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Personalised 'eyevatar' ray-tracing technology unlocking HD-vision

90% of adult patients achieving '20/15' vision or more with next-generation laser eye treatment: NEW AUS RESEARCH

Associate Professor Chandra Bala
New research author, Ophthalmologist & Director, PersonalEYES, *SYDNEY*

What is myopia?
(00:26-00:41)
If you imagine the eyes like a room and light comes in through window, it should fall on the back wall. If it falls in the middle of the room, that's shortsightedness. So, the patient or the individual can see nearby but can't see far away and they need glasses for far away.

What is astigmatism?
(00:44-00:56)
If the eye is like a room and light's coming through the window, the front window should look like a soccer ball. If it looks like a rugby ball, well then now you have two curvatures. And so, it's a more complex situation and that's astigmatism.

How does next-generation, ray-tracing laser eye technology work?
(01:00-01:44)
Ray-tracing laser technology is new. What we do for the first time is we develop an optical model of the individual eye of the patient. We pass about 500 to 700 beams of light through the eye and we can see how the light is behaving in this individual eye. From that, we create an eyevatar of the eye. We can virtually treat the eyevatar of the eye and then present it to the patient for actual treatment. So imagine you're buying clothes. Would you not like to try those clothes before you buy? The same way we try these treatments on the virtual model eye and then apply it to the patient. This is what increases our accuracy and efficacy.

How many Australians are currently living with the common eye conditions, myopia and astigmatism?
(01:47-02:05)

Approximately 1.7 million Australians have astigmatism and close to around seven million have myopia. It is very common in the community, and in fact it's getting more and more common as we are using smart devices and spending more time indoors. It is a real problem for the modern age.

Why is myopia increasing?
(02:08-02:20)
There's been a lot of study and work on why myopia is increasing in society. Children tend to play indoors, they're not being exposed outdoors, they're doing a lot of near work. So, constantly myopia is increasing.

How many Australians are living with astigmatism?
(02:23-02:26)
About 1.7 million people have astigmatism In Australia.

How many Australian adults are suitable for the next-generation, ray-tracing laser eye technology?
(02:29-02:43)
The ray-trace laser eye technology is available to 95 per cent of people who are suitable for laser technology. If people are not, then there are other options as well. And that's the joy of being born in this century.

What is standard 20/20 vision, and how do normal eyes work?
(02:46-02:58)
People would've heard of normal 20/20 vision, which means you're sitting at 20 feet from a target and able to read what a normal person can read at 20 feet. That's how 20/20 vision works.

What are the common misconceptions about 20/20 or 'perfect vision'?
(03:01-03:22)
20/20 people think is perfect vision because that's been the language that has been adopted. But the tantalising possibility is that we could do better. The technology can fine-tune your eye to the next level and take you to 20/10 vision, as double the distance you can see from. And so that's what this new laser technology is about.

How can myopia affect a person's quality of life?
(03:26-03:48)
Myopia can be a real bother. It can affect you in the, in your night driving, in your daytime driving depending upon how bad it is. And if you're way myopic, something like a minus 13 or 14, it becomes a serious issue for you from your safety. You can't open the front door of your house and know who's outside unless you have your contact lenses in. So it can be quite extreme for some people.

How do common eye conditions such as myopia and astigmatism, affect a person playing sport?
(03:51-04:40)
If you're playing sport, you know something that requires very good hand-eye coordination, it can become a bit of a challenge. You can't see the scoreboard at the other end. You can't see where the ball went. You hit the ball and it went away into the ether because you're not able to track it properly. Going swimming is a challenge, because if you wear contact lenses under water you increase your risk of infections. So let me rephrase that. If you wear contact lenses under water, it increases your risk of infection. You can't wear glasses and go underwater. So you have to now purchase special goggles with lenses in them. If you want to go diving for example and you want to see underwater the Great Barrier Reef, these become issues. So spectacles and contact lenses are very common in community, but they are a challenge, if you are a very active person.

Can you reflect on your just-published research involving ray-tracing laser eye technology treatment?
(04:43-05:34)

The research project that I led, and which has just been published, is the largest series in the world of patients who have undergone ray-trace-based LASIK. It has 400 eyes of patients who have followed before surgery and after surgery up to three months. We evaluated this technology to its fullest. Within that research, we found that all patients achieved 20/20 vision, more than half achieved 20/12 and a half, and eight per cent achieved 20/10, which is the "super vision". 40 per cent of patients saw one or more lines better than they had ever seen before surgery. Eight per cent of people whom we treated achieved 20/10. That was unheard of before, we didn't have eye charts that went to 20/10 and suddenly we have to change all our eye charts to get to 20/10.

What is the significance of your just-published new research?
(05:37-06:08)
For the first time we could treat people and take them beyond the 20/20 boundary. Our research was in the real world. We treated 400 eyes. We watched them over three months. We got stable outcomes, and in eight per cent of patients we got as far as 20/10. This is such a small line that we don't generally have eye charts that test that load, so we had to change our eye charts throughout the clinic to even test them at that level. This is a very exciting outcome for us.

What is high-definition, or 20/10 vision?
(06:11-06:33)
High-definition vision, of 20/10, means you are sitting at 20 feet and reading something a normal person can only read from 10 feet. Your vision is 10 feet better. Almost double, literally double than that of the other person. That means every leaf on that tree as you walk by, you can count.

How extraordinary is ray-tracing laser eye technology from a surgical perspective?
(06:36-07:04)
The ray-trace laser eye technology is one of its kind. It is the first time that it has asked surgeons to change their mindset about how laser is done. For the first time, we actually measure the eye fully. We actually care about the structure of the eye of that individual patient and don't assume it. So we can personalise that treatment for that eye.

How does the 'eyevatar' technology work?
(07:07-07:38)
Normally when we do laser eye surgery, we assume everybody's eye is the same. We know the power is different, but we take that power and create a laser pattern and apply it to an eye thinking it's the same as the other person's eye. For the first time, we are able to measure the components of the eye, and put it together as a model, a mathematical construct. To create this model, when this was attempted 10 years ago, it used to take 24 hours of computing to create this model. Now it takes four minutes.

How significant is the next-generation, ray-tracing laser eye technology?
(07:41-08:01)
The ray-trace laser eye technology is transformative. Is for the first time, it's made us rethink the design of the laser pattern of what we want removed, and how we can customise it, almost to the same extent as each person's fingerprint is different. The laser eye treatment is different for each eye.

Chris, 42

Accounting firm MD, soccer player & father-to-two who wrestled with blurry vision for almost two decades, *SYDNEY*

When did you first notice your failing eyesight?
(08:09-08:35)
I noticed at first when I was at university, so there was quite literally overnight, there was a day where I was sitting in a seat in a lecture theatre looking at a screen that was maybe 20 or 30 metres away. The next day when I came back, I sat in the same seat and I couldn't see the words on the screen. So that was the first signal that my vision was deteriorating.

How old were you when you first noticed the deterioration in your eyesight?
(08:38-09:08)
I was twenty-three years old when I first noticed that my eyesight was getting worse, and it made me suspect that I needed glasses. Uh, and I basically was waiting for that day to occur because both of my parents wear glasses and a lot of people around me wear glasses. I spent a lot of time studying at university, reading books close up, and it was maybe a bit of an inevitability for me that I thought that I would eventually hit that wall.

Who diagnosed you with myopia and astigmatism?
(09:12-09:20)
Initially I was diagnosed with myopia and astigmatism by an optometrist that I went to see who sent me a prescription to correct it.

How would you describe your myopia and astigmatism symptoms?
(09:23-09:40)
Myopia and astigmatism causes your eyesight to blur on details that are far away. So I was okay if a book was up front, close to my face, but the further away that it got, the more fuzzy and blurry the details became.

What way, if any, did your myopia and astigmatism affect your day-to-day life?
(09:43-10:28)
Living with astigmatism and myopia affected my daily life because I really couldn't go out or even wake up in the morning without reaching for my glasses. I had to have some kind of assistance to see clearly, and if I was playing sport, which I often did, I would need to wear contact lenses. Otherwise, I simply didn't have the confidence to perform the way that I would've without the myopia or astigmatism. It also affected my confidence in driving, for example, so I'd make sure that I either had my glasses or my prescription sunglasses on when I was driving my car to make sure that both myself and everybody in the car were safe.

What aspects of your work were most affected by your myopia and astigmatism?
(10:31-10:44)
My myopia and astigmatism affected my work because the computer screen, which often has very small text and detail on it, uh, that's important to me in my work, I couldn't see it anymore.

For how long did you live with myopia and astigmatism?
(10:47-10:59)

So my myopia and astigmatism stayed with me from the age of twenty-three until the age of forty-two, which is what I'm now. So a few months ago I had the surgery done, and that's when it ended.

How challenging was it to play soccer while living with myopia and astigmatism?
(11:03-11:22)
Playing soccer with myopia and astigmatism was challenging because if I forgot my contact lenses and I didn't have a spare one in the bag, I would have to hope that there were no long balls coming my way. Uh, because my vision from far away was quite blurry.

What prompted you to finally seek a permanent solution for your myopia and astigmatism?
(11:26-11:48)
The reason why I ultimately sought a permanent solution to my myopia and astigmatism was because of my mate Dave, who had the exact same procedure done maybe a couple months or a few months before me, and encouraged me to go and get that done at the same place that he'd had it done at.

How did you determine the most suitable treatment option for your myopia and astigmatism?
(11:51-12:25)
The way that I determined the most suitable vision correction treatment option for me was, first of all, listening to the pre-screening optometrist who told me that I was eligible, gave me a set of contact lenses to trial. I trialed those lenses. They weren't exactly what I was looking for. So I spoke to the doctor to make sure that they understood what outcome I was seeking from the ray-tracing procedure.

The outcome that I was seeking from the ray-tracing procedure was simply to be able to see as if my glasses were on, but they were off.

How did you feel a week after undergoing permanent laser vision correction?
(12:29-13:10)
About a week after I had my surgery, I picked up my glasses and my spare glasses and my contact lenses and my prescription sunglasses and threw them in the bin. And it was at that point that I realised that these things that I used to have to wake up every day and hunt for otherwise I couldn't function, were no longer a part of my life. And it's almost like it was almost like a, a, a new phase of my life where I wouldn't be subjected to these daily reminders of my deteriorating eyesight anymore.

Why appealed to you about undergoing next-generation, ray-tracing laser eye technology treatment?
(13:13-13:26)
The thing that was so appealing to me about the ray-tracing procedure was simply the ability to not have to wear glasses or prescription sunglasses or contact lenses anymore.

How does it feel to be free from myopia and astigmatism?
(13:29-13:44)
I just feel normal now. I don't feel any different like I did with glasses where I had to wake up every day and search for my glasses or make sure I didn't knock them off the bedside table. It just makes your life easier.

What is your eyesight like nowadays on the soccer field?
(13:48-14:00)
So now after the procedure, I have a lot of confidence on the pitch because I can see everything clearly. Even if it's a ball that's down the other end, you know, 90 metres away from me, I can see it pinpoint.

What professional challenges that you previously encountered while living with myopia and astigmatism, have now resolved?

(14:03-14:24)
The computer screens are no longer blurry. Uh, the contracts are no longer hard for me to read at arm's length. There's no challenge on looking at lecture screens or at teaching from a lectern to notes. Uh, and I don't have to wear glasses when I go to events anymore, which is helpful.

How precious do you consider your eyesight?
(14:27-14:46)
You only realise how precious your eyesight is when you can take your glasses off and chuck them in the bin and realise that you don't need them anymore. Well your eyes are the, you know, the, the lamp to your soul. So they are the most important sense that a person can have.

Maddie, 21
Aspiring flight attendant who wrestled with poor vision for more than a decade, *SYDNEY*

What common eye conditions were you living with?
(14:54-15:11)
I was shortsighted in one eye and long-sighted in the other. Um, so it really did affect me when I was driving, um, when I was working, and even on my glasses, I had one thicker lens. So yeah, it was quite, um, made me feel a bit insecure at times.

How challenging was it to live with myopia (shortsightedness) and hyperopia (longsightedness)?
(15:14-15:27)
It was quite challenging, especially when I was driving. It was very hard for me to look at signs. Um, especially as well when oncoming traffic, the lights would like be really glared like, cause a lot of glariness.

What prompted you to finally seek medical attention, and when did you do so?
(15:31-15:39)
I was getting a bit, um, fed up with wearing glasses and contact lenses, and I just was looking to a way that I could get out of them.

Who diagnosed you with your eye conditions?
(15:42-15:53)
I booked in a consultation in with Dr Chandra Barla. Um, and from then he did tell me that I was, uh, shortsighted in one eye and longsighted in the other, and recommended ray-tracing eye technology.

How did it feel to live with two eye conditions?
(15:56-16:06)
I was really worried, um, when I was behind the wheel, uh, just because I felt like I wasn't able to see really clearly. Um, it was, just brought out my anxiety a little bit more.

In what way did your eye conditions affect your day-to-day life?
(16:09-16:24)
If I was needing to read something, it was quite difficult, um, especially when working. I was looking at a computer screen for about six, eight hours, um, and I really had my head into the computer screen, so, and it was very blurry for me. Um, so that was quite difficult.

Were your friends aware of your poor vision?
(16:27-16:42)
Just mostly when I wore glasses, they would kind of realise, oh, oh yeah, that's right. Like, you know, you can't see without them. 'Cause I would kind of walk around blind to be honest when I wouldn't wear them. Um, so that was, yeah, I guess in a way it was kind of a running joke at times.

What prompted you to finally seek medical attention for your eye conditions?
(16:45-16:50)
I just kind of got fed up with wearing glasses and contacts and wanted a, a way to get out of them.

How did Dr Chandra Bala determine ray-tracing laser eye technology treatment was right for you?
(16:53-17:01)
Dr Bala, uh, did some measurements for me, um, and then came to realise that I actually did need the surgery.

How did you feel the day after undergoing personalised, ray-tracing laser eye technology treatment?
(17:04-17:11)
The day after surgery, I saw a sign on the road while we were driving and it was from far and I was like, wow, I can see this. Like I can read it.

How are you feeling today?
(17:14-17:22)
Uh, really happy feeling, really confident. I just feel like me again. I feel like I'm able to pursue my career, which is to become a flight attendant.

What is the role of your glasses and contact lenses these days?
(17:25-17:30)
So my glasses and my contacts all packed away, thrown in the bin, never see them again.

What is your message to other adult Australians living with a common eye condition who may be considering undergoing laser eye treatment?
(17:34-17:45)
There's always ways that, um, you can improve your vision. Um, so if, if you are looking into doing something like that, definitely um, give it a go. Give it a shot.

OVERLAY: 17:48 – 27:01

TIME CODE	DESCRIPTION
17:48 – 18:29	PersonalEYES – Right eye 'eyevatar' example
18:29 – 18:44	Animation of pupil in green eye dilating
18:44 – 19:13	Extreme close-up – Woman opening eyelid for an eye scan. Technological eye scan diagnosing woman with astigmatism
19:13 – 19:20	Extreme close up – Blue eye technology measuring coordinates of eye
19:20 – 19:31	Close up – Looking through optical trial lens frames with eye chart in background
19:31 – 20:09	Close up – Flashing pairs of eyes featuring diverse group of individuals
20:09 – 20:20	Close up – Woman with blue eyes looking into camera, lit by sunlight
20:20 – 20:23	Mid shot – A/Prof Bala greeting Chris (patient), shaking hands and entering PersonalEYES clinic
20:23 – 20:31	Wide shot – Chris and A/Prof Bala walking down corridor towards camera. A/Prof Bala inviting Chris to enter consultation room
20:31 – 20:41	Wide shot – Chris and A/Prof Bala entering consultation room and sitting down
20:41 – 20:50	Mid Shot – Chris placing his chin on diagnostic eye equipment, followed by A/Prof Bala examining Chris' right eye
20:50 – 20:55	Close up – A/Prof Bala positioning and adjusting eye equipment
20:55 – 21:03	Close up – A/Prof Bala examining Chris' right eye, lightly opening his eyelid while a light shines into it
21:03 – 21:06	Close up – A/Prof Bala looking into diagnostic eye equipment
21:06 – 21:11	Extreme Close up – Scanning Chris' right eye with blue light
21:11 – 21:18	Mid shot – A/Prof Bala passing Chris a white eye instrument to look through
21:18 – 21:22	Close up – Camera panning across eye chart
21:22 – 21:32	Close up – Chris looking through white eye instrument and reading A/Prof Bala all letters on chart in front of him
21:32 – 21:42	Close up – A/Prof Bala speaking to Chris and asking him to attempt to read the bottom line on the eye chart
21:42 – 21:46	Close up – Chris looking through the white eye instrument and continuing to read aloud the letters on the eye chart
21:46 – 21:57	Mid shot – A/Prof Bala instructing Chris on what to do while Chris continues looking through the white eye instrument
21:57 – 22:22	Close up – A/Prof Bala performing ray-tracing laser eye technology procedure on patient; placing pads and a speculum on/near the patient's eye to keep it open
22:22 – 22:28	Extreme close up – A/Prof Bala moving the laser down to touch the patient's eye
22:28 – 22:34	Close up – A/Prof Bala looking through eye instrument
22:34 – 22:42	Wide shot – featuring screen showing technology in action
22:42 – 22:54	Mid Shot – A/Prof Bala and technician looking at TV screen showing pupil
22:54 – 23:04	Wide shot – A/Prof Bala using laser on the patient's eye
23:04 – 23:11	Camera focusing on the TV screen showing laser working on the patient's pupil
23:11 – 23:30	Mid shot – of A/Prof Bala removing white pads and speculum from the patient
23:30 – 23:39	Mid shot – Chris walking into his home office with a laptop, opening book and phone on his desk, beginning to work
23:39 – 23:51	Close up – Camera panning from Chris' chest to his face while he works on laptop

23:51 – 24:01	Extreme close-up – Chris' eye shifting from side to side while working on laptop
24:01 – 24:12	Mid shot – Camera panning from open book to Chris working on his laptop
24:12 – 24:19	Close up – Chris' hands typing on his laptop keyboard
24:19 – 24:28	Mid shot – camera panning left to right with Chris working on his laptop
24:28 – 24:35	Close up – Chris working with eyes shifting to different parts of his screen
24:35 – 24:48	Mid shot – Chris walking over to sofa, sitting down, opening his book, and reading it
24:48 – 24:55	Close up – Camera panning to Chris's face, reading his book
24:55 – 25:01	Close up – Camera panning from the open book to Chris reading the book
25:01 – 25:07	Close up - Camera panning back to Chris's face while he is reading the book
25:07 – 25:09	Extreme close up – Chris reading book
25:09 – 25:17	Wide shot – Chris bouncing a soccer ball on his feet
25:17 – 25:28	Close up – Chris dribbling soccer ball on oval
25:28 – 25:43	Wide shot – Chris running with soccer ball, shooting for goal, then dribbling the ball from foot to foot
25:43 – 25:46	Mid shot – Maddie sitting, smiling, scrolling and typing on her phone
25:46 – 25:49	Close up – Camera focusing on Maddie's hand while scrolling on her phone
25:49 – 25:54	Close up – Camera focusing on Maddie's face while scrolling on her phone
25:54 – 26:12	Mid shot – Maddie sitting down, taking headphones above iPad, placing them on her head, and tapping on iPad
26:12 – 26:19	Close up – Maddie scrolling through iPad, selecting and tapping on a video
26:19 – 26:27	Close up – Maddie watching and listening to a video on iPad in front of her
26:27 – 26:37	Close up – Maddie placing her head in front of ray-tracing technology device, looking forward
26:37 – 26:48	Close up - Maddie's eye displayed on screen while eyecare professional steering ray-tracing technology towards Maddie, examining her eye
26:48 – 26:52	Close up – Eyecare professional examining 'eyevatar' on screen
26:52 – 26:54	Extreme close up – Maddie looking into ray-tracing technology device
26:54 – 27:01	Mid shot – Eyecare professional and Maddie with ray-tracing technology device

ends#

For more information regarding this VNR, please contact:

Kirsten Bruce & Millie Chamberlain, VIVA! Communications
M 0401 717 566 | 0404 568 615
T 02 9968 3741 | 02 9968 3741
E kirstenbruce@vivacommunications.com.au | millie@vivacommunications.com.au