Living Life in Balance with our Passengers: An Interview with Toni Harman on the Infant Microbiome

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REBELLE: I took your mini-course, *What is the Infant Microbiome,* and watched the documentary, *Microbirth*, and your story is so interesting—transitioning from film producer to infant microbiome advocate and educator. Can you tell me a little bit about that leap? What got you interested in this topic?

HARMAN: We just finished our first feature film, a psychological thriller, and sold it to a Hollywood studio. So, we thought we were off on a journey to Hollywood. Then I discovered I was pregnant, which was fantastic but took me off in a different direction. During the pregnancy, I was hoping for a home birth. I wanted candles and music. I wanted to be supported by midwives. As it sometimes happens, it didn't go to plan, I ended up having an emergency c-section, and then I struggled to breastfeed. I didn't have any support, and I supplemented with formula. I found it really difficult, that transition from what I had in my head and what I wanted for my birth experience to reality. I felt alone and disempowered.

So, that experience led me to start thinking and, as a filmmaker, gave me a whole set of questions. I started looking into the world of birth. I started meeting doulas, and I made a film about doulas, and then I got into the science and the politics of childbirth. I made a documentary called "Freedom for Birth" about human rights in childbirth and how it should be the right of every expectant parent to decide how, where, and with whom they give birth. That right is not available to many women around the world. After making it—it premiered with 1,000 premieres in 50 countries—we had people marching in the streets of Buenos Aires. We had

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hundreds of emails coming into us each day talking about their birth stories, and it just became this fantastic reaction to this film. But, it was so divided in terms of opinions, and when we made Freedom for Birth, I couldn't see an opposite side to giving birth.

I couldn't see how anyone could argue against human rights in childbirth. How anyone could argue that it wasn't the mother's choice, how and where, and with whom she gives birth. I couldn't see the other argument. But we got a wave of emails and messages presenting this other argument, saying birth can be very problematic, and many births ended in c-sections. It just became really polarized. Alex, my partner, and I thought, okay, let's step away from the politics of childbirth and look at the science of childbirth. We started looking into the microbiome and how that affects pregnancy, birth, and breastfeeding. And it's amazing. That was ten years ago. We've spent a decade in a world of microorganisms.

R: Wow, what a trajectory. That's amazing. It's interesting, I recently began following many people in the birthing community online, and I am amazed to see the polarized arguments. I thought I would find a supportive community, but it's like people have their corners. It tends to be holistic home birth versus obstetric hospital birth.

We can be so divided, and it's a shame because who suffers? The birthing families and parents and infants. So, you're right; the politics of birth are a lot.

H: I think you're right there. I mean, there are sort of two polarized ways of looking at birth. You've got the midwifery model, and you've got the obstetric model. They do kind of clash.

But, I think the science of the microbiome can bring everybody together. I am learning from microbes. That sounds really crazy, but this is the idea of a symbiotic network where you work together for the benefit of everybody. When most people talk about birth, they talk about humans and the human process of giving birth. But, if you take away the human side, you're left with microbes and the microbial transfer that happens during childbirth. That has no politics. That's just how birth works.

R: Yeah, it just happens, whether you believe it or not. Okay, so that helps transition into what exactly is the microbiome and why is it so important?

H: The microbiome is the collection of microbes that, if you're talking about the human microbiome, are the collection of microbes that live on and in you. There are trillions of microorganisms, so that's bacteria, viruses, fungi, archaea… These tiny, microscopic microorganisms that you

can't see with your human eye, yet they're all over you. Most of them are from your mouth to your anus, and the biggest part of them are at the bottom of your gut.

So, a baby who is mostly born sterile starts to get their microbes as soon as the mother's water breaks, as they journey for vaginal birth. As the baby travels through the birth canal, they pick up the mom's vaginal bacteria. Then as the baby comes out, hopefully gets a good lick of the mom's bum because that's the mom's gut microbes, and then, the baby will go straight onto the mom's chest and be covered in the general dirtiness of birth. Through skin-to-skin contact, her baby acquires the beneficial skin microbes. So, all of these microbes are acquired in that sensitive period during birth. That's the main seeding event for founding the baby's microbiome.

R: I'm thinking about births that I've had and witnessed and the last century of modern birthing, and it often isn't what you just described. It can look like: take the baby away, clean it all up. It seems like there's an attempt to keep it a very sterile environment.

H: I hear horror stories from midwives who say that the doctor basically had sterilized the whole perineum with like pouring whatever antibiotic or disinfectant over the mother's vagina and their whole area…

R: Gets an *antimicrobial*!

H: Exactly, exactly. And you just think, gosh, it's just this basic understanding of the science of the microbiome. This is not me saying this; 1000s of papers have been published. This is no longer emerging science. This is the vertical transmission of microbes from the mother to the baby during vaginal birth.…the murkiness of birth, that dirty, messy, murky birth, should be embraced. That is the best thing a mom could give her baby, along with breastfeeding.

There are special sugars in breast milk, which are food for those wonderful beneficial microbes transferred during birth. The sugars in human milk are the perfect food, and they're matched up to the bacteria. So in this amazing seed and feed process, you have the seed, which is the bacteria, and you have to feed, which is the sugars in breast milk. It's this wonderful, fantastic system that we're interrupting.

R: It's almost like nature knew what it was doing.

H: Oh, that's it, we have evolved for this to happen, and it's an incredible, miraculous process. We have so many layers to it because once

it's fed by the special sugars in the breast milk, these help ensure the right type of microbes populate the infant gut really quickly, and having the right type of microbes populating the gut really quickly, they're the ones that train the infant immune system. They're the ones that are going to protect the baby's long-term health.

R: Let's talk about that a little bit. My son was also born with an emergency c-section, and they immediately put him on antibiotics. It's hard not to think that he didn't get what he needed, and it's such a heavy feeling as a mom. Is there something parents can do after the fact to make up for when things don't go as planned?

H: Breastfeeding for as long as possible. There is really strong science behind that. There's research into probiotics, but not all probiotics are the same, and different probiotics might work for different people. So it's finding the probiotic that's right for you. There are certain tests you can do, but then I'm not sure because it's still an emerging field about probiotics. But, yes, there are things you can do. Things like going for walks and exposing your child to the natural world, getting houseplants, doing gardening, getting a dog, there's really good research about the benefits of getting a dog…

R: Does it have to be a dog, or could it be a cat or a hamster?

H: I can't remember the exact statistics, but dogs are really good because they go outside, and they burrow in the ground, and they get mucky, and they come back in, and they lick your face, and that's brilliant because they are microbial superhighways. They spread all of the bacteria they get from outside around their house. We don't have a dog; we hire a dog. We borrow someone else's dog just for this purpose.

Cats aren't like that. Cats would go outside, very clean, possibly come back in and they may just sit in the corner and clean themselves. So it's just the dynamic–you might have a cat that runs around and licks you like a dog. That would probably be the same sort of exposure. We've had lots of hamsters in my daughter's life. I'm a big fan of hamsters, but they stay in their cage so they don't bring in the outside world. We interviewed this scientist at the University of California, and he said, ideally, you'd want to have a pet cow.

R: That's so funny. So it's the exposure to the outside world and the fur that collects those microbials, not just the pet itself. It's what that pet brings into the home.

H: And there are other things you could do. A diet high in fiber, a plant-based diet, cutting down the processed foods, cutting down on antibiotics—using antibiotics only when necessary—and maybe not being so sterile in your house. Antibacterial cleaners are fantastic, but maybe our houses are too clean.

R: Let's dive into the connection between the microbiome and your mental health and the quality of microbiome and your risk for disease. You mentioned briefly in this interview, but I also know from your course and documentary about the seed and feed process—receiving that initial microbiome as you exit the vagina and are exposed to microbes. It has lifelong implications. Can you speak to that long-term importance?

H: Scientists are just at the tip of the iceberg in terms of how important it can be. And, at the moment, it's very difficult to establish causality. For example, it's very difficult to establish that because a baby was born by c-section or had antibiotics that this causes other illnesses. However, there are associations, and the associations are that a baby born by c-section, and c-section usually comes with antibiotics, or if formula fed, that child is at increased risk for a certain number of diseases. Increased risk for allergies, asthma, diabetes, celiac disease, other autoimmune conditions, and obesity. So there's links with increased risk, but that doesn't mean that every child is going to get that. It just means that there's an increased risk across the population.

The thing is, if a child is at increased risk for asthma or obesity, the scientists also show there is a trajectory of disease. So, if you have asthma early in life, you are at higher risk of having other conditions later in life. If a child is obese early in life, then I think it's either 43 or 46 comorbidities associated with obesity. So there's a kind of a trajectory of disease that child is more likely to be at risk of.

Also, the microbiome has been associated with many other conditions, from multiple sclerosis to other autoimmune conditions and a whole web of diseases. So it could be, and this is the hypothesis right now, that what happens during that early infant period has lifelong effects. And it's not just the microbes themselves, the microbes interact with genes. The expression of genes, switching on and switching off genes, called epigenetics. It's a really complex process, but the evidence suggests there are lifelong consequences to what happens during that really sensitive period that surrounds birth.

R: A new study that came out said that the fetus doesn't have a microbiome yet, but the infant does, so we're still learning about the timing of all of this. But, I read another study months ago that said a

person who eats a ketogenic diet (high fat, low fiber, low plant diet) kills off a lot of their microbes because the microbes aren't being fed through the pre and probiotics that they get from plants. Therefore, if the pregnant person doesn't have it to give to the infant, they can't transfer what they would they don't have. I was nervous about a headline like 'a fetus doesn't have a microbiome' because the pregnant person's microbiome is still very important. I'm not sure what my question is in there; I guess I'm just saying there's still seems to be some confusion and dots are being connected. And there's mixed messages. Do you have any key takeaways to birthing families or to people who maybe didn't have the birth they had hoped?

H: There was some research that was published that there was a scientific consensus that the baby starts acquiring microbes after birth. This is a hotbed of science to dispute because other scientists will say, "Actually, I disagree with that consensus." So, this is an emerging field. There's so much to learn. And yes, the dots haven't been connected yet. They're starting to be connected. But in many areas, they don't have all the information. But there are key takeaway messages.

Sleep is really important, particularly if you're pregnant. Sleep, relaxation, meditation–there was a study, I think it was on Tibetan monks showing how much meditation affects the microbiome. So if you're pregnant, taking time out to meditate to relax, or the things I mentioned before about things you could do—gardening house plants, opening windows is great to let nature in, getting a dog or a cat that goes outside.

Leafy green vegetables are good for everybody. And maybe not restricting your diet so much apart from processed foods, eating a diverse range of fruits and vegetables, and having diversity within your diet. If you're not sensitive to gluten, then eat oats, bran, barley and wheat, and all of those types of things. A diversity of whole foods that is high fiber. That is fantastic. But also eating your sauerkraut, kimchi, yogurt, and probiotic foods are good.

What else can you do? Just being mindful, that's my biggest takeaway message. Just be mindful that you're not who you think you were. You might have thought you're a human. I'm Toni. I've got trillions of human cells, that's me. I've also got trillions of other cells in me that also need to be protected and thought about, and to be I need to be mindful of. So that's my take-home message that you are more than you think you are. So just behave in ways that are taking on microbial friends.

R: Yeah, tend to your passengers, you're their host. That makes a lot of sense. And that's interesting to think about, that we are kind of

responsible for these microscopic creatures. We take care of them, and they take care of us in return.

H: That's the whole point. This idea of this symbiotic network that we help them, and they help us. We're all happy about living life and in balance with our passengers. I like that expression.

R: Well, that's wonderful. Thank you so much for your time and for chatting with me. It's been so interesting. Is there anything that you feel is important that we didn't get to?

H: Our conference. We're running our first-ever international global-scale conference, connecting a fantastic panel of scientists with childbirth educators, doulas, midwives, and other birth workers. We're bringing everybody together in this two-day virtual conference to discuss how we bring this information to parents in a way that doesn't trigger parent guilt. We'll have keynote presentations and panel discussions, but actually, the key is the small group discussions. I'm looking for people to generate solutions. We've got the big birth and doula organizations involved, including APPPAH. My vision is to generate momentum, to bring this science to parents, and to unite and galvanize the community birth community, so that we change the face of human health.

R: I love that. When is it? Where can I go to learn more and sign up?

H: 29th and 30th of April 2023. Go to microbirth.com.

R: Wonderful. It was so nice to meet you. I wish you the best for your conference. And I'm so grateful for the work that you're doing.

H: Thank you so much.