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TRANSCRIPT

Gretchen Repasky 00:06

Have you ever stopped to think - how far away is the closest clinic or hospital? For most of you, that's probably less than 20 kilometers of maybe even less than two kilometers. But, a study of maps published in 2020 tells us that about 10% of the global population can't access health care within an hour of motorized transport. And for some really remote regions, it can even take days. This can get really challenging for people living with diabetes or other chronic diseases, who need regular treatment and screening for complications. One idea is to design smarter screening programs. But how?

Today, I'm talking with three experts in public health and epidemiology, whose work deals with exactly this problem in Greenland. Stine Byberg is a team leader affiliated with the Steno Diabetes Center, Greenland. Stine is a public health researcher looking at disease prediction, especially for the eye disease that affects people with diabetes. Trine Jul Larson is a researcher at the Institute of Health and nature in the Greenland Center for Health Research at the University of Greenland. Trine uses artificial intelligence and telemedicine solutions to assess diabetic eye diseases. And, Marit Eika Jørgensen is a researcher at the Steno Diabetes Center in Greenland and professor in Clinical Epidemiology at the University of Southern Denmark. Marit is an expert in diabetes,endocrinology. I'm your host, Gretchen Repasky. And this is Postdocs Talking, connecting diabetes and metabolism research to society.

Stine, Trine and Marit are all joining us remotely from Greenland today. Stine and Marit are in Nuuk and Trine is sitting several hundred kilometers to the north in Ilulissat. Welcome to you all.

Stine Byberg 02:19

Thank you.

Marit Eika Jørgensen 02:19

Thank you.

Trine Jul Larsen 02:20

Thank you.

Gretchen Repasky 02:21

It's so great to have you here today, because I'm excited for all of our listeners to hear about your work. And I'm also thrilled to be connecting with scientists in Greenland. Tell us just very briefly about the Greenlandic health system. Set the scene for us.

Stine Byberg 02:33

Well, as you already mentioned, Greenland is a very, very large country. And it's only populated by 57,000 people. So they are scattered all around the coast. And, of course, that is very challenging for a health care system. Both you have a small number of people and they are very scattered around the whole country, which is the biggest island in the world. And in addition to that, it's also covered by an ice cap. So you cannot drive or bicycle or whatever you usually do anywhere else, you have to take a boat. And if it's during the winter time, the seas can be frozen or you have to fly. And that also depends on the weather.

Trine Jul Larsen 03:19

When you live in remote places in Greenland in villages and settlements, as Stine mentioned, it can take days. And sometimes you have to be in the town for almost a week because it can take...you have to get a time for the eye screening and you have to get an appointment at the doctor's. So you have to be far away from your family for some time.

Gretchen Repasky 03:48

Marit, what is your perspective?

Marit Eika Jørgensen 03:52

I think it's worth to mention also that Greenland nowadays is a pretty modern society. Many things have changed here dramatically, especially after the 1950s where the country has changed from being a traditional hunter society, and then to a much more modern society and people live longer. And that of course, influences also our way of living. And of course, influences, health in general. And luckily the population is growing older, which is also important for when it comes to chronic diseases.

Gretchen Repasky 04:31

So with this change in the society, then it's interesting to look at that - perhaps Stine, from the epidemiological point of view, as somebody who's looking at how to better predict disease. Can you tell us a bit about type 2 diabetes in Greenland because I understand it's been on the rise?

Stine Byberg 04:50

Yes. And I think Marit is a real expert here. So I'll probably just be citing her and then she can she can jump in when I say something wrong. But you're right, the prevalence and incidence has been increasing. I think back in the 1950s, there were a few studies looking at diabetes in Greenland and found almost no one had diabetes, a very low prevalence. And then there was a study done in 1999, where the prevalence was almost 10%. And that was very surprising, because everyone had thought that diabetes was not a problem in Greenland. And then it was. And also surprising and frightening was that I think it was 70 or 80% did not know they had diabetes. So, receiving the right amount, or the right care and treatment was not possible for 80%. What is also special for Greenland is that, of course, the societal changes that have been ongoing for the past 50 years, they have resulted in a change of lifestyle, and this has induced obesity, and all these known risk factors for diabetes. But in addition to the known risk factors, such as diabetes and physical inactivity, there is also a genetic aspect in Greenland, where some genes where we think they have been preferential in surviving in these harsh Arctic environments, they, in the modern society, seem to have adverse effects on developing disease.

Gretchen Repasky 06:33

That's interesting, let's make sure we come back to that genetic aspect, and explore that a little bit further. Before we before we do that, Marit, I wonder, could you comment a little bit on how does this rise actually relate to perhaps Danish society, and how type 2 diabetes has perhaps the prevalence of it has changed or not changed in the last 50 years?

Marit Eika Jørgensen 06:58

I think what we see here is completely parallel to what we've seen in the rest of the world, maybe a bit of an epidemic, appearing a bit later than we have seen in many Western countries, but it parallels very well the kind of diabetes epidemic we see also in low and middle income countries in the world, especially Asia, where diabetes is rising rapidly - as a result of and as mentioned already, the lifestyle changes. So the Westernization of the societies, but also in combination with or seen in a population where there's some kind of basic susceptibility to develop diabetes and metabolic diseases. So it's very clear, it's obvious that this is not a matter of only genetics or lifestyle changes. It's really the combination, the interaction between the two that is playing a role here.

Gretchen Repasky 08:01

How about the numbers overall? Because Stine, you mentioned about 10% prevalence in the late 90s. How does that compare to, let's say, in Denmark?

Stine Byberg 08:13

Well, I think the prevalence is Denmark is around 4-5%. Is that right, Marit?

Marit Eika Jørgensen 08:17

Yeah, I think it's close to double of what we see in Denmark. But it's not that easy to compare, because the Danish population is older. Life expectancy is longer - but approximately the double of what we see in Denmark.

Gretchen Repasky 08:36

Trine, let's talk a little bit about diabetic retinopathy, because this is at the heart of your PhD thesis, which I understood you very recently submitted. Can you tell our listeners what actually, what is diabetic retinopathy?

Trine Jul Larsen 08:51

Well, diabetic retinopathy is if you have gone a very long time with high blood sugar level in your body, and the high blood sugar level can damage your blood vessels in the eyes and make them weak. And in the long end, if it's not treated, or if they don't find out in time, it can lead to blindness. So it's very important that they find out they have this disease and that it is treated.

Gretchen Repasky 09:23

And you've been focusing on this, I know in your in your thesis. Tell us a little bit about why is it so important to study there?

Trine Jul Larsen 09:33

Well as Stine and Marit mentioned before diabetes in Greenland has increased in the last couple of decades. And we want to know if they have long term complications, to see if they have this disease. So my thesis is actually based on the population health survey where we want to get a picture of how it is with diabetic retinopathy now. And my second paper is focusing on the whole population in Greenland, registered with diabetes just to see how it is and what is the prevalence and the incidence of this.

Gretchen Repasky 10:19

Stine, Marit, could you tell us a little bit perhaps about why looking at diabetic retinopathy is actually so interesting there in the population in Greenland? Because there are there are plenty of other diabetic complications as well.

Stine Byberg 10:35

Well, first of all, this diabetes epidemic is quite recent. And as Marit said, it's mimicking the Western world, but it's come later. So we're actually still in the beginning, maybe of an of a diabetes epidemic. So we actually don't know how is the population affected by long term complication, which is one of the dangerous things about having diabetes, obviously. Then there was a study done in Nuuk, which is the capital of Greenland. Just a register-based study where researchers looked at diabetic retinopathy in ethnic Greenlanders and Danish-born people usually, and found that the Danish-born people had three times higher occurrence of diabetic retinopathy than the Greenlanders. And when they looked at other long term complications, the rates, or the prevalence of long term complications were more or less similar between Greenlanders and Danish-born. So that was quite interesting that the Greenlanders seem to have a much lower prevalence of diabetic retinopathy, in a small study in Nuuk. So we were not sure this was the this was the case for the entire country. So that's why we also think it's very interesting to look at diabetic retinopathy in Greenland. And also, because we know that the genes play an important role in the development of diabetes in Greenland. So maybe they could also play a role in the development of late stage complications.

Gretchen Repasky 12:11

So let's go off of that point now. And tell us a little bit about your main research questions because I get the feeling they're centered around this this question about the influence of genetics. But not only that?

Stine Byberg 12:27

No, of course, doing genetic research means that you need blood samples from people and you have to do some expensive analysis. So we don't have that data yet. So for Trine's PhD, we wanted to start at the beginning and just make an overview. What is actually...is there a difference in the prevalence of diabetic retinopathy? How does this look for the Greenlandic population? What are the risk factors that we can get from data from the population health survey, but also from the electronic medical registers? And then we know for a fact that we have these distances, and the screening program is very expensive. And it's very time consuming. And in Greenland, as a whole country, we also have difficulty in attracting healthcare personnel. So there were a lot of challenges where we thought "Can we somehow make a solution to combat these challenges?" So that was sort of the stepping stone for Trine's PhD. And then we also wanted to look at some genetics in the population health survey where the people have been genotyped. But we simply

had too few cases of diabetic retinopathy to be able to look at genetics. So that was planned, but didn't happen.

Gretchen Repasky 13:57

that's interesting, the prevalence is just too low, to be able to get enough numbers to be able to study.

Marit Eika Jørgensen 14:03

But I think interestingly, we are now able to actually expand genetic testing to the entire group of patients with diabetes. So we are now whole-genome sequencing, offering whole-genome sequencing all patients with diabetes in Greenland, and that will, well, it will allow us to map the genetic components of the population, but also to actually see what role does it play to have this very special genetic population structure in terms of the risk of developing complications? So that is one question. On the other hand, what makes diabetic retinopathy it's not that we're not handling the other complications, but diabetic retinopathy is challenging in another way than the other complications because it requires the right type of equipment. It's often very expensive. You need the qualified staff to take the photos. And we rely, we are dependent, on specialists in Denmark for grading the photos. So diabetic retinopathy is, from an organizational point of view, particularly challenging compared to the other complications.

Gretchen Repasky 15:29

Trine is it then perhaps the situation that this is a more difficult kind of question that you're asking about diabetic retinopathy and you have kind of a bigger payout? So that's the reason for going after them? Because what is it that by studying this eye disease, what in the Greenland population? What is it that you could determine? Or what could you do with that information?

Trine Jul Larsen 15:56

We want to catch them before they develop the disease. And we want to be able to treat and make it easier for the population to access this disease.

Marit Eika Jørgensen 16:12

What is also important for us as clinicians is of course, if we find early stages of diabetic retinopathy, we can we can actually do a bit to prevent disease progression if we can improve glycemic control. And if we can, lower the blood pressure, etc, hopefully doing do something before specific eye treatment is needed, because that often has to take - always has to take - place in Denmark. So when you're when you have come to a stage where you need treatment for eye diseases, and then it's really expensive. Whereas we can hopefully do a lot in terms of preventing. So these things go hand in hand.

Gretchen Repasky 17:01

You mentioned there a few of the clinical signs that go along with the diabetic retinopathy. I was wondering if you could talk a little bit about the clinical risks that exist for developing the eye disease? And maybe how are these in Greenland compared to in Denmark?

Marit Eika Jørgensen 17:22

Well, first of all, glycemic control is the major factor. So, that is the most important thing to do something about and really try to lower blood sugar - in terms of preventing diabetic retinopathy. But also tobacco means a lot and blood pressure, or high blood pressure is a risk factor. And then there is, and I'm not an expert on that, some of the local things in the eyes - the anatomy plays a role for the risk. And genetics as well may play a role, especially because the types of diabetes we see in Greenland - they're somehow different from traditional type 1 and type 2 diabetes. One type of diabetes is related to a gene called TBC1D4 and people with diabetes caused by this gene, they actually only have high blood sugar after a meal. But then, they have severe muscular insulin resistance, but after, a few hours after, then blood sugar goes down to normal. And we actually don't know how much it means to have this kind of temporary high blood sugar. It might turn out that the risk of complications is lower. And that could be a nice message to give to these people.

Gretchen Repasky 19:05

Is that a genetic variant that's observed only in Greenland or do you find that in other

Marit Eika Jørgensen 19:11

Yes, it's an Inuit-specific genetic variants, so this is also in the Inuit populations in Canada and Alaska, but not outside the Inuit populations.

Gretchen Repasky 19:24

Are there other similar variants?

Marit Eika Jørgensen 19:27

Yes, very recently we have identified a type of monogenic diabetes or what we call MODY diabetes that is known in other populations as well. But there is a novel MODY-free agent HNF1A variant, which is again, Inuit-specific. We don't know much about it yet. But the years to come will show us whether this type of MODY should be treated as other types of MODY and how severe is this type of MODY diabetes. And these two variants alone they account for I think close to 20% of all diabetes we've seen in Greenland and so it's not really only an academic interest, it's something that matters.

Gretchen Repasky 20:29

The prevalence of type 2 diabetes in Greenland has increased over the past 20 years, and is high - about 10% of the population. Greenland is an autonomous island country within the Kingdom of Denmark. It's divided into five municipalities with a population of just over 56,000 people. A third of the population is concentrated on the southwest coast near the capital of Nuuk. The second largest city is over 300 kilometers to the north. In Greenland distances are vast, and access is often only possible via water or air, posing a challenge to healthcare services. Basic preventive care screening can take days for persons living in small settlements. Although several genetic variants unique to the Greenlandic, Inuit, and highly associated with the development of diabetes have been identified. It's not known if or how these genes affect the development of late complications, for example, in the eyes, peripheral nerves or kidneys. But interestingly, the prevalence of diabetic retinopathy is low in the Greenland Inuit, despite the high levels of diabetes diagnoses. If genetic information could be used to identify subtypes of diabetes with low or high risk of retinopathy, a more cost- and time-effective screening program could be designed, screening low risk persons less frequently, and persons at higher risk more frequently. Considering the geographical challenges to health care access in remote areas, not just in Greenland, we need to do better with research-backed approaches to ensuring public health.

So, Stine and Trine, let's let's go back to you. And Could one of you maybe start us off here by telling us about the study population in Greenland?

Trine Jul Larsen 22:36

Yeah, well, the study population is based on the population health survey where we traveled around in Greenland, where people are invited to participate in a population survey, where we started to look at later, we just complication where we did some screening where we imaged their eyes to see if they have diabetic retinopathy. So that was the first study where we looked at diabetic retinopathy,

Gretchen Repasky 23:16

How many people were in this first study?

Trine Jul Larsen 23:19

I think we have a total of 2500. But 500 were invited for this late complication screening,

Marit Eika Jørgensen 23:29

And, Trine, I think triggers it's worth to mention that doing such a population survey - that that's not something you do on a Friday afternoon.

Gretchen Repasky 23:36

Tell us a bit about that, about that as a method.

Trine Jul Larsen 23:42

They were invited based on their HBA1c. And previous participants in the study were invited to this complication screening where we were screening for neuropathy and diabetic retinopathy. And it took almost 45 minutes each in this screening. And then the participants would receive an answer for their eye screening within three months, because the images were assessed by a specialist in Denmark at Steno Diabetes Center in Copenhagen.

Stine Byberg 24:29

But yeah, I think it's also right what Marit said about the setup for the population health survey, because assessing these 2500 participants took one and a half years, and I don't know how much, how many years of planning before because I was just a data collector. But that took a while also to plan and then we visited - how many towns and how many villages? Trine knows that.

Trine Jul Larsen 24:59

I think it was...was it 12 towns and eight villages?

Gretchen Repasky 25:04

And I have to ask how do you get around to those towns and villages? Is it by plane?

Trine Jul Larsen 25:09

By plane. And by boat. And then we have to carry the Optus camera, which weighs about 45 kilos. So it was very challenging sometimes.

Stine Byberg 25:22

I have seen images of you examining people on the boat with the Optus camera and then putting it in a small boat and sailing it to the coast where you put it up in a school, as well.

Trine Jul Larsen 25:37

Yeah, yeah.

Gretchen Repasky 25:38

Wow. And so all of this took about a year and a half of data collection.

Trine Jul Larsen 25:46

Yeah.

Stine Byberg 25:47

Yeah

Gretchen Repasky 25:48

Is it that the screening takes place every other year?

Trine Jul Larsen 25:50

It depends on what they find in your eye. But if you don't have any alterations in the retina, then usually they'll give you a two year interval. But if you have very high levels of blood glucose, for example, then they might ask you to come more frequently, because we know that is an important risk factor. But it all depends on if you have any diabetic lesions in your eye.

Gretchen Repasky 26:19

Let's talk a little bit about what Marit brought up with, how can this be improved? So Trine I know that you're doing some deep-learning based methods development, right? And how maybe tell us what that is and how that might improve the existing screening technology?

Trine Jul Larsen 26:43

Well, in my thesis, we developed an artificial intelligence model to automatically detect diabetic retinopathy. We managed to make a model, but it still has to be optimized. So it's not something we can apply right now. But, for further perspective. Later on, if we improve it, it can be applicable in the Greenlandic population. And that would it would be less time consuming also for the personnel in Denmark assessing the images.

Gretchen Repasky 27:29

So right now, does it work that that, that the images are collected on-site in the health care clinics? And then those images are digitally sent to ophthalmologists in Denmark? Right. And then they do the analysis? And then they send back the the diagnosis? How does using an

artificial intelligence or a deep learning model change the process of the grading or the examination for retinopathy?

Trine Jul Larsen 28:04

Yeah, well, right now, when the patient gets an eye screening, the images are stored at a server and then they are sent to a ophthalmological nurses in Denmark, which creates the images. They are very fast when they get the grading but it can take two to three days before we have received an answer for the eye screening. And, with this artificial intelligence model, it could, we could get faster response for the eye screening, and it could ease the work for the nurses in Denmark, grading the images, because we have so low prevalence and incidence of diabetic retinopathy. If we could prioritize the images, which have retinopathy, it could ease the nurses in Denmark,

Marit Eika Jørgensen 29:11

I think actually, there was some small mistake, it's not two to three days, but rather, two to three weeks. Which is also pretty fast.

Stine Byberg 29:24

But maybe I can just add that this is also the way that the image screening takes place in Denmark. But in Denmark, it's less of a problem that you have this delay in response because people maybe live a maximum of 50 kilometers away from the screening, or even 100, but that's easy to commute in Denmark. And Greenland, you travel maybe for two or three days to get an eye screening, then you go back again, then there is something they find something in your eye that they want to look closer at. And then you have to come back to the screening station or you have to go to Nuuk where they have more advanced equipment, or you may even have to go to Denmark for further examination. So all of this, especially if you have to, for example, go to Nuuk and then they say, “Oh, we want even more examinations, you have to go to Denmark,” you're talking about a long delay in diagnosis, which for advanced retinopathy can be very critical in regards to preserving your eyesight. And for a country like Greenland, where you have a very low prevalence of retinopathy, then using an artificial intelligence model where you can select out those that definitely do not have retinopathy and saying you come back in a few years for screening, and then immediately sending those on that have some kind of alteration in the retina, maybe even have a hotline to the ophthalmological nurses can really improve screening efficiency and also detect sight-threatening retinopathy at an earlier stage.

Marit Eika Jørgensen 31:17

I think also, we have to mention the simple costs, because actually it costs some 800 DKK per grading sent to Denmark, and we know that less than 10% actually have alterations. So it would be nice if we could save the money for those with significant alterations that need to be taken

care of and then might not need the grading for the remaining or the majority of patients with diabetes.

Gretchen Repasky 31:56

I would love to hear a little bit more deeply about how the artificial intelligence model works.

Stine Byberg 32:04

Well, what artificial intelligence does is it works like our intelligence, only a computer does the work instead of your brain. But it's a bit in the same way. We don't always know how our brain identifies something, for example, a dog as a dog. In the same way, we don't always know how these artificial intelligence algorithms, they actually identify a dog as a dog or diabetic retinopathy as diabetic retinopathy in an image. But they learn in the same way as we do. We see a lot of images and at one point, we start to recognize, oh, this is the dog or this is diabetic retinopathy. So what you do is you give the computer a lot of images that have already been expert-graded. And since the screening program in Greenland has, with these Optus cameras that are used along the coast has taken place since 2015, we're able to retrieve all of the images that have been taken an expert-graded in Denmark for the Greenlandic population, and then feed it to the computer. And then it somehow learns how to identify the same patterns as the nurses in Denmark identify. If you look into the literature, there's a lot of artificial intelligence algorithms for detecting diabetic retinopathy in all kinds of populations. But since we don't know how the computer learns how to identify retinopathy, we have also seen in many other studies, that if you transfer one algorithm to a different population, it performs very badly. Because there may be something in the anatomy of the eye or something with the coloring. For example, Asian populations, they have more yellowish color in the retina than Western populations. So then the artificial intelligence gets confused and performs badly. So that's why if you want to use this as a tool in, for example, Greenland, where we know the anatomy of the eye is different, then it's important that you develop an algorithm specifically for the Greenlandic population using data from Greenland.

Marit Eika Jørgensen 34:07

I think what we also should mention is that we use another type of camera here. So that is another reason why we cannot apply algorithms developed for other types of eye examinations. So we need to develop an algorithm for this type of camera.

Stine Byberg 34:28

And maybe we can just add the camera used here is a wide field camera. So it takes one image, but images a large area of the retina, whereas the cameras, for example, use for screening in Denmark, they picture smaller areas of the retina and you piece the pictures together to get sort of an overview of the retina.

Marit Eika Jørgensen 34:49

And the reason why we have this type of camera in Greenland is that it's much easier to handle for staff who are not specialists within this field.

Gretchen Repasky 35:00

So, so far we've talked about a variety of factors that might weigh in on the low rate of eye complications in the Greenlandic population. I wonder if you want to expand on any of those. So we've talked about genetics and anatomy, but what do you see as the most important factors that could result in this low rate of diabetic retinopathy?

Marit Eika Jørgensen 35:24

Yeah, I think as well as already mentioned, the glycemic control plays an important role. Blood pressure may be important we have we talked about genetics. But I think we shouldn't be. We shouldn't take it too easy because we're dealing with a very young population and our patients with diabetes have a very short duration of diabetes. So, in the future, we might see more diabetic retinopathy simply because the population is older, and they are living with diabetes for more years. So, I think it's too early to say that the Inuit are protected somehow. And anyways, it's something that we have to take care of and prevent and scream and treat.

Gretchen Repasky 36:23

So Stine, and Trine, on that note of thinking about taking care of the population, what kind of concrete differences do you think that the discoveries from your work will make for society? You could think perhaps, in the in Greenland, but perhaps the Arctic society or perhaps on the global scale?

Stine Byberg 36:46

Well, we keep repeating ourselves with these vast distances and this harsh climate. But I think, knowing from Trine's research, knowing who we are, not knowing exactly but knowing much better who is at risk of developing diabetic retinopathy and doing the screening in a smarter way, we can better risk-stratify the population, locally at the screening sites, and concentrate our efforts on those at high risk of developing diabetic retinopathy or higher risk of developing eyesight-threatening diabetic retinopathy. And then the vast majority of the population who are at very low risk and who do not have any alterations, we can leave them be for a while. So it's simply making better use of resources, both for the health system in Greenland, but also for the population in Greenland, who may have to travel this very far distances, being away from family having to take time off work. And this goes for the entire Arctic, because it's not only Greenland, that is challenged by the infrastructure. It's like that in the entire Arctic, and I think, actually, in many parts of the world. Go to Africa, and you will have some of the same problems. And also

for Greenland, but that also goes for Africa, we don't have enough healthcare personnel to do screening on site. So we rely on these telemedical solutions. And we rely on the nurses in Denmark being able to take time to grade images for Greenland. And in Denmark, the in the prevalence of diabetes is also increasing, and more and more people are being screened. So we're also putting more pressure on the healthcare personnel in Denmark.

Gretchen Repasky 38:40

Marit, you have also this view, perhaps from the Steno Diabetes Center, Greenland, what is your take on Stine and Trine's findings, and how they will be seen as having an impact on the broader society?

Marit Eika Jørgensen 39:00

I think this type of research really fits very well to the ambition for Steno Diabetes Center Greenland where we, of course, overall, we should deliver good care to our patients. But we're working very much on the organizational part because the country is so special. So we're doing a lot of currently on telemedical solutions for consultations. And also in Greenland, we have similar to what we have in Denmark, we have excellent health registers. So we are actually able to monitor the quality of what we're doing, both the traditional risk factors, but actually also process indicators. How many of our patients are actually timely screened, not only for retinopathy, but also for other complications? So we have an excellent opportunity to employ the research findings and actually also to monitor how well things are going. So I think this type of research where we combine, let's say, epidemiology, genetics, all that stuff, with a healthcare perspective fits very well with the idea behind the Steno Diabetes Center.

Gretchen Repasky 40:16

If we think about those technology angles, have you even thought about maybe far in the future, how this could look, for example, drones be used carrying this equipment to go to the really remote settlements?

Marit Eika Jørgensen 40:34

But I think the drones have to really grow bigger.

Stine Byberg 40:41

Marit, you've been away in southern Greenland for the past week. So you haven't seen that from just outside the hospital, they've been testing a drone that delivers medicine out to the smaller villages, and then looks like a small airplane. And, I think it can carry 30 kilos. So our new camera that we have tried in southern Greenland, which is small, weighs 25 kilos. It may actually be able

to carry that one. But I think they need to test it a bit more before they drop the camera in the ocean.

Gretchen Repasky 41:15

But it's fascinating to think how this screening might be able to be taken to the people rather than the people to the screening.

Marit Eika Jørgensen 41:22

We still need people to operate the cameras. But I think we're definitely in a field where technology works with us.

Gretchen Repasky 41:36

Stine and Trine say a little something about what has been particularly interesting for you as you have been interacting with people.

Trine Jul Larsen 41:47

I think it's when we did the Population Health Survey. People were very interested to participate. It was like, 'finally, there's some one here to know how we are and want to see how we how we're doing.' And, I think they were really willing to participate because people living in remote areas, they don't see health care personnel or like researchers very often. So there's some interest in us too, and they were very positive about participating in research.

Gretchen Repasky 42:35

And how was that for you as a researcher getting that that kind of reception, that kind of feedback?

Trine Jul Larsen 42:42

It was really nice also because I speak Greenlandic, and I think it was important for the population that they can talk to someone in their own language and don't have to be translated. It meant a lot to the participants. A normal question like, 'how are you doing today?' and I would get a very large response. I just want to know how they were and they just kept talking. And it was very intimate. Like, I didn't expect they would be so open. So it was like 'finally there are some here who want to know how I am.' And I just wanted to do as a complication screening, but I would get a lot of more response than I was expecting.

Gretchen Repasky 43:41

Stine, what has been interesting for you?

Stine Byberg 43:46

Well, I think some of the same things as Trine was mentioning, because, well, during Trine's PhD, the only time where we had people between, real people between, our hands was in the Population Health Survey. Now I don't speak Greenlandic, so people didn't talk to me as much as they did with Trine. But I think it was also very interesting, like, how interested actually, a lot of the participants were in their own health, and also how we were going to use these results. Because some of them also ask, okay, so, of course, how am I doing? But how are you going to use these results? And how is it with the diabetic eye disease in Greenland or diabetes in Greenland. And I think that was an interesting discussion also to have with participants in this study.

Gretchen Repasky 44:37

So as we talked earlier, there's been quite a rise in the prevalence of type 2 diabetes and Greenland in a pretty short period of time. So I'm really curious to hear what do you think of if this trend is going to continue? What is the situation for Greenlanders in 2030, 2050?

Marit Eika Jørgensen 44:57

It's hard to predict, but we have seen even a further rise in diabetes prevalence from the two population surveys in year 2000 and 2010, and too, the most recent in 2018, where somehow depending on diagnostic method, but we had seen a further increase in prevalence of almost 50%. We also see an ongoing rise in obesity, particularly among women, which makes it likely that the prevalence will continue to rise. On the other hand, I think there's more acknowledgement of what a healthy lifestyle means, and education is getting better. Many other aspects are improving in this society. So, there might be different trends, but I think we might still expect to see a rise in prevalence also, because the population is getting older.

Stine Byberg 46:13

But more people are being detected now. So that is on the plus side.

Gretchen Repasky 46:21

So, what are your next steps and the challenges ahead for you and your research projects?

Stine Byberg 46:27

Well, I think with Trine's research, what really is intriguing right now is why do we see this low prevalence compared with other populations. And, of course, the easy, low hanging fruit would be that the population in Greenland simply haven't had diabetes for long enough yet. And it's a young population. But we don't quite believe that that is the only explanation. So we would very much like to look into the genetics. And there is a plan, and I think it's already been implemented that will try and genotype all diabetes patients in Greenland. It will take a while, of course, so we won't know that for the next couple of years. But we've also been talking about for the known risk factors, such as HBA1c and diabetes duration and blood pressure trying to match the Greenlandic population with Danish population, for example, on the same levels of HBA1c, blood pressure, duration. And just very roughly see, do they have the same prevalence of diabetic retinopathy, if you align the risk factors, or does the Danish population, for example, have a higher prevalence with the same risk factors?

Gretchen Repasky 47:51

Well, let's wrap up now. And let's wrap up by returning to where we started, we're certainly not going to be able to physically shrink those vast distances in Greenland. So how can research-backed approaches improved preventive medicine, especially in remote areas? Let's leave our listeners with your final thoughts.

Stine Byberg 48:11

Well, I think from what Trine has been doing, we have a much better overview of what is the actual prevalence and incidence of retinopathy, and it's very low compared with Denmark. It was not just a chance finding in some of the earliest studies. And using new technology, for example, new cameras, artificial intelligence algorithms, has a great potential in Greenland, for early detection and detection close to home, and better risk stratification of the patients. So, we optimize the resources.

Trine Jul Larsen 48:52

I agree with Stine. And if it could ease the access for the patients and make it easier for them to get screened for a diabetic retinopathy, it would be very important.

Marit Eika Jørgensen 49:10

I think also, we can learn a lot from the diabetes area about how to optimize chronic care, how to use telemedicine solutions. And the results from our field might definitely benefit other chronic disease areas in Greenland. So I think we can learn a lot from this type of research on a more general level.

Gretchen Repasky 49:40

I wish you all the best as you continue to contribute to the design of smarter, stratified screening programs. A very big thank you for spending time with us today and sharing your work with our listeners.

Stine Byberg 49:54

Thank you.

Trine Jul Larsen 49:55

Thank you.

Marit Eika Jørgensen 49:56

Thank you.

Gretchen Repasky 49:57

Thousands of postdocs around the world are dedicating their careers to better understanding and improving diabetes prevention, care and treatment. You can learn more about Stine, Trine and Marit, the guests of our show today, at our website, DanishDiabetesAcademy.dk, where we have short bios, additional information about their research and photos of them at work. Our show today was produced by the podcast agency Kontekst & Lyd. If you like what you've heard, remember to leave us a review so others can find us more easily. A very warm thank you to the Danish Diabetes Academy for keeping Postdocs Talking. Thanks for listening!