capital will be needed to take V3 to clinical trials. Merrilees' patents have only 10 more years to run, but he thinks that's a realistic timeline if the money comes through.

"When you look back at it all, you realise, my god, this is quite a story. Where it will lead to... we think we have some ideas, but we don't really know. But once you know where it goes, it's no longer called research. It's development." +

Room to Breathe

For a small group of New Zealand women with a rare but fatal lung condition, Mervyn Merrilees' pioneering research on heart disease offers an unexpected glimmer of hope.

Day by day, Imeleta Maddox's lungs are running out of space. You can almost feel the effort of each laboured breath – the fight to draw in air and the suffocating sensation of never quite getting enough.

Eventually she'll face being hooked up to an oxygen tank. It would make breathing easier, but it's an admission of defeat that the 45-year-old mother of two is not yet ready to make.

"I refuse," she says. "Once I have it in the house, I'll become addicted to it."

In her living room, the table is laden with sausage rolls and biscuits she's put on for morning tea; a gesture of welcome and normality, but it's cost her. Warily she sits nursing a hot cup and shakes her head.

"I used to be such an outgoing girl; now I just take a day at a time," she says. "I'm glad it's not hereditary or my poor daughter would get it too. It's an awful thing."

In 2005, Maddox went into hospital for minor day surgery. She didn't come out of the anaesthetic until the following morning and spent the next two weeks in intensive care, coughing up blood.

At first doctors thought she'd picked

up an infection during a recent trip to Samoa for her mother's funeral.

Instead, she was diagnosed with lymphangioleiomyomatosis (LAM), an extremely rare lung condition.

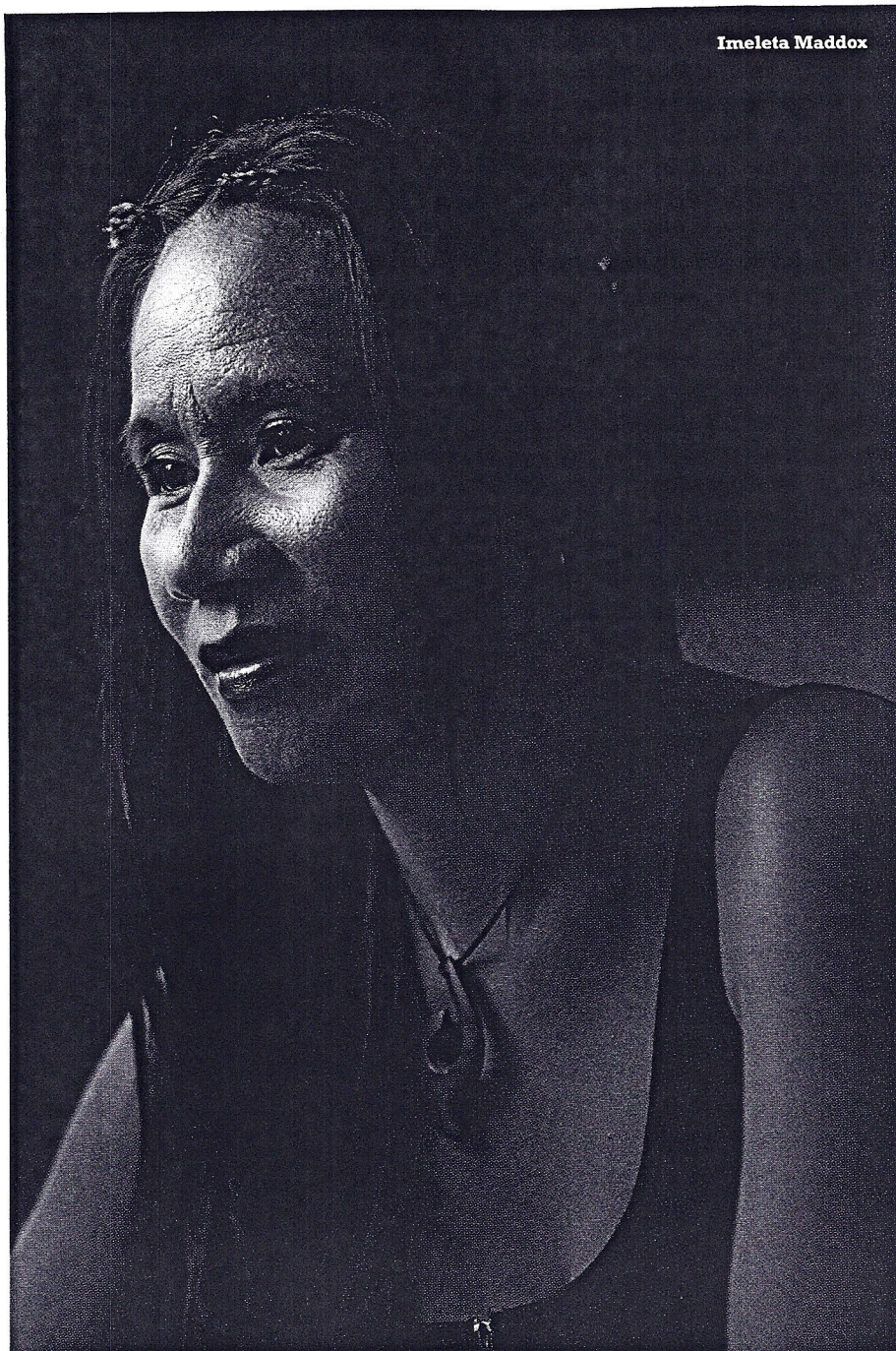
"What the hell is that?" Maddox remembers asking. When they told her, "it nearly knocked me to the floor".

All diseases are cruel but LAM has a particular malevolence. Progressive and fatal, it strikes apparently healthy women in their mid-20s or 30s; a genetic mutation causes muscle cells to misfire and clump in their lungs. Pregnancy seems to accelerate LAM's advance, often triggering early symptoms, and there's no cure – a lung transplant is the last resort. For most, the initial prognosis is less than a decade to live.

Maddox, one of only 21 cases diagnosed in New Zealand, has already survived beyond her doctor's expectations, despite being hospitalised with a collapsed lung.

She gave up her job after suffering panic attacks, but still keeps up with the housework, even if it means sitting down to vacuum, and tries not to worry her kids by letting them see how much she's struggling on family trips out. (She and husband Brett have a 20-year-

Imeleta Maddox



old son, Mason, who's at university studying computer science, and a teenage daughter, Crystal, at secondary school.)

During the past six years, as Maddox's world has shrunk, Bronwyn Gray has been her lifeline. Gray's daughter Lisa was diagnosed with LAM in 1997 at the age of 29, after originally being told she had exercise-induced asthma, a common misdiagnosis. "When Lisa asked what it meant, they said, 'We can't tell you; we don't really know. But it's a disease you will not survive. You won't live to be an old lady,'" Gray recalls. "We walked down the hospital corridor holding

hands and went home and cried."

A former history and English teacher, Bronwyn Gray abandoned her retirement plans and set out to find whatever she could about the little-known disease, setting up the NZ LAM Charitable Trust, which has raised more than \$1 million for international research.

At Auckland University she found an unexpected ally in Mervyn Merrilees. When they met 11 years ago, he'd never heard of LAM either. However, his curiosity was piqued when he found the damage caused by LAM had striking resonance with his own long-running

research into the changes that occur in blood-vessel walls, leading to heart disease. Could the V3 gene, with its ability to rebuild healthy arteries, also restore damaged lung tissue?

In a line of inquiry running parallel with his team's cardiac work, Merrilees is putting that theory to the test, using V3 to drive out the "sticky" proteoglycan molecules that accumulate in LAM lungs, and to lay down new elastin.

"The changes we find in blood vessels now turn out to be in lungs," he says. "The question is, can we get the lung to repair if we put get elastic fibres back in?"

An international study has also shown significant benefit from a breakthrough drug treatment, rapamycin, made from a soil fungus found on Easter Island. The MILES Trial, reported in the *New England Journal of Medicine* in March, showed women taking rapamycin recorded no deterioration of lung function after 12 months, compared to a 12 per cent decline in the control group.

Both Imeleta Maddox and Lisa Gray are on daily doses of rapamycin, funded by Pharmac under "exceptional circumstances" at a cost of \$1200 a month. Jess Van Slooten, a young Christchurch woman diagnosed in 2008, is also on the drug and has started a blog to track her progress (jessvslam.blogspot.com) as she trains to take part in the 84km Bike the Lake cycle race in Rotorua this November.

For Bronwyn Gray, the rapamycin trial results and Merrilees' research work are the first real grounds for optimism since her daughter was diagnosed. Lisa, who's a Family Court lawyer, is now 42. "She's not well, but she's not on oxygen and her lung function is not decreasing. She has – we have – hope now."

Merrilees has spoken at several international conferences on LAM in the United States and describes it as a heartbreaking condition. "When there are not only scientists and clinicians sitting in the audience but also patients with oxygen bottles, that really focuses the mind."

Gray has nothing but respect and affection for a man who has given his commitment to an obscure cause for little reward or recognition.

"For 11 years he has had this hideous disease that kills young women at the forefront of his mind. He is such a human being, this man. He really is. And these are women who want to stay human beings – they want to live. He is my hero." +