Transcript

George Leeson

Welcome to the Ageing Conversation, a series of podcasts from the Oxford Institute of Population Ageing at the University of Oxford. I am Professor George Leeson, Senior Professorial Fellow at the Institute. The Oxford Institute of Population Ageing is now celebrating nearly 30 years. was the first institute to move away from looking at old age per se and instead to examine the implications for societies, economies, political systems and indeed the wider global community of the profound demographic shifts brought about by falling fertility and increasing longevity. We are a multidisciplinary institute and the topics presented in this podcast series reflect the breadth of expertise exploring different aspects of population ageing, past, present and future. Each of these podcasts features an interview conducted by one of our research fellows and I'm delighted that the current series features Dr Chiara Fukaci and Dr Kate Bancroft. The opinions expressed by the interviewees do not necessarily reflect those of the Institute.

Introduction

Welcome to the podcast series of the Institute of Population Ageing at the University of Oxford. In this series, we're going to look at interesting aspects of why we age the way we age. And the next episode is hosted by my colleague, Dr. Kate Bancroft. Let's dive in.

Kate Bancroft

So I'm joined today by Dr. Ghada Alsaleh, who is the founder and leader of Oxford Space Innovation Lab. So welcome Gharda to the podcast. Would we be able to begin just with a little bit of an overview about you, what you do here, and how you got into this position?

Ghada Alsaleh

Thank you so much, Kate, for having me here, and hello for everyone. So, I'm Doctor Ghada Elsaleh, and I'm trained as a pharmacist, but I was always fascinated with research. I did my PhD and during my PhD I was working and interesting to understand rheumatology disease. Specifically, I was working with rheumatoid arthritis and osteoarthitis patients. But during my time of PhD and my postdoc, I was start to be more curious about aging and the process of aging. And after having my PhD and postdoc, I managed actually to become as a PI where I'm leading a group of research. My interest was more about aging and specifically in age-related disease such as osteoarthritis, which I also was interested in with this disease during my PhD. Why I'm Now in this position or if you ask about the space innovation lab, how it's start is most likely curiosity. This was the first. part because as I mentioned I'm very interested in

aging and one of the things that I notice and a lot of people also know about that that the astronauts suffer from a different disorder in their muscles like muscles atrophy in their bone and also disorder in their immune system and when I was looking at this I said to myself well this is a bit very strange or very similar in a way to what an elderly people suffer usually. So do we have this problem in this space? Do we age faster in this space? And then I start to be connected to people who work in the space sector, people from NASA, ESA, some other also company to understand how we could be using the space to study aging. Brilliant. And here we are.

Kate Bancroft

Yes, here we are. So obviously this is an audio podcast, but I'm in your office and I can see lots of screens going on, which is really, really exciting. So would you be able to give us a little bit of an overview of what's going on in the innovation lab? And you've said there that it's about age, whether we age more slowly, sorry, more quickly when in space. So do the astronauts as well, do they feel a bit worried about going up there and the toll it's going to take on their body because of things like what you just described?

Ghada Alsaleh

To answer the first question about what's going on with all the screen, so we have a direct connection with the International Space Station. And all the screen that you can see here is kind of a control system that allowed us actually to manipulate the sample that we send to the space from the office. So it's a very important point. It's a very new technology because usually when we want to do any experiment in space, we have to choose astronauts, we have to train them, we have to tell them what experiment they need to do. In this new space innovation lab, the idea is to make everything automat from Earth. And the only thing the astronaut they needed to do is to take a small box and actually put it and attach it in a platform in the International Space Station. And that's it. So it's very easy. Anyone can do that. And from there, we are connected to this small box, which have our biological sample. And we can have a monitor this sample every second, every minute. 24 hours, 7 days. So this is really a very important point because you can accelerate the experiment going into space, but also you could reduce the costs. because you don't need actually to cost the time of the astronaut. You don't need to cost their training. A lot of things happening when you do experiment in space. It's a very unique and great environment.

Kate Bancroft

Wow. So one of the screens I can see up here is a camera of the, so it's artificial human tissue. Is that right? How you describe it? Yeah. And you can manipulate the human tissue with different chemicals and things that to see how they react.

Ghada Alsaleh

Absolutely. So this photo here is or this image is coming from the International Space Station. They are organoids. The organoids that's been actually a collection of different tissue that mimic a specific organ. And as I mentioned earlier that I'm very interested to study osteoarthritis disease, which we know that is affect the synovial tissue and the chondrocyte or the articulation. So here what we were developing, we were developing an organ that mimic exactly the synovial tissue of a human being because we can't take synovial tissue from astronaut to study what happened to them. So the idea and also in a lot of research we go to this 3D organoid model because then we don't use that much animal which is really good because we reduce that but at the same time some could mimic part of the human body. And yes these are synovial organoid and the other part they were skin organoids, some of the fibroblasts coming from the human skins. And the idea is to see whether these tissue, these two different kind of organoids will be accelerate aging when we look at the process of aging or at the cellular process of aging.

Kate Bancroft

So is it like a quasi experimental randomized control chart. So have you got some cells there of the organs that are not being manipulated with the extra chemicals and some that are and you're comparing them?

Ghada Alsaleh

We do have some of the drug that we considered in the earth as anti-aging drug and we use that alongside with the organ weed to see if there is truly the organ weed accelerate aging and they become aged faster. any of this drug would stop or slow down this mechanism.

Kate Bancroft

Brilliant. And are the astronauts that are in the space station right now? I'm looking at the map to see we can see them over Brazil. Is that where you'd say they are right now on the map? Oh no, they're on the right hand side, aren't they? Sorry, I'm getting the wrong symbol.

Ghada Alsaleh

They are in Kazakhstan.

Kate Bancroft

Kazakhstan. So yeah, at the minute we can see the space station's in the dark side of the planet right now. Brilliant. So are the astronauts that are in the space station, are they working on lots of different trials and stuff that are going on inside of it or just your one?

Ghada Alsaleh

Well, yeah, this is a good question. Normally, the astronaut have a lot or a very busy timetable. They have so much of things to do and they have a lot of experiment to deal with and to test. However, my experiment. they don't really need to do a lot of things. As I mentioned, this is what make it a bit unique. That there is a box, they take it, they just put it in a very specific platform there and they will leave it. This next step where they will go, they will take it out from this platform and send it back when the other things. So, but they do have a lot of experiment. We know that their time is busy because they also and somehow part of experiment to see how human beings could believe, could be, at some point react to the microgravity, to the space in front.

Kate Bancroft

Yeah. Oh, okay. And so you're controlling that box from this room that we're in right now. I would be so scared if I was a member of your team of accidentally pressing something that destroyed them or spoiled them. How do you control them? Is there some computer?

Ghada Alsaleh

It's very, very well actually control and of course it's security. There's a very specific baby and there's a very specific also, you know, word pass. And of course we have only two persons who were trained to work with the software and manageable the sample. So no, I don't, I'm not worried about that. We are all aware. You're not going to.

Kate Bancroft

Intern, press delete or wipe out. Is your whole team working on this one project that's here?

Ghada Alsaleh

No, actually, as I mentioned in the beginning, so we are interested in ageing and I'm working on ageing into aspects, the ageing of our immune system because it's very important we know when the our immune system aged this will increase the problem of infection the loss of the vaccination efficacy and part of it we did also a few clinical tries trying to see can we give some supplement to these elderly people that could prove their vaccination and their immune system and I have who work on that and also we have an RA. In the other part, most of the team focus on osteoarthritis and musculoskeletal aging. And the third part is about actually the space and how we could use that as a platform to study aging, which I think is very important because If you can imagine, if we prove that, we age faster in space, at least in terms of organoid, that's mean the experiment that we could do it here in Earth for 20 years. or more, we could do it in one month in this space or two months. I am not giving a correct number or the

right rationality, just to give you an idea as it happens so fast there. So these are the three main projects we work on, but you can see they are all related to understand the aging process. And what I want to really emphasize here that we are not interested to increase lifespan or stop aging, what we are interested in to heal or slow down the age-related disease. We'd really like everyone to live healthier until the last day in their life because this is what's matter. How much you enjoy your life rather than how much day you spend in your life.

Kate Bancroft

Yeah, that's really important. So these tests are to test medication or different types of technology that could slow it down. So what you're saying is in a test, we might have to trial something. We know in aging related research, like tests have to go on for years and years and years because we're trying to show something over a period of time. But here in the space station, we can do this, show the effects of it in a much smaller amount of time.

Ghada Alsaleh

Absolutely. Because, you know, on Earth to age, we need several years, right? I mean, if we are 40, we are not aged now, even After sixty-five, you are reconsidered we become aged, but to be really studying this process of aging, we need to follow for a similar year, let's say from 20 to 60 or even from 40 to 80, so you can't say that. to understand this process is really take a lot of period of time. It happens in Earth. You never aged in one day and the other day you wake up, you are aged. So it's really over several years. In the microgravity in the space, it seems to be this happening so fast. Now we need to understand how fast this is. And maybe other things just to add to your question, to make it clear, because a lot of people, when we were talking about space and when we're going to go into space, we have this notion of we're going to come back younger because if we calculate the time in terms of time, definitely we'll be spending shorter time in space, which is longer on Earth. So if we go 13, and we come back, we might be still 40 years old compared, you know, if you just do this calculation as an interstellar movie.

Kate Bancroft

Yes.

Ghada Alsaleh

Right.

Kate Bancroft

Favorite.

Ghada Alsaleh

But the things that we will need to be aware of is different between chronical aging and biological aging.

Kate Bancroft

Yeah.

Ghada Alsaleh

So chronical aging, how much time, you know, we live in terms of years. Biological aging, we might be actually 14 years old, but actually our body is like a person who are 60 or 16 years old. So the biological aging is different, depends how healthy you are.

Kate Bancroft

Yes.

Ghada Alsaleh

And the study in the International Space Station, we don't have the nation of time for the moment because the International Space Station is very close. It's only one minute between us and them. So we are not really studying the chronicle aging or yes. It's not this chronic time related doesn't matter.

Kate Bancroft

We can't compare.

Ghada Alsaleh

We can't compare it now. But we could definitely compare the biological age. And this might reflect later if we spent more time in space, though we said it's only like five years in space while in Earth was 20 years, how much biologically we really aged. And this is very important.

Kate Bancroft

Yes. Fascinating. So are you allowed? to share whether it's looking promising or is that top confidential project information?

Ghada Alsaleh

No, I'm happy to share, but for the moment we need to wait to see the results. So I can't sell any of the results. But I really want to emphasize one more thing is that this project is again not about studying how we age in the space, it's most likely to use the space and the technology there to help the majority of people who are in Earth now.

Kate Bancroft

To.

Ghada Alsaleh

Live healthier. It's not likely to go into space. Of course, it's one of them. It's important and we know that's our future and something would happen. In the meantime, what matters is Earth and we will believe in Earth and how we could use all this technology to help people and make them suffer less.

Kate Bancroft

I think as soon as people hear space, don't they, it's more, people start thinking things like that, like it's going to make, are we testing, are we trialing these so that we can live longer? It's not about that. It's about getting drugs tested faster so that we can get them to the people who need them the most on Earth.

Ghada Alsaleh

So that's really the measure and the most important point. We're doing this for people in Earth. We're doing this to help people live healthier and have a healthy span. And we could use this environment to accelerate our experiment, our study, our knowledge about this.

Kate Bancroft

And are some of these or other places doing work on cancer in the same way and things like that they've still not been able to find?

Ghada Alsaleh

There are some actually other projects. I don't know. how far they are, but they are also trying to understand cancer. Some of other people would like to study cardiovascular or even brain, tissue brain and all this organ development. But it's still, we don't know which experiment and where it's a very limited information.

Kate Bancroft

Yeah. And I'm also interested in people doing animal, like animal testing in a similar way that what we're doing is, creating an artificial form of human organs. Are they doing the same with animals and things and for pets and stuff or do you not know?

Ghada Alsaleh

Yeah, no, I mean, I don't know the exact data as I mentioned because there's a lot of, privacy at some point and other point we know about it. There's animals have been sent to space and different sorts of animals, I mean, mouse or dog and to see how.

Kate Bancroft

Living style.

Ghada Alsaleh

Yes, and there are other scientific questions.

Kate Bancroft

I had no idea.

Ghada Alsaleh

Yeah, it's happening, actually.

Kate Bancroft

It's fascinating. But living, I'm trying to imagine like a rocket full of Labradors floating around. So they have a nice time in space.

Ghada Alsaleh

Yeah, I'm not sure how much they spend, to be honest, but it's happening. I don't expect it to send a lot of, but definitely mouse, like mice that we use in. It's not to be used in some experiment.

Kate Bancroft

Brilliant. So last question, so don't take up too much of your time. So aside from this project, when you've been at conferences or you've read academic articles, what breakthroughs or developments in space technology excite you the most?

Ghada Alsaleh

About biology, the side of biology.

Kate Bancroft

Yeah.

Ghada Alsaleh

To be honest, I don't know.

Kate Bancroft

We can go this way. Yeah, OK.

Ghada Alsaleh

Because you ask about something that I didn't actually.

Kate Bancroft

Sorry, no, it's fine.

Ghada Alsaleh

You could cut this.

Kate Bancroft

Yeah, we'll cut this question now.

Ghada Alsaleh

Yeah.

Kate Bancroft

Okay, well, I am really, really happy to be here today. It's been really, really fascinating. I could look at this stuff all the time, even though I don't really understand any of it. But thank you so much for helping me understand this project. It's been really, really interesting. And if people wanted to follow more about this work or your academic work, what would they, where would they be able to find you online? Where do you disseminate your research?

Ghada Alsaleh

First of all, I would like us to thank you to have me here. It was really very nice to have you and it was a very nice discussion. So we have our lab website and also we have LinkedIn. So they go to our Oxford University Alsaleh Lab or Muscular Screed Aging, they would find more information about the experiments and they could really follow us in the social media, LinkedIn and X. Brilliant.

Kate Bancroft

Well, thank you so much for your time and all the best for the rest of the project.

Ghada Alsaleh

Thank you so much, Kate, and lovely to meet you.

Kate Bancroft

Lovely to meet you.

Ghada Alsaleh

Thank you again.

Kate Bancroft

Thank you. Bye.

Ghada Alsaleh

Bye.