AACP Australian Chapter – 2015 March Conference
Breakout 1 Transcript

OK, trigeminal sensitization basically involves priming a whole organism and causing the malfunction of the trigeminal system. We have learnt today that a major stressor is sleep deprivation, and another would be related to direct and indirect trauma to the trigeminal system through V1, V2 or V3 and probably the cervical vertebrae as well.

Definitely direct stressors. I don't know if there are any Californians in here but I wouldn't go walking in the pub if I were you because that is going to be a risk factor, especially if you are a dog walker in California. Certainly if you are a policeman and you work with capsaicin spray, I think that would be a stressor to your trigeminal system.

So our workplace environment and our job descriptions may directly affect our stress levels, relate to our sleep deprivation, direct [and] indirect trauma and other chemical and toxic mediators that might cause the priming of the system.

So we think dentists have a terrible work environment because they can't look straight and musculoskeletal pains will result from poor posture in the work place, as it would for people who look at computers all day.

We think direct trauma could come from professional athletes or people who have physical jobs where they might hurt their big toe and sensitize their whole body, and by indirect glia cells transformation we might end up getting trigeminal pain.

Culture at the work place is important because of stressors. Everyone copes with stress differently and what's a stressor for one person at the workplace wouldn't be for another. Severe workplace stressors and bullying could have a major effect in exacerbating the priming of the trigeminal system. The culture of the workplace may involve what we eat. A taste test from McDonalds perhaps might not be ideal.

There's one other thing. Noise and light. Yes, computer screens, and loud noise like heavy rock.

Night work I think is a big issue because people who are working beyond their capacity to sleep are going to be deprived. I think that will be a major sensitizor. So thanks team for letting me go through that.

Thank you Scotty. Well our group came up with some questions. We have listed some questions you might add to your patient questionnaire to cover the influence of epigenetic factors on sensitisation of nociceptor pathways.

So you will ask the history of the symptoms of when they occurred, how long it's been there (duration). You will also ask the history of any trauma, physical or otherwise. Look at diet, and their nutrition. Any toxic factors which might have influenced their lives. Also work patterns – if they are shift workers and ergonomic factors at work like posture as Scott mentioned. Perhaps computer stuff, whether they have got the keyboard and monitor at the right level and are seated correctly.

Family history of medical/ pain complaints including parental and granparental history is also important.
Also any history of childhood illnesses which also might affect that?
Obviously, history of tonsils, middle ear issues and airway problems is important.
And then questions about their diet, What sort of diet they typically have and their nutritional levels.
Lifestyle factors. History of exercise. Or whether they have a sedentary lifestyle, and also questions on sleep. What sort of sleep patterns they have? Whether they practise good sleep hygiene?

What you can do to ameliorate these would be obviously changing those patterns which come up as being pathologic. So you look at changing their diet, changing some of their work stress environment, so you might suggest they get up and stretch periodically and exercise, maybe treat them with some sort of physical therapy for that.

Ok, our questions was "Do you agree with the statement that central sensitisation can promote peripheral sensitisation?" and I am sure we all agreed that it does.

Clinical examples our group came up with the fact that a lot of the chronic illnesses will cause a central sensitisation which will in turn lead to the peripheral sensitisation.
We spoke specifically about a few. One was chronic sinusitis inflammation which then leads on to a forward head posture, chronic neck pain.
The therapy we would use for that would be obviously to refer the patient to actually have the chronic sinusitis dealt with as opposed to just the neck pain dealt with as a result of it. So it's looking at it from a perspective of not where the pain is felt, but the actual possibilities of the causes.

The next thing we looked at was obesity. Our diet can affect central sensitisation by increasing the carbohydrate intake. You increase insulin and it affects the type of muscle and hence produces inflammation in the muscles and fatigue.

There is a need to have a multi-disciplinary approach in terms of nutritionists, dietitians and the likes.

The third thing we discussed was irritable bowel. How the gut innervation causes the irritable bowel, causes the central sensitisation in the spinal tract, which then can affect, say for us as dentists, the trigeminal system and hence cause clenching, grinding, neck pain, things like that.

"What's the percentage of your patients exhibit evidence of sinus pathology?"

We did a kind of survey of percentages and we came up with an average of 60%. And for chronic allergies it was 70%.

And what do you believe this contributes to? Do you believe it attributes to cranial facial pathology? Yes. That was a simple one. Is that a trick question?

What things can you think to discuss with your patients to decrease neck muscle tension?
We have all kinds of things on that one. So we have to work on good posture.
We do exercises, … told us the yes dear exercises 15 degrees yes … yes… I call it the yes dear exercise.
Good ergonomics.
Like a massage we can treat them in-house or we can refer out to a different practitioner.
Review sleep hygiene.
Good diet.
Stress reduction.
Proper breathing and then posturing of the tongue and the neck.

What is significant in having painful muscles on a palpation test. That's a simple one because it was central and peripheral sensitisation with connections to the trigeminal complex.

Our question was on the transition from acute [to] chronic pain. And our question was "What steps can you take to reverse the underlying changes?"
We wanted to get the understanding from the patient of what is going on. So one of the key steps was actually finding out what was going on. So therefore it was through a series of questions.

We were looking at their sleep patterns. So are they doing things like sleeping for a long time on the weekend, so coaching them on that. Are they waking remembering their dreams, or are they waking feeling refreshed. Are they taking daytime naps? Is the sleep architecture good? Are they needing any medications to fall asleep? Are they having problems with sleep onset insomnia, or sleep maintenance insomnia? If they are answering yes to any of these, we will discuss sleep hygiene issues.
So talking about a dark room, no electronics, no stimulants, possibly after as early as even 9 o'clock depending on how sensitive they were to that. Avoiding alcohol within 3 hours of going to bed because of the sleep fragmentation effect and the effect on REM sleep. Making sure that the room is cool.

Things like advising them on things like dust sheets or dust mite sheets or washing sheets in hot water to reduce the amount of dust mites.

Using ear plugs if they live somewhere noisy that they can't get away from. And things like warm milk and melatonin. Hot baths before going to bed. Just turning down the lights. Switching off the electronic stuff.
Maybe doing a brain dump before they go to sleep at night before going to bed to get anything out of their head so they can get a good night sleep.

We are also going to ask some questions on lifestyle and coach them in those areas. So are they smoking? We now know the effect of that.
How much alcohol is there in their lives? Is alcohol used as a comforting factor or something as an avoidance?
Is there underlying psychosocial issues that need to be addressed? Talking about stimulants and the effects they have on pain and sleep. If they aren't doing any exercise, suggest they do some exercise. If they are doing exercise inappropriate, suggest they do exercise that is less damaging or gentle, or more effective to their level of existing chronic pain.

Managing any chronic pain they have, so not just ignoring it, seek help from a physical therapist.
If there are levels of high stress around the work place, what can they do to be able to ameliorate that? Things like meditation, breathing meditation, breathing exercises,
Perhaps there is a role for a referral to a cognitive behavioural therapist so talking to them about the role of those people within their life to assist in improving their stress levels.

Reducing sugar, increasing water, reducing stimulants, preservatives, additives, looking carefully at gut health. Have we got dairy intolerance, gluten intolerance, having an anti-inflammatory diet, so increasing omega-6, and other anti-inflammatory things.

"Which is more important? Nature vs nurture". We thought that nature created the predisposition, but nurture created the expression or the suppression. That was the quick answer.

The question was "What factors do you consider the most important in the transition from an acute to more chronic pain state?"
We listed the factors with the most important was obviously sleep deprivation. Particularly REM sleep deprivation.
Sleep hygiene was a factor. Particularly changes in your sleep position, or changes in sleep patterns things like sleep phase changes particularly in adolescents. There was a frequency and intensity of stressors. There was psychological factors particularly things like job satisfaction, then we have things like addictions, such as smoking and alcohol play an important part. Lack of exercise is another one. Obesity as we were looking at passed down from generations. Nutrition and diet were important. As were social support and other lifestyle factors. And another important one that was emphasised was the influence of long-term untreated injuries.
From a perspective of treatment, obviously a team approach is what's required. These things are obviously a multi-faceted approach. Not only do we have the dentists, you're going to need people like sleep physicans, ENT, allied health professionals, sleep psychologists, in order to treat these patients appropriately.

Our second questions was "Do you typically inquire about early childhood and recent traumatic stress events and list some of the strategies?"
generally yes, I think most people here we say we did inquire but some of the things we suggested we do inquire about were systemic disease, family bereavement, pet bereavement I thought was a good one particularly in relation to kids. Starting school I find with some kids was a stressful event. Social isolation, are other kids introverted or extroverted? One thing I am interested to learn, I think we are all going to ask a question is, does premature birth have any influence, and things like enuresis is important as well.
So in terms of treatment for these kids once again, I think breathing and airway are important. Proper sleep patterns are important, I think we need to look at things like meditation, counselling, allergies are important, getting allergy assessments done on these kids, obviously nutrition is going to be important, sleep patterns are going to be important as well, changing sleep hygiene, these things are important and I think just doing a general screening on our population of kids is another factor we can look at.

Now, our question was "What are the medical conditions might amplify the effects of TMD, and how do we deal with them or these?"
There was quite a number we came up with. Systemic inflammatory conditions. Metabolic disorders. Diabetes and obesity. Chronic pain. Acute pain. Chronic pain virtually anywhere in the body. Sleep disorders and other sleep hygiene. Anxiety, depression. Medications related to REM reduction. Addictions. Over the counter medications, prescribed or self-administered drugs. Toxins within the environment. Respiratory problems. Upper airway resistance. Sinusitis. Dental origin pain. Bruxing, and muscle pain from that. Dietary related stressors. Things like Eagle and Ernst syndrome. Obesity. Sedentary lifestyle. Posture, occupational respiratory posture compensation. Forward head posture. Environmental. Poor dental treatment i.e. poor restorative or poor ortho. Gender because females are 7 times more likely to have it.

Our approach to treatment was 1. A team approach. Proper diagnosis. Address the structural issues. Postural therapy. Physical therapy. Occupational ergonomics. Sleep: address sleep disturbances whether they be OSA, sleep hygiene, etc. Breathing, airway, address the ENT, upper airway resistance and infections within the system. Address sympathetic dystrophy, relaxation techniques, yoga, meditation, breathing techniques, other physical therapy like low level laser or TENS, or Nucalm which I haven't heard of before, anti-inflammatory meds to address the inflammation and also addressing the inflammatory diet. Anti-stress techniques such as cognitive behaviour therapy and also seeing therapist for emotional problems. Address the drugs, whether they be both self-medicated or prescription. And exercise and I have already mentioned the emotional therapy and therapists related to that.

So our question was E. Can pathology in one branch of the trigeminal nerve promote sensitisation of other branches.
Well, the short answer is pretty much any branch can. So we look at sinuses, migraines, TMD, TMJ inflammation, chronic infection, and as we listen today it seems like pretty much anywhere along the spinal chord can cause this problem.

And so the next question was "Does it change your treatment plan when there are many sore muscles?" the short answer is no because we are excellent clinicians. And we were always going to do a thorough clinical and systemic diagnosis.

What might you do differently and what are other factors would you consider? Well, really we are looking at anything that is causing some sort of central sensitisation, peripheral sensitisation through multiple causes so you have got to screen for sleep hygiene, sleep disorder breathing, stress, emotional wellbeing, look at their diet, bloodworks, look at thyroid function, lifestyle, medication, smoking, alcohol. The treatment really will be a multi-disciplinary approach to really de-stress the patient so that's again treating any sleep disorder breathing and maybe referring to physical therapists, nutrition, nutrition supplements, laser

therapy, breathing exercises, normal exercise, relaxation, looking at CBT if necessary, occupational therapy.

Audience: I just like an answer to Darryl's question about premature birth.

Oh, premature birth? We were just talking about a little bit ago about premature birth because actually my PhD is in fetal lung development and looking at what proteins were involved in fetal lung development, and I had the opportunity to work with a lot of neonatologists and one of the things that we probably really made a huge mistake on is that when babies were born prematurely back in 70s, 80s, we started coming in with surfactant replacement and these other types of therapies and they were able to basically push the window down to like 20 or so weeks of gestation. We were able to get children that were being born successfully so all the way down to 24 weeks with surfactant replacement and high frequency inhalation, you allow these infants to survive. But what was somewhat disheartening is we had this period that we actually decided that these patients, well, these little infants, were so susceptible to disease that we didn't actually touch them. So there was actually no physical contact or really minimal physical contact with the infants at this point in time and we realised now that that was a mistake that what we need to be doing is we need to have the infant, you know, even these premature babies they need to be touched, they need to be stroked. One of the biggest hormones, what is the big hormone that you get when you get someone touching, oxytocin right? And what they shown is that oxytocin is really incredible for actual neural development and some of the pathways and connectivity that we were talking about earlier that whole feeling of security and such is really important and that's what actually happens when basically you actually touch the child. And so again it's the whole idea that with the premature infant now, they have implemented that they now do get physically touched everyday. They try to bring them with the mothers as much as possible and they try to move them along pretty quickly because of that.

This is the kind of tangential one that begins the idea about breast milk versus non breast milk. One of the things where again I think we made a huge mistake, that I think it's almost for me it's totally irrational why we got to the point in our lives that we actually thought that like cow's milk was actually better than human milk to actually feed our young. When you really think about that realistically it really is dumb funny to be a biologist, and why would we think that another animals' milk is better than our own milk? So you know I asked my Mum that question, and she is a biology teacher in school and so she said it's a whole cultural thing, right? I was born in the 60s and so she said there was this whole movement that after WWII well at least in America, women went back working and stuff and it's almost like you are nursing your child, you were too poor to afford you know like a better way or something. It was really kind of weird like when my mum explained it she said you were embarrassed to actually nurse a child back then, because it basically meant that you were so poor you couldn't afford any other way to do it. So anyway when you look at this, think about how crazy that is, we actually now have gone full circle and realise breast milk is really incredibly important because a, the composition is completely different, and it's a different bacteria in our gut than cow's milk does, and but it's also just the presence of holding the child, right? And then being able to touch it, again the oxytocin that whole bonding that has to occur really has important implication on the nervous system and that whole security and it's kind of what we talked about the couple of slides with the rearing of the mother, you know, the offsprings given in rats, and such is that even we can overcome a lot of these things by actually just handling them everyday. Even when you have a bad mother, you can actually overcome those. So it's again kind of a long-winded answer to the premature thing, but you know.

Audience: Kind of related to that question, rather than premature babies. Particularly in relation to microbiome difference between natural birth and caesarean section.

That's a great question. We are going to touch a little bit on that tomorrow but I am going to go ahead and give you a prem run. Basically what we are finding is that microbiome are not the same … Where does the bacteria come from that actually is supposed to seed an infant?

I think somebody said vagina. Yes what's amazing about this is that through natural birth the infant will always take some mothers vaginal fluid and then basically it helps seed. And what is incredible about this and I am not making this up. But in some other cultures, They will do this.I don't where NIH got this idea, but the NIH has now funded studies because one of the things that's happening in Florida is that I think I read over 50% of all the births in Florida now are by C-section. And it's become a major epidemic in America. Basically doctors want you to choose the date. They are basically selling this in such a way so you can make sure that your doctor is the one who delivers your baby. And so they are literally doing this in like over 50% of births. Some countrys is ridiculous, it's like 70-80% of the mothers are giving birth by C-section. And then when you do that right, at least my understanding is that when you do that, when you are going to have a second child, it's almost a C-section as well because now you have compromised the uterus, and is that correct?

So the idea now is that you now have these infants these children being born while they are not getting the correct bacteria, so if you are born by C-section, the bacteria isn't coming from the maternal vaginal area like it should be, so what's actually seeding that? Skin, it's coming from the skin. It's a completely different biome, right? So when I was at this meeting just recently, I was actually at the neuroscience meeting. They were showing that we have three major pockets where the biomes are different. So you have the skin biome, you have the gut biome, and then you have the vaginal and gut biome is kind of together, so wait, 4 different ones, but the vaginal one is similar. So what they were showing and it was an incredible study is they actually track infants and look at the microbiome, so they really collected poop from the infants and then analyse the change in bacteria composition through like the first year of these infants' lives and what they found is how it actually gets seeded and how these different biomes they are actually separate, so you have a little bit of overlap but actually the bacteria that exist on your skin are very different from the ones that actually exist in your oral cavity, that was the one I was missing, it's the oral cavity is actually quite unique because it's as naïve as it was I thought the oral cavity will be very similar to the gut but it's not at all. And you guys probably already know this.

So what's interesting about this is getting back to the idea where NIH got this idea. I think it probably came from the bush, literally. I have a student in my lab from Kenya and we were talking about in general about this and I said something about this whole birthing process and he kind of laughed. And he goes Oh we have been doing that for centuries. I said doing what. And he said when infants were born in their tribal area, they actually will take and wipe the finger down there and then put it on the inside of the mouth. And so they basically seeded the infant with that. If I understand this right, NIH just approved this study to actually do this in America with C-section babies. It's that in babies that were born in C-section, they are literally going to take vaginal swipes from the mother and actually inoculate the child with that like it would normally happen, and they think it's really going to be amazing because what we are finding with C-section babies is that because they don't have the right microbiome they are much more susceptible to allergies and basically other types of things, and we think by seeding it correctly, it's going to be a major game changer as far as you know the long term prognosis of these children these kids.

Basically we are growing up in too sterile environment. As dumb as it sounds. Well, the breast milk will get the antibodies and stuff and right, you get the nutrition, but you don't get bacteria. Yeah, you are still basically not getting the right microfauna down there. What I am saying is because of this, because of being not properly seeded, they think it is really driving up allergies. The other thing too, is my dad from the time when we were little, I remember my mom will go "Oh they have eaten dirt literally and worms and everything." We were allowed as kids to go everywhere and do everything. Now we have this crazy thing. You know they come in from recess and they wipe their hands. We actually are too sterile. We are actually showing you that when you raise animals in a sterile environment they are hypersensitive to everything because their immune system is designed and basically their system is designed to have stimulus coming in and it adapts to that right.

Basically by keeping the environment too sterile you end up with long term problems. We have a girl in our lab that you know, her mom is a phobophobic, so she just basically just didn't want to touch anything. If she went outside, she literally had to come in and almost get scrubbed down. And she was really fanatically about all this. And now the girl is a lady who is working in my lab, and she is susceptible to everything. I mean it's sad. It's kind of like the old chicken pox thing you know like when we were younger. It's kind of sad but when somebody

has an illness or something, it was almost like you put them in that house. You like went “Hey come over here because Tommy has got chicken pox”. Oh yeah great! But it was the whole idea that when you got immunised or exposed when you were young, your system is highly adaptable and then you get this you build up of your immunity, and it’s very stable then. But when you get it later in life, that’s much more detrimental. So I think yeah we are hopefully shifting it back to a much more healthy environment.

Audience: OK, just back to the vaccinations. Because they are using surfactants and aluminium sulphate and they are using tymerosol. That is obviously being very influential in inflammation or reaction to the brain, for example like in autism. Can you… what’s your view on that?

I don’t have much, well, as far as vaccinations and stuff go. I know they linked it, well, unfortunately there are a lot of famous people in America who linked it with autism, right? We have communities in California where 80% of the children are not immunised now. I mean how serious is that coming up. I mean these are educated communities. Highly educated white coloured type of communities where 80% of the children in those communities are not being vaccinated for anything because of fears of different things like that. So we are from a CDC perspective we are kind of freaking out. This is not what we really want to be happening. We almost have stuff eradicated or at least under control and now it’s moving in a completely different direction.

That’s definitely the case. I mean like you said you really have to assess each child. We tend to do global vaccinations, but again that’s kind of a dangerous thing if your immune system is already compromised. I know like we have had with adults in America because we have all the flu vaccinations and such. But again I always have to explain to somebody that if you are already sick or you are not feeling well, you probably don’t want to get the flu shot at that point in time. You can actually have a very bad consequence from that. So again you know, It’s a trade-off of when to do it. But I think you are right, you have to make sure that the patient or the infant or however old the child is, is very healthy when you are actually vaccinating them.

Audience: Seeding the microbiome as a baby is obviously very important. But what about seeding the microbiome as an adult with faecal matter. And also, do you have any data on that? And also how do you determine what’s a healthy donor?

Healthy microbiome? The thing that we are actually finding is that actually it’s population dependent. So if you go across the world, we basically have access to all these different types of food, and types of spices and things, but not always is our system actually adapted to metabolise those correctly. And so when you start looking at what is good in one population, that might not be something that you would put in another population. One of the things that I will get back to is that most of you probably heard this. Dr … actually asked me about this today. That is if you actually take the poo from an obese animal, right? And you put it into a non-obese healthy rat or mouse, it will become obese doing nothing else other than changing its microbiome in the gut. You can do the same thing with diabetes. If you take a diabetic animal, and again you take the poop from that and you put that into a healthy animal, you will cause that animal to become diabetic. And that’s the great question. Will it work in the reverse? And that’s the scary part about it is so you really can’t take healthy bacteria and put it in there. Think about it as invasive species. Everybody knows what invasive species are. The problem is when you change the microbiome in this negative way, that it actually can out compete the native ones. What we are finding now is that diet actually plays a really major role on that because diet will influence what can grow in your gut. We will talk about this more tomorrow but basically you have to think of the gut like a lawn or a garden and then you have these organisms that are growing down there and you have to maintain them. And what you want to do is to maintain the ones that are keeping you healthy and you want to keep out the invasive weeds or those invasive species otherwise you will have allergy. So that’s what we are seeing with that.

The things we are working out right now I just got a text I have to go up and read it so I am actually kind of thrilled about this because we are actually doing the experiments with the perfect storm that I will talk about tomorrow. So an animal going into chronic pain will show that actually the microbiome has some changes. And we have got to the point that we can look at just the gut profile of the bacteria that are in the gut of the animal and know what stage

of chronic pain and the pain spectrum it's in. Just by changes in that. What's really crazy is that now what we are doing is we are trying not to correct it, we are actually seeing that if we take the poop basically and purify out the bacteria from there from a chronic pain animal and put it in a healthy animal, that animal is going into a chronic pain state. We have two showing that right now. So we were hoping to have that data to actually show you guys before we left. But it's like they are sending me the data. But it's like it's a little bit too premature. That's what I am waiting on with the data cells. What it looks like is happening is it looks like it's long term, so it's more like a sensitised stage initially and this is the crazy thing about it. The animals we are talking about are not the one that are the severe ones, they are just highly sensitised animals. So they are not even the ones you will say they are in chronic pain, if that makes sense. You know, so one of the things that we wanted to do to those stressed animals that we are talking about, we collected poo from them and we are going to take that bacteria and put it in and see if that induces the same phenotype in another animal. So it's really a kind of a you know kind of a crazy time period when you start thinking about how important the gut microbiome is and that's why I think NIH is investing tremendous amounts of money right now to really look at all the microbiome because I think we drastically underestimate it. How important the bacteria are that were living in association with us. How important that they are keeping us healthy.

Audience: Microbiome therapy is … progressing and is very prominent and very promising treatment. There is strong evidence that ulcerative colitis can be actually cured. They have done several treatments. The first article I read four years ago where they took faeces from the husband and gave to the wife and she was totally cured. The alternative would be total colectomy, which is drastic surgery. But in the future you may go to the pharmacy and buy your microbiome in a capsule or if you are obese or if you are diabetic, or if you are getting dementia, the microbiome can keep you more alert and improve your cognitive function properly.

And see, that's what we were talking about. So this is the more extreme. Like you said the one condition where they actually have shown that this kind of intervention of faecal transplant really works is colitis. The other thing we are looking at is how you do this nutritionally, like you probably heard of, like with probiotics is the term. So there is prebiotics, and probiotics. Probiotics are what help maintain the gut fauna, you know. So it's not therapeutic. It's what helps maintain the commensal bacteria. The ones that are supposed to be there. So things like eating yoghurt and stuff will actually maintain high levels of lactobacillus and those are very anti-inflammatory. They actually keep the basically the bad bacteria out of the gut and so.

Audience: in all the times, in families in villages, they used to have a common table and to eat from the same pan all of them. They usually have good immunity and good system and good health and longevity. And also those who go to the Ganges river for the ritual apparently they have better immune system because they drink and swallow water with poo or very rich microbiome.

Audience: I was just wondering if there is any evidence about whether the babies born to mothers who might have unhealthy vaginal swabs are going to suffer as their microbiome is already unhealthy. Maybe someone who is on long term antibiotics is that going to affect the gastrointestinal tract of the baby.

My understanding is that for the trial that is coming up they really can only enrol healthy mothers, if you will. So I agree with you totally I don't think you really want to inoculate with a vaginal fluid that is actually not healthy. But I think the way I understand the study is that they are literally looking at healthy mothers and then doing them first.

Audience: but I was then wondering if there has been any attempt made for a mother who has an unhealthy biome to rectify that matter before she gives birth vaginally. To improve her gut microbiome…

You are talking within the vaginal area though. Yeah, and I think I don't know how you actually do that as well. I mean like I said probiotics I don't know of any probiotic type of thing that you can actually use to improve that type of environment. There are probably other people who would know what to do to improve that.

Audience: you know long term antibiotics for example will cause candida, the growth of candida. So mothers who for one reason or another who might have been on some form of medication that will alter their vaginal flora surely that's going to have an impact on the child.

One of the biggest things that I will be presenting tomorrow, but one of the things that neuroscientists talk about is pretty remarkable was when you take a child and you actually put them on an antibiotic, right? Think about most antibiotics, they are broad spectrum. So think about when you put an antibiotic in a child, right? You are not only killing the bacteria that you want, the pathological ones, but you are also changing what is going on in the gut, because you are killing them as well. And what they showed is when that happens in these children basically their gut microbiome completely shifted and it went back to more of the vaginal type, and then once take them off antibiotics they went back to having a more normal gut biome. So they think its the vaginal microbiome which is actually responsible for seeding the gut microbiome actually is very protective and is really quite remarkable how we are just beginning to try to understand how this all happens and how everything is seeded. But broad spectrum antibiotics are not good so long term use of these things is actually terrible for the intestinal tract.

Audience: I have also read that the bacteria from the mouth in the final trimester actually might migrate through the placenta to the baby. So the baby actually isn't abiotic when it is born. I have not been able to confirm it anywhere else. Have you?

I have never. No I have never heard of that. I mean to me I really don't know how it would get there. Now… I don't know.