00;00;00;00 - 00;00;28;10
Cale
Welcome to Grin + Bare It, a show that uncovers the remarkable stories from one of the most demanding industries in the world - healthcare. From inventors and trailblazers to frontline workers and scientific experts, we explore the biggest challenges faced in healthcare and how these brilliant people have solved them. I'm your host, Cale Donovan, an award-winning entrepreneur and co-founder of Bare, one of Australia's largest end-of-life providers.

00;00;28;13 - 00;00;55;18
Cale
On today's episode, we're speaking about epigenetics. Epigenetics is the study of how cells control gene activity without changing the DNA sequence. Currently in pop culture,there’s a lot of conversation on epigenetics and it’s usually followed up by a supplement ad or a self-serving fitness program. I wanted to understand the science of it from one of the world's leading experts. I'm speaking with Professor Sarah Cohen-Woods from Flinders University.

00;00;55;20 - 00;01;19;13
Cale
Sarah has worked alongside some of the giants in the field of genetics, including Peter McGuffin, Sir Michael Rutter and Robert Plomin. She is now leading the behavioural, genetic and Environmental Mechanisms Lab at Flinders. For all her achievements in the scientific realm, Sarah is incredibly humble and honest about her journey through academia. On the show, we discuss why epigenetics is so important.

00;01;19;18 - 00;01;36;12
Cale
The complex relationship between nature and nurture, the ethical issues around DNA sequencing, and the challenges of pursuing professional goals whilst raising a family. Another amazing guest, let's get to it.

00;01;36;15 - 00;01;39;09
Cale
Sarah, thanks for joining Grin + Bare It.

00;01;39;10 - 00;01;41;09
Sarah
Absolute pleasure. Thank you for having me on here.

00;01;41;14 - 00;01;53;28
Cale
No problem at all. So let's set some context. First up, I would love you to describe what is the field of epigenetics. And then also specifically describe the research areas that you're focused on within that.

00;01;54;01 - 00;02;20;26
Sarah
No problem. So epigenetics is an interesting one because it's something that a lot of people I think have heard the term and the phrase, but may not fully understand what it actually is. So I might first start off, okay, with you just to explain what it is. But very simplistically put, the way I encourage my students, my staff, you know, new people in the area to think about it is if you've got your DNA code, which people are more familiar with, that's very static.

00;02;20;28 - 00;02;42;16
Sarah
That's like a musical score. So think about the musical notes, you've got on a page, that's your DNA code. The notes are written down and also the speed and that sort of thing. However, how those notes are expressed. So the expression of those notes, that is where your epigenetics comes on. So epigenetics is something literally called above the genome.

00;02;42;18 - 00;03;04;17
Sarah
And it's got to do with turning your DNA code on or off and changing how the genes or your DNA code is expressed. So where you've got this musical score with your DNA code, the conductor who informs his wonderful orchestra how to play, that demonstrates the epigenetics, the expression of that DNA code. So that's what epigenetics itself is.

00;03;04;19 - 00;03;36;12
Sarah
And sometimes people can confuse epigenetics and genetics, but genetics is very static. Your DNA code is your code. Epigenetics can be dynamic. It's changeable. And because of that, that means the environment can influence your epigenetics and how your genes may be switched on and off. And that's where my work comes in. So I do a lot of work around the genetics of behavior, broadly speaking, in particular at the moment around eating disorders, disordered eating, depression, psychoses, but also how the environment can influence your genetic risk.

00;03;36;12 - 00;03;56;17
Sarah
So somebody with a high genetic risk may not necessarily go on to develop a condition. And that might be dependent on environmental exposures and experiences. And that is what then can result in a condition developing. And that might be through epigenetic mechanisms where you've got these other mechanisms happening on top of your DNA code that switches genes on and off.

00;03;56;21 - 00;04;18;13
Cale
An interesting analog, I never thought about it in that way, which is the conductor and the environment in which you put the conductor of your genetics into completely changes the way

that they may operate makes complete sense as you describe that. A big question I pose to old guests is a little bit of the so what? Why is this problem we're solving?

00;04;18;13 - 00;04;28;15
Cale
Why is this research you're committing your life to worth doing? Can you give some insight into the impact that understanding this effectively can have on us as humans?

00;04;28;21 - 00;04;46;06
Sarah
Yeah, absolutely. It's what I call the so what, who cares question. And it comes front and center to a lot of the stuff that we have to do. And it's probably one of the most common comments I say to colleagues is say what? Who cares? Make your case. So I have a lot of sympathy for that phraseology. Yes, I do “So what?

00;04;46;07 - 00;05;07;29
Sarah
Who cares?” I would say in this area it's very, very broad, very, very wide. So even just starting on the genetic risk side before we even go to the epigenetic risk, it's about identifying individuals who may be at risk of developing particular conditions. And if we're able to do that, maybe we can better target interventions. Early intervention is absolutely key in mental health.

00;05;08;01 - 00;05;32;14
Sarah
And so that is something that genetic research is able to, hopefully long term be able to achieve. But in addition to that as well, with the epigenetic knowledge as well as the genetic knowledge, it's about mechanisms. So for example, we're trying to have a look at epigenetic correlates of adolescence. So teenage disordered eating. So when kids engage in disordered eating patterns between, you know, 14 and 20.

00;05;32;14 - 00;06;10;24
Sarah
So in their adolescent years, it's a really important developmental period. But we also know that adolescent or teenage disordered eating is correlated with all sorts of other physical and mental health outcomes down the track. So we're trying to understand, you know, what epigenetic impacts may be occurring and how that may explain some of these correlations and, you know, be leveraged in the future to predict those who may be at risk of going on to develop a range of conditions, from changed bone mineral density to blood pressure issues to mental health challenges, a whole range of conditions so it can be leveraged in that sort of way.

00;06;10;26 - 00;06;30;09
Sarah
But a key thing as well, of course, is scientific knowledge. I worry a little bit about the so what, who cares question as much as I do. I've had it drummed into me through our funding system in

particular, but I worry a little bit about it because without basic science you won't reach the So what? Who cares? There are some times we just need to know.

00;06;30;10 - 00;06;46;08
Sarah
Sometimes it's just knowledge, and it's that knowledge that will create that massive step forward. But we can't necessarily predict now where it will go. So knowledge and yeah, and real, real impact I think in prevention and early identification down the track.

00;06;46;11 - 00;07;15;13
Cale
I've, I've always been incredibly intrigued actually by academia and even the comment you made there on the justification of the research that happens. Sometimes the justification is just we need to set the foundation for maybe something that could be hugely valuable in future. And so before we jump into some of the specific research that you've done, I would love to know your personal background and why you're so passionate about this particular area.

00;07;15;13 - 00;07;16;27
Cale
How did you find yourself here?

00;07;16;29 - 00;07;35;11
Sarah
It was a bit serendipitous, actually. I distinctly remember I finished I did my university degree at Leeds in the UK, and I remember sitting in the computer room because back then we had computer room and, you know, thinking, oh my God, what am I going to do with my life, you know, well, it's like everybody wants to be a clinical psychologist.

00;07;35;11 - 00;07;59;11
Sarah
Of course, I wanted to be a clinical psychologist. So what's my next step? And I came across an advert in a paper, British Psychological Society bulletin. It was a paper, and it was for a master's and PhD opportunity at the Institute of Psychiatry in London, which is now the Institute of Psychology, psychiatry, neuroscience or psychiatry, psychology and neuroscience.

00;07;59;15 - 00;08;20;04
Sarah
And the due date was my birthday. And just on a whim, I decided, yep, let's — I think I, a day's notice, I'm going to apply for this. This is really cool because the PhD was all around genetics and environment and nature and nurture, and in my psychology degree there'd been quite a bit of nature versus nurture. I mean, obviously acknowledgment that we're moving away from that.

00;08;20;04 - 00;08;44;04
Sarah

But I still felt like the stuff I really enjoyed was the biology side of psychology, and that the sociological side or the social psychology was massively engaging, but it just wasn't integrated. So this was a real catch all for me. So I was very excited. So I applied for that, somehow got through to an interview. I remember sitting on that sofa where Peter McGuffin, Robert Plomin, and I think it was actually on Cassidy.

00;08;44;05 - 00;09;16;19
Sarah
So all the big names were interviewing me. So it's marginally terrifying as a 21 year old, and I remember getting the call that I'd been selected when I was driving back up to Leeds, and it was just, yeah, it was a big surprise. I didn't expect to be successful, but that really laid the foundations, I think, and it was a great program and I worked with all the greats and I had fantastic opportunities that they afforded me really amazing opportunities and being in the UK, great opportunity to travel as well because it's, you know, relatively affordable back then and they were able to support a lot of that.

00;09;16;19 - 00;09;28;17
Sarah
So yeah, I was very, very fortunate. I worked with a lot of fantastic people. I moved to Australia in 2012, largely for family reasons, and it's a great country.

00;09;28;17 - 00;09;30;29
Cale
You don't have to say that. So ironically, by the way.

00;09;31;01 - 00;09;51;20
Sarah
Oh, I totally know. I would never I would never leave Australia, I love it. It's a great place to have children and it's just a fantastic place to live. But honestly, but it's probably from a work perspective it's probably a bit harder going. There's less resources, I think. And also, you know, my connections were all elsewhere, but I've had a fantastic time developing my lab.

00;09;51;20 - 00;10;05;01
Sarah
I moved to Flinders in 2016, so for about eight years and yeah, we've been going from strength to strength. So I don't know if that really answers your question or I deviated, but I don't know what there isn't to love about this area. So bringing together of life, right?

00;10;05;07 - 00;10;20;18
Cale
I think you've summed it very well by saying exactly that which is incorporated everything that you are particularly passionate about. In one line of study, I'm going to take a detour. Nature versus nurture. Talk to me about that. What's your point of view on nature versus nurture?

00;10;20;21 - 00;10;43;14
Sarah
Well, there is no versus, is there? It's not a fight between the two. What I always say is, you know, you don't exist as a bunch of genes. You're not just a blob of DNA, but you also don't just experience your environment without your self, your biology, its nature and nurture. I think my Twitter handle something like nurture of nature I think might have been I tried the nature of nurture, but someone else had it.

00;10;43;16 - 00;11;02;09
Sarah
But I think that sums it up. It's about the combination of the two. There is no versus. You can't have one without the other. And really it's it's the concert and the movement between the two that create the outcomes we have. So me taking you on a perhaps a little detour, you know, I always say to people, think about your genetic risk for a condition such as depression.

00;11;02;09 - 00;11;22;14
Sarah
Depression is very common, you know, a 20 to 25% prevalence. And what you find with these conditions, different individuals may have similar life experiences but not go on to develop depression. So why does one person and not the other say, if you think about the person having a whole heap of marbles in a jar – you've got a jar,

00;11;22;20 - 00;11;42;16
Sarah
and those marbles represent the genetic risks. One person may have more marbles than the other person because they're at a greater genetic risk. Relative to the other person, and then you give them environmental challenges represented by water or grains of sand. And what you find is the person with more marbles in their jar. It'll take less time for them to reach the top and overflow.

00;11;42;18 - 00;12;05;00
Sarah
And that's example of how nature and nurture are working together, not alone, to precipitate these behaviours and these, you know, mental health outcomes as well as, I mean, it's absolutely applicable to physical health outcomes as well, the gene environment thing. And so it's not nature versus nature and nurture. It's absolutely nature and nurture, or nature of your nurture, or nurturing your nature.

00;12;05;02 - 00;12;27;19
Cale
The tongue twister say that three times over and over. So to clarify then it's not nature versus nurture. It's a combination of both. But what I interpret is that the combination can vary depending on what condition or what sort of attribute we're talking about. It can be 10/90, it can be 40/60, can be whatever sort of split.

00;12;27;19 - 00;12;34;13
Cale
And it's completely dependent on time as well. When you're experiencing your environment, would that be a fair summation?

00;12;34;18 - 00;12;59;16
Sarah
Yeah. So you've definitely brought in some other really important concepts. So starting with a time one actually developmentally there are absolutely developmentally critical periods. And that's something we're doing some work from the epigenetic perspective to look at, you know, whether there's particular critical periods that correlate with epigenetic changes in the blood of individuals in adulthood, if they've experienced stressors at particular times in their early life.

00;12;59;16 - 00;13;18;14
Sarah
And that was in collaboration with a group over at Harvard. And yeah, we certainly found evidence for that. That was in the context of predominantly socio-economic factors that we found predicted that. But equally to the developmental point, you talked about it's condition-dependent. And you're absolutely right. When I was talking about the jars, I was talking about individual dependance.

00;13;18;14 - 00;13;40;13
Sarah
So different individuals have different numbers of marbles depending on the genetic risk that they are harbouring for a condition. But equally conditions have different what we call heritability estimates. So that means the variance in that condition that we attribute to genetic factors, say some conditions are highly heritable, like bipolar disorder and schizophrenia. They have heritability estimates of 80%.

00;13;40;13 - 00;14;05;27
Sarah
And I could talk to you for hours about how that, how we've come to that, I'll save you that. But then you've got conditions such as depression, which may have her– or does have heritability estimates that are lower, or 42 to 55%, and what's that saying? Is that the influence, I guess, of the environmental and non-genetic factors is greater than what it may be in the context of some of these other conditions, which are much more highly heritable.

00;14;05;27 - 00;14;07;03
Sarah
Does that make sense?

00;14;07;06 - 00;14;31;16
Cale

Makes, makes complete sense to me, for sure. I would, and I would love to spend that other hour, two hours, three hours unpacking specific things because I find it so intriguing. Wanting back to some of the practical implications, like in your research and some of the breakthroughs that you hope to make or have made, what do you think the implications are on the healthcare system of your research findings in and around epigenetics?

00;14;31;19 - 00;14;52;08
Sarah
Interesting question. I like the phrase healthcare system, not healthcare, because I think they're two different things, right? So if you're thinking from a healthcare perspective, I would hope that some of the things that we're doing, you know, will aid an early intervention. So early identification of individuals who are at risk and enable us to target our interventions optimally and early to prevent a condition.

00;14;52;08 - 00;15;24;24
Sarah
Prevention is always better than a cure. But in addition to that as well, understanding the mechanisms through which conditions developed. So by understanding the biology or genetics or epigenetic factors, for example, using the disordered eating again as an example, by understanding the biological effects and consequences of periods of disordered eating in a very important physical development period, we're able to hopefully better design treatments in the future and also again, identify those people at risk of, you know, other poor health outcomes.

00;15;24;24 - 00;15;45;16
Sarah
I try and avoid the phrase bad. So there's, there's that sort of side of it. But when you say system, I think that's a really interesting question, because I would hope that long term, the sort of work that we're doing has [the] capacity to save money for the system. And through prevention, actually, rather than cure by early identification, hopefully you'll stop people getting ill.

00;15;45;16 - 00;16;07;02
Sarah
And, and when you do that, you really reduce the burden on a health care system. Now, as much as there's wonderful things that come from our work, you know, genetic risk, identifying genetic risk, understanding how the environment modifies that genetic risk. As scientists, it's important for us not to be naive of misuse of science as well. And that can also happen in the context of healthcare settings.

00;16;07;02 - 00;16;28;06
Sarah
And there are some things I'm really conscious of. One is I haven't explained to you what a polygenic risk score is, but very simplistically, we're able now to calculate somebody's genetic risk burden, if you like, for a range of conditions. And that's just adding up all the different

genetic variants you may have. that puts you at risk for something such as schizophrenia, for example.

00;16;28;09 - 00;16;51;21
Sarah
But the issues and the concerns that can exist is that people might start to try and do embryo selection on the basis of something such as polygenic risk. But the key word of polygenic risk is risk, which is something humans are really bad at understanding. But it's not definitive. These aren't single gene Mendelian conditions where if you have a variant, you're going to get that condition.

00;16;51;23 - 00;17;12;21
Sarah
It's a risk. So then you start coming into a real ethical quagmire. If you start trying to use these polygenic risk goals to, to– for embryo selection and such, like there's certainly been talk around that. And I think that we've got to acknowledge that there's a risk of misuse for that. And that's something I would never condone and, you know, let alone the phenotype.

00;17;12;21 - 00;17;29;17
Sarah
So, the, the conditions that people might select and in addition to that is the whole issue of genetic discrimination, which our genetic identifier identification could result in as well. So there's a lot of positives, but we need to be aware of those cautions as well.

00;17;29;23 - 00;17;51;16
Cale
I want to unpack that a lot. I'm actually going to do it a little bit later in the conversation as well, because I know it's an area of interest for you. This podcast is focused a lot on people overcoming specific challenges, and I would love to hear, the most challenging thing for you personally about undertaking this type of research?

00;17;51;18 - 00;18;15;22
Sarah
Look, I think, honestly, if I'm honest with you, it's, it's family, right? I am a mother, I have two fantastic kids. They are now getting older, so in some ways it makes it easier. In some ways it makes it harder because we're at that fun adolescence stage. And I can't speak for men and what they feel. But certainly as a woman, you feel a lot of pressure that you've got to be a present mother, you've got to be a good mother, but you've also got to be a present worker.

00;18;15;22 - 00;18;41;10
Sarah
And you've got to be an exceptional worker, actually, in our field to, to obtain funding, I mean, success rates are 10%, if you're lucky, a little bit more. And so it's extremely challenging in that regard. So I think for me the greatest challenge has been trying to navigate that and have a

really good, positive time with my children and family life, whilst at the same time kicking the goals that I need to be kicking at work because you can't drop the ball.

00;18;41;10 - 00;18;48;06
Sarah
Once you start dropping the ball, you will never be able to pick it up again because you will never get that funding. And so I'd say that's the trickiest thing.

00;18;48;12 - 00;19;02;21
Cale
I would have a guess. You're not alone at all there, Sara. On that particular challenge, I would love to hear how you overcome it. How do you approach that type of challenge? Any tips that you have there for trying to achieve both?

00;19;02;29 - 00;19;24;13
Sarah
Well, there's a few things. One is finding a good, supportive work environment. So I think I have been really privileged with my time at Flinders, with my managers. They have been fantastic, and very supportive in some cases in similar life stages, which is extremely helpful. The other thing is I also try and practise what I preach in my lab, so I normalise the challenges I have.

00;19;24;13 - 00;19;41;12
Sarah
I will not pretend I have to run off for a meeting. I will say, oh, the school just called my child sick. I've got to go, you know, normalising that side of things for my people in my lab. And then as for how to manage it, sometimes I feel like I'm not. I won't lie, you just keep going, right?

00;19;41;12 - 00;19;58;03
Sarah
And do the best you can. I do a lot of work in the evenings, but I'm hesitant to condone that because it's probably not the healthiest approach and I have a supportive partner as well. You know, without him, I wouldn't be able to go on my conferences and my neighbours and my other family members. You know, we're very fortunate.

00;19;58;03 - 00;20;08;26
Sarah
I think, and in my field as an academic, there's a lot of people who come without any family around. And that's much harder, much harder. I just think, be honest to people as much.

00;20;08;27 - 00;20;29;28
Cale
Yeah, I love that. I love the concept of being transparent and honest about what's happening. And also this concept of being realistic. And so your third point was not a be a superhero, just

do it all. It's kind of like sometimes I'm crappy at that. That's just the way it is. There's ebbs and flows within it, but you know, I'm generally on the right path.

00;20;29;28 - 00;20;52;00
Cale
It's super important just to acknowledge that being honest about what's going on in a moment. On the thread of advice here, I want to make it as practical as possible for some people who are listening. And there's a few different types of folks who I think would be really interested in your advice or opinion. The first is those that are in research roles.

00;20;52;00 - 00;21;11;07
Cale
The second is the layperson. I would consider myself one as well, which is there is a lot of pseudoscience and a lot of fads that roll around, which people dive straight into without necessarily sort of knowing all of the detail. And the third is for people that are practitioners or working in healthcare. And so I'll split these out there.

00;21;11;11 - 00;21;23;17
Cale
So those that are in academia and research, specifically sort of medical healthcare research, is there a single piece of advice that you would follow to help them become really successful in that field?

00;21;23;19 - 00;21;50;23
Sarah
You're going to fail, and that's okay. The number you, all, all those professors you see with the fantastic grants, the number of failures to get there and the fantastic research, the amount of failure on that path is exceptional, but it's not documented. So accept that you're going to be unsuccessful and accept it's not a reflection on you. And I am an absolute hypocrite in this, you know, to just accept that you know you are going to be unsuccessful.

00;21;50;23 - 00;22;14;16
Sarah
Don't give up. It doesn't mean you're not good at what you do. A lot of people who are of exceptional standard don't initially get funded. My most recent successful category one grant, which it has meaning two people in the field that went in three times, I think, before it was successful the first time it completely tanked. I just want people to know that, and I know people said it to me and it didn't really stick, but I think it's an absolute truth.

00;22;14;20 - 00;22;21;26
Sarah
You've just got to accept that there's going to be failure on the way. And really, it's not failure. It's just learning how to try and do it a little bit different next time.

00;22;21;26 - 00;22;39;06
Cale
Yeah, I'd love to actually follow that up with how do you build this resilience is it a, like, is it a battle worn scar that you just have to keep hitting yourself with to, to get there, or do you like, is it, are you guided by a mission? Honest. Honest.

00;22;39;09 - 00;22;55;09
Sarah
So I had a rejection last week and I mean I expected the rejection. I, it was quite brutal. Perhaps I didn't perform as well as I would have hoped, and I probably spent a good half hour to, you know, looking at new careers. That's my reaction. And then after that I felt better. I was like, no, what am I doing?

00;22;55;09 - 00;23;17;27
Sarah
This is silly. You know, this has happened before or it'll happen again. Honestly, actually, in truth, I think finding a good mentor if you can, and ideally one who you know, who's been through similar life experiences as well, so they get where you're coming from. I actually and I didn't mention this before, I almost quit science when I had my first baby, and Peter McGuffin, who is my supervisor.

00;23;17;27 - 00;23;36;00
Sarah2
Sadly, we lost him this year. Peter worked so hard to keep me. I gave him a resignation letter, and the reason was that I knew that I would be writing grants when I wanted to be spending time with my kids, and that was not a future I thought I wanted. And if it hadn't been for him, I would have quit and I'd be a teacher now.

00;23;36;03 - 00;23;44;29
Sarah
But he convinced me to stay and try again for another grant. And I did. So yeah, I just think I can't even remember the question now.

00;23;45;01 - 00;24;00;03
Cale
No, it's, it's actually, he said some great lessons in there. I particularly like that. Look for another job and realise that you're in the spot you're supposed to be. Without going too deep, I would love to know that advice from your mentor — was it the right advice in hindsight?

00;24;00;06 - 00;24;19;26
Sarah
I mean, I've done well. I think it's hard. Life's not. It's not about right and wrong. It's not black and white. It's hard when your children say to you, I wish you didn't have that job, that has – and

that happens, you know, because their children, they have needs and they're honest. If you want an honest comment, go to a child.

00;24;19;26 - 00;24;37;17
Sarah
In many regards, if I've gone I've been a teacher, I think I'd have been pretty good. And I think I would have had an easier life. Definitely. But I also don't think I would have done some of the cool stuff that I have done or have capacity to do. You know, I'm in a privileged position where I have the opportunity to make changes, not just on the individual level, but maybe on a larger level.

00;24;37;17 - 00;24;56;14
Sarah
And I think that's [an] immense privilege that I wouldn't necessarily have had in that regard in that way then. And, you know, I get to be a role model for my two girls as well. Not to say that teachers aren't. They are exceptional. My husband's a teacher. I think they're extraordinary human beings. And it's probably a good thing I didn't go into teaching children.

00;24;56;16 - 00;25;14;07
Sarah
Teaching adults is good. But yeah, I don't think there's an easy answer to that. I think in some ways it would have been easier if I'd gone that path, definitely, and less stressful. But we have immense privileges as a family and also me in my life in terms of my career, because of what I decided to do in the end.

00;25;14;07 - 00;25;15;03
Sarah
So.

00;25;15;05 - 00;25;47;21
Cale
Well, I think you're also being too humble, because I think the impact of your work is very, very outsized. So I think we're all lucky to have you have made that choice. If it gives you any comfort Sarah. The second cohort of people and this is me and I'm sure this is other people listening. In this case, we're incredibly popular now to talk about a particular scientific subjects and listen to podcasts with people who, not necessarily have an agenda, but they have a limited view and they're very prescriptive about what will improve your life, improve your performance.

00;25;47;21 - 00;26;04;27
Cale
Yeah, all this other good stuff. I'm wondering for the layperson, how can we get better at interpreting research findings and how do we determine what to believe, what to follow? I know that's a big question, but I would love some advice on that coming from someone who lives in research day in, day out.

00;26;05;04 - 00;26;24;13
Sarah
I think there's two parts to that. One is about how, how you get better at understanding research. I think the question is, how do scientists get better at communicating research effectively? Because we can't expect laypeople to understand all the statistics out there. I mean, I, trust me, I teach medics, I teach psychiatry registrars, I teach psychology students, statistics.

00;26;24;18 - 00;26;49;01
Sarah
It's my, one of my babies. I love it, and I swear everybody should understand it. To protect themselves from this, to immunise themselves from people, taking advantage. But the reality is you can't expect people to. What I can say to people is, if it's not a genuinely peer reviewed piece of research, it's perhaps questionable, but you still have to be careful with that, because these days there's so many journals that perhaps publish things they shouldn't necessarily publish.

00;26;49;01 - 00;27;06;00
Sarah
So just because it's peer reviewed doesn't mean it's good either. I think scientists have to get better at communicating, and I think the media has to get better at communicating. They need to employ scientists to communicate these stories. I think, in my humble opinion, effective scientific communicators, some of them aren't.

00;27;06;03 - 00;27;23;04
Cale
So for the layperson, rather than relying on scientists becoming better communicators, is there anything specifically that they can do beyond the peer review, which would, yeah, help them get comfort or just a better fundamental understanding of what they're what they may be encroaching on.

00;27;23;07 - 00;27;44;29
Sarah
I think multiple sources. If you've got one podcast, one person saying one thing, check it out more widely. If you keep finding that it's the same sorts of people saying this one thing, but the mainstream rhetoric is the opposite, there's usually a reason for that. I always say take caution in big statements. If someone's saying this is the gene, the identified gene is a gem.

00;27;44;29 - 00;28;03;25
Sarah
For that you find there are people who genotype people or offer genetic tests and then offer them nutritional supplementation on the basis of those tests. And there is absolutely no scientific basis for this. I'm sure they'll try and, you know, can test me on that, but there really isn't. And the genetic variants they're identifying have very small effect, each of them.

00;28;04;00 - 00;28;22;15
Sarah
And again it works in concept with multiple things. So if something sounds too easy and too good to be true, it probably is. If somebody says a gene or a variant or let's have a look at these ten genes. And then I'm also going to give you some supplementation based on the results of that test that you've just paid me to do.

00;28;22;15 - 00;28;49;26
Sarah
And then you're going to pay me money for this supplementation. Be sceptical because there's a direct gain for those individuals in that situation. So I guess my best piece of advice is don't be cynical, but be sceptical. If you're hearing something very dogmatically being said without any acknowledgment of the nuance or the grace, it's probably not true, because there is very little in science that is black and white or in healthcare, in health science that is black and white.

00;28;49;27 - 00;28;57;20
Sarah
When you're talking about complex genetic conditions, if you're talking about, you know, the single genes, it's a different thing. Single gene disorders.

00;28;57;23 - 00;29;19;03
Cale
Great segue. That's very helpful, actually, because I find that those side deals that are giving advice typically have a plan. I saw a product of supplements. W- whatever that looks like, which is highly convenient. And often it goes hand in hand with just general good health. So be more mindful. Get outside, get more active, watch what you're eating like.

00;29;19;03 - 00;29;30;05
Cale
I think there's correlation or causation. There is a little bit opaque in terms of what they actually prescribe and do, versus what you would have done anyway if you just had of believed any advice which was be healthier.

00;29;30;05 - 00;29;58;03
Sarah
If I can just add one thing, if you just think about GP's, your doctors, your medical doctors let you go and see, they, they diagnose you or treat you or prescribe you something, but they do not sell you that drug. You go to the pharmacist to buy that drug, right? It's separated. And the problem you have with these other practitioners, and I'm not going to point and name you know, practitioner names, but with some of these practitioners you've got a situation where they're diagnosing and treating and profiting from it directly.

00;29;58;03 - 00;29;59;24

Sarah
And that's where you have the problem.

00;29;59;27 - 00;30;26;16
Cale
And good. Yeah. Good. Segue into practitioners in healthcare. I was actually speaking with someone recently who said it's just in possible to stay on top of every piece of research that's coming out. Is there any advice that you would provide practitioners, people that work in healthcare, to stay on top of the most recent and most reliable or impactful research out there?

00;30;26;22 - 00;30;47;25
Sarah
Yeah, I think this is a good question, because I don't think there's any easy answer. I, you know, even as an academic, it's hard to stay on top of everything because there's such a huge volume these days of research coming out. But, I mean, there's a range of options really. Obviously you've got podcasts, but again, you need to use your critical eye on what's worth and reliable to listen to versus what might not be.

00;30;48;01 - 00;31;10;13
Sarah
But you'll see conferences in your, you know, various allied health areas. There are usually conferences once a year or state meetings, that sort of thing. They can be really good places to get some up to date information. And magazines, so, you know, you've got Scientific American and depends on your field. You have a range of magazines that are specific to professions as well, which can be really good for that sort of stuff.

00;31;10;15 - 00;31;30;09
Sarah
The only piece of advice I always give is, don't be scared to question what you're reading and to go to the source. If again, if it's like amazing, this is a breakthrough, try and go to the source. Check out the paper yourself. Assuming you feel comfortable to read a scientific paper and make sure that the conclusions are captured a little bit in the reality of what you read.

00;31;30;09 - 00;31;44;05
Sarah
But I think it is a very difficult question. I think just immersing yourself in those opportunities for conferences and relevant podcasts with the caveat that you need to know that it may not all be correct. And I think that's a good way to go about it. Maybe listening to Grin + Bare It.

00;31;44;10 - 00;32;15;20
Cale
Shameless plug, I'll take it. I want to switch back to the point you made, particularly around this idea of genetic sequencing and some of the dangers inherent within that. When you spoke about it, my mind went to, as a researcher, this must be invaluable, like the information that can

be gleaned from the exercise. But, you know, it's interesting how you stopped short of that and said, well, there is, you know, a bunch of ethical considerations that are required as to what we do with that information.

00;32;15;20 - 00;32;34;15
Cale
And I know we spoke about the impact of, say, insurance or the impact of ostracising a particular genetic cohort almost. I would love to hear you just talk about that a little bit more in how you think about it ethically, how you think about it practically, is there, you know, ways in which we should approach this, which you think would be best.

00;32;34;21 - 00;33;00;24
Sarah
So I think there's a few levels to this. The one, is the basic in participating in genetic research or giving your genetic information over as an adult when you're able to make that choice to participate in a study or to do 23andMe or Ancestry.com, those sorts of sites. And so I, I've always expressed a little bit of caution about people engaging in private companies such as 23andMe and Ancestry.com, and there's a whole wealth of them.

00;33;00;24 - 00;33;19;16
Sarah
So not just them. Because of what you're doing, when you're doing that, as you're handing over your DNA code to a business, who then actually, you know, is able to to use that data in ways that they see fit, you do give consent for that to then be used for research. So I'm a slight hypocrite in that we've definitely benefited from people doing this because as researchers we can access that data.

00;33;19;17 - 00;33;38;12
Sarah
But at the same time, I always have to caveat with the businesses just to be take care because we can then sell your data, say, for GSK to study something. And again, it might be really valuable, really useful research, but you lose all control over that. The other side is you don't know the data security sometimes of these companies.

00;33;38;12 - 00;33;58;06
Sarah
I think one, I think Ancestry might have been hacked recently. It was around the time I was doing an opinion study around genomic newborn sequencing, which is what I'll touch on afterwards. That was terribly timed for that. But, you know, these things can happen. And of course, they've got extraordinary security in place, but nothing is infallible. In contrast with research studies,

00;33;58;06 - 00;34;26;25
Sarah

yes, they have those issues. But actually everything's got to be, you know, encrypted on the university server, backed up in very specific ways. It's very safeguarded. It's very managed. It's very detailed and led by ethics. We can't do anything without ethical consent from our university boards and that sort of thing. So on that side, you know, I always encourage people to participate in genetic research because, you know, it's my bread and butter, but to do so better in research studies and then with these other companies is my, my humble two cents.

00;34;27;00 - 00;34;45;02
Sarah
But then the genomic newborn sequencing, which is something that's, you know, probably going to come to the fore in the very near future. I think it's a, it's a wonderful thing. If I had opportunity to do that with my children, I absolutely would have. But it does open this can of worms, which has got to do with genetic discrimination.

00;34;45;04 - 00;35;07;08
Sarah
And I feel that our government ideally needs to legislate explicitly against that to prevent genetic discrimination to be possible through insurance companies. Currently, there is no legislation on that, but there is a campaign for that, and I think that is really important before newborn genomic sequencing comes into play. And the other issue, of course, is when you sequence a newborn's genome, what do you do with the data?

00;35;07;08 - 00;35;25;22
Sarah
Do you hold on to that? Who has access to that data? How long do you hold on to that data? Do you have to destroy it by the time they're 18? Because surely when they're 18, they need to consent to the testing themselves. You know, when they're young, when they're babies, they're not consenting. The parents are consenting. What are the implications of that?

00;35;25;25 - 00;35;46;05
Sarah
What are the implications if a condition is identified and maybe, you know, the parental line does not fit in the way people expected. You know, there's just a lot of complexities around there. There's definitely a lot of work in that space, but it's just things we need to be aware of and the work around. With newborn genomic sequencing stuff is that you focus on child onset conditions.

00;35;46;05 - 00;36;04;00
Sarah
You don't even look at the adult onset conditions because you know, those kids will at some point be able to decide if they want that information themselves, if it's adult onset and that they're treatable conditions or conditions that, you know, an intervention can be done. So there are ways to manage it, but there are still things to be done.

00;36;04;00 - 00;36;07;28
Sarah
And one of the key ones, I think, is legislation for genetic discrimination.

00;36;08;05 - 00;36;19;08
Cale
Legislations does sound obvious, but also incredibly complicated. I'd love you to maybe give an example or two of the types of discrimination that would potentially happen.

00;36;19;11 - 00;36;26;10
Sarah
Oh, I mean, I can't say with any certainty it's not, I have to say, legislation is not my field, insurance is not my field.

00;36;26;13 - 00;36;35;04
Cale
It's probably more, it is an idea of how far this could go in a world of the types of information that parents would be providing in, in that world.

00;36;35;08 - 00;36;55;16
Sarah
To qualify that. One of the issues we have when you go for life insurance is you have to declare if you've had genetic testing and the insurer can ask you to disclose that, like what that testing was and what was found. And if you don't, then arguably you might not be covered if an issue comes along. And also if that's the case, I believe for TPD types of insurances as well.

00;36;55;19 - 00;37;16;18
Sarah
And the issue you've got with that is that they may decide not to insure people who may have cystic fibrosis genes, for example, like there are conditions that I've talked about. My research has been in the complex genomic field where there's not absolute certainty that somebody is going to develop something, but there are lots of conditions where there is some certainty that they're going to develop something.

00;37;16;20 - 00;37;32;08
Sarah
And that might mean that the insurer says, well, I'm not going to insure you because I know you're going to get sick, and I know you're going to be a drain on my health fund, or you're going to die, and then I'll have to pay out on your life insurance. So I'm not going to insure you. And people don't get a choice in the genes that they're dealt.

00;37;32;08 - 00;37;55;19
Sarah

And I just, I fundamentally think that that is an extremely wrong thing to have happen. But there's a risk of that happening at the moment. There's a moratorium, which means that it's not meant to happen, but there's a risk. So where you've got the risk conditions, where you've got a high risk, say, for cardiovascular disease, you might just get substantially increased premiums relative to somebody who won the genetic lottery and has a low risk.

00;37;55;19 - 00;38;20;04
Sarah
And that person might be eating 20 cakes a day, you know, not going for a run, and you might be living on vegetables and a healthy, balanced diet and doing your, you know, required exercise every day. But your premium is 20 times the other person, again, purely based on the genetic costs that you have been dealt. It is worth pointing out that to some extent this does happen because you do have to declare family history.

00;38;20;04 - 00;38;47;18
Sarah
And family history obviously is a loose indicator of genetics, but I think there's very real risk there. I think there's very easy ways to protect against it. Well, I mean, nothing's easy with legislation but relatively easy ways to protect against it. And I think it needs to happen sooner rather than later so that people know that, you know, when these things come into play, that everybody's going to get a fair go, to use an Australian phrase, in terms of their insurances.

00;38;47;21 - 00;39;01;27
Cale
Yeah, it's, it's actually a great lead into the next question on where we are today versus the future. You're right on the cutting edge. What do you see as the future of your field of research?

00;39;02;00 - 00;39;34;28
Sarah
Hopefully forever evolving, not static. I imagine not being siloed again. So I've spoken about genomics. I've spoken about epigenetics. I think the future is about combining these things, and it's about combining these data and combining them also with environmental risk factors to develop truly, you know, combinatorial or psychosocial holistic models, predictive models for particular outcomes, be it to understand mechanisms of illness or to predict onset of illness and identify better interventions and timing of interventions and that sort of thing.

00;39;34;28 - 00;39;45;11
Sarah
So I think the future is together. I think the future is collaboration, and I think the future is looking at data as a whole and not in individual pieces.

00;39;45;15 - 00;39;50;29
Cale
And so what do you think would be the biggest roadblock to having this integrated view?

00;39;51;02 - 00;40;16;10
Sarah
Other than funding? There's always the funding roadblock. I think the biggest roadblock is probably a lot of our academic model. You know, for collaboration, you need to put egos aside. To put egos aside, you need to have a funding system that recognizes the benefit of collaboration. And so genomics is a beautiful example of that. I think it was in 2009, 2007, I think first, started Psychiatric Genomics Consortium.

00;40;16;10 - 00;40;37;07
Sarah
And what this was was a group of psychiatrists at one of our major conferences got together and said, we're not going to solve this problem on our own to identify genetic risk factors, we need massive cohorts. So the Psychiatric Genomics Consortium was born, and now we have publications with hundreds of authors all together identifying risk variants for a range of conditions.

00;40;37;09 - 00;40;53;19
Sarah
And the only reason that's possible is because people are willing to contribute. Their cohorts have a co-authorship, not necessarily be a lead, and accept that that's the way the, the dice rolls for discovery. So I think, yeah, probably ego is going to be the biggest issue. And the way our system is set up at the moment.

00;40;53;22 - 00;41;08;26
Cale
Ego is a tough, a tough, tough roadblock, I would say, and the human psyche to get all people working together. Sarah, what gets you up in the morning? You've obviously spoken about family. You've spoken about your work really passionately. What actually gets you excited?

00;41;08;29 - 00;41;29;05
Sarah
I'm glad you said excited, though, not up in the morning because that would be my daughter unwillingly at 6 a.m. every day. Yeah. What gets me excited? I guess it's a data analysis. I'm not going to lie. It's not writing the papers. It's not writing the grants. It's analysing that data and seeing what the stories are. You know what the data is telling you.

00;41;29;07 - 00;41;44;09
Sarah
Yeah, there's nothing quite like that moment when you're analysing data and like, oh, are we going to find something or are we not? And when you do and it's something really you didn't expect, and you sit there and you start to think, well, how do I make sense of this? Is this just a random, untrue finding, or is this just some.

00;41;44;09 - 00;42;02;25
Sarah
Oh, I hadn't conceptualized of it that way. Maybe that's what's driving that effect. Let's do another study and see if that's the case. You know, that's the cool stuff. That's the exciting stuff. The data analysis and understanding what those numbers mean when they come back at you. But I am a total geek. So.

00;42;02;27 - 00;42;25;03
Cale
Well, to finish out the final question, the Grin + Bare It is the name of the podcast and the reason for the name is that it's often the throwaway piece of advice when people are facing a challenge in their life. And so it's just suck it up, get on with it. Interestingly enough, in some of your advice to our cohort, it was accepting that you're going to fail and building resilience within that.

00;42;25;06 - 00;42;34;12
Cale
If you had to pick one piece of advice that you found helpful in your life, for people who are confronted with a challenge, professional, personal or otherwise, what would that be?

00;42;34;15 - 00;43;02;22
Sarah
One bit of advice that helped me. All you can ever do is your best. You cannot do better than your best, so be kind to yourself. Do what you need to do in your job, but don't forget to do what you want to do within that as well. Don't ever just do things to get the next dollar and just follow things to get that next grant, because then the real discoveries will get lost, because the real findings,the real big wow

00;43;02;22 - 00;43;10;29
Sarah
moments are very rarely things that you planned in your research and outside of your research. So. I'm not sure that was very concise advice.

00;43;11;01 - 00;43;35;24
Cale
It was actually got to a very, very nice point, which is some of the greatest achievements in our lives are often surprises and just not necessarily what you had set out in your professional or personal life, that they can be the greatest achievement. So I think that's actually really, really well put. Sarah, it's been an absolute pleasure. I could have spoken to you for another three hours on an array of topics, and I hope to in future.

00;43;35;26 - 00;43;42;28
Cale

Thank you so much for joining us today and wish you all the best in your work and your family and everything else related to that.

00;43;42;29 - 00;43;50;17
Sarah
Thank you. Absolute pleasure. Thank you for having me on.

00;43;50;20 - 00;44;20;27
Cale
Thank you so much for listening to this week's episode. Hope you enjoyed it. As always, I would love your feedback, questions, or any suggestions that you have to someone that I should be speaking to next as our guest. You can find me on LinkedIn, or you can find the Grin + Bare It podcast on TikTok and Instagram. Now, the best way to support this show, if you did like it, is leave your feedback, subscribe wherever you get your podcasts, or simply share it with your friends and colleagues.

00;44;21;00 - 00;44;29;21
Cale
Thank you so much again. See you next time on Grin + Bare It.