Groninger Glaucoma Evening 2019

The first Groningen Glaucoma Evening took place on June 25th in the University Medical Center, Groningen (UMCG). Despite the warm weather the turnout was great, with around 50 people attending. Participants, both with and without glaucoma, signed up for information on the latest glaucoma research on glaucoma. The general theme of the evening: a lot more research for glaucoma is needed. Also, many healthy older people want to help and do their part in glaucoma research.

Glaucoma evening organizers and PhD students Iris Tigchelaar (left) and Anna Neustaeter (right) pose with the swag bags that were given to all participants

After the welcome reception, attendees were escorted to the Red lecture hall. The organizers of the evening, Iris Tigchelaar and Anna Neustaeter, welcomed all participants and explained the evening's programme. It consisted of three parts: Part 1 was a lecture given by Prof. Dr. Nomdo Jansonius, an ophthalmologist, the head of the ophthalmology department, and a professor within the UCMG. Part 2 consisted of three parallel informative workshops where participants had pre-registered, and Part 3 was a question-answer session with an expert panel, where questions from the attendees were given practical and in-depth answers.

Part 1: The Lecture

Dr. Jansonius described the development, diagnosis, and the course of clinical care of glaucoma to attendees. He further described current research taking place within the European EGRET research program (see box), and how these scientific breakthroughs will help patient care in the long run.

"You usually need reading glasses around the age of 45. During the optician visit, your eye pressure will be measured. If it's too high, you'll be referred to an eye doctor. The eye doctor will examine your optic nerve and visual field. These two things together can lead a glaucoma diagnosis. The first treatment given to the patient is usually drops that lower pressure within the eye. The vision you have upon diagnosis can be retained, but the loss cannot be reversed. If you start treatment in time, you can keep reading the newspaper and driving for a long time."

What is EGRET?

EGRET stands for European Glaucoma Research Training Program. It focuses on research into the cause(s), earlier detection, and better treatment of glaucoma.

An important goal of EGRET is to make new, young researchers enthusiastic about glaucoma research. There are 25 active researchers in Finland, Germany, France, the United Kingdom, and in the Netherlands. In addition to the UMCG in Groningen, the Academic Medical Center in Amsterdam is also involved in EGRET. A large part of the research within the UMCG takes place at the Ophthalmology Department and the Neuro Imaging Center (NIC). The researchers work together with the Epidemiology, Neurology, and Audiology departments.

Dr. Jansonius giving a lecture to attendees of the 2019 Glaucoma Evening

Late diagnosis, or poor treatment can lead to permanent damage and vision loss. “This is what we are trying to prevent. Current treatments work the vast majority of the time, but sometimes they don’t. This is why we need to do a lot of research." Dr. Jansonius then gave an overview of current state of research.

Glaucoma is still being discovered too late

“Currently, 15 percent of glaucoma patients will go blind by the end of their life. That means they see too little to normally participate in society. This is mainly due to discovering glaucoma too late, despite all attempts to detect it early. People still go to the eye doctor too late, at that point it becomes very difficult for patients to keep their sight. So our main goal is to discover glaucoma much earlier.”

"I came here with my husband, who has glaucoma," says Mrs. Huising. “He was diagnosed with glaucoma prior to a cataract operation. His eye pressure was very high, which probably damaged the optic nerve. Now his eye pressure is low and stable. Once a year he comes to the UMCG for a check-up. He also participated in a visual field study.”

Good glaucoma monitoring is difficult and takes a lot of time

“When you get diagnosed with glaucoma, monitoring the progression of the disease is very intensive. For example, the visual field exam takes a lot of time for the patient. As patients get older, this becomes more and more tiring. Nevertheless, it is currently the most important exam for us as ophthalmologists to best treat glaucoma patients. But this needs to change. As our population ages, we will see more glaucoma patients, and we want to care for them as best as possible.”

There is only one treatment

“Right now, the only treatment for glaucoma is to lower the pressure in the eye. Sometimes it can easily be achieved by taking eye drops daily. However a lot of the time surgery is needed to decrease the eye pressure. That being said, surgery is not a guarantee as the eye pressure could stay higher than what we want. To summarize, there is much we can improve upon for the treatment of glaucoma.”

What is the role of blood pressure, brain pressure, and genes?

“We suspect that both blood and brain pressure play an important role in glaucoma. There are also many places in the DNA that are related to glaucoma. But the question remains; how can we properly incorporate all these factors into a treatment for glaucoma? Currently we don't have a good test or therapy that incorporates blood pressure, brain pressure and genetics for glaucoma.”

An experimental reaction time device was demonstrated during the glaucoma evening break, with attendees testing out how quick they are

Damage cannot be repaired

"If we succeed in repairing damage caused by glaucoma, we would be a huge step further. It would mean that if you detect glaucoma at a late stage the damage could be reversed. But we aren't at this point, yet." Dr. Jansonius then gave the attendees a glimpse of the current research taking place within EGRET.

Mrs. Van Arragon recently participated in an audiological study where the brain pressure is measured. "I have normal pressure glaucoma, and brain pressure could be an important factor," she says. "In this study, you are laying on a tilt table and are slowly tilted, starting with your head higher than your feet, to your head lower than your feet. All in all it took about half a day." Mrs. Van Arragon was told at the age of 55 that she has glaucoma. "I have consulted several specialists, including Dr. Jansonius, with whom I am now a patient," she says. "The UMCG is two and a half hours of traveling for me, but I don't think that is a problem. As a patient you have the responsibility to be informed as well as possible and not to accept everything indiscriminately. That is also my message to my fellow patients : inform yourself."

Genetic research within glaucoma

"In Groningen we have research taking place within Lifelines; a large-scale population survey where 10 percent of people in the Northern Netherlands participate. Because of this research, we now know a lot about the genetic characteristics of people from this region. A few years ago we started collecting genetic material from glaucoma patients from the ophthalmology department. As a result we have the genetic profile of 1,000 glaucoma patients. This should be able to teach us something about the heredity of glaucoma. We may also use a person's genetic profile to potentially detect glaucoma earlier."

The role of brain pressure in glaucoma

"We are researching the role of brain pressure in glaucoma. A few years ago, evidence suggested that glaucoma might not just be about eye pressure, but that brain pressure also plays a role. To be more precise, we are looking at the difference between the eye and the brain pressure on the optic nerve.

We can measure the eye pressure, the method has not changed in the last fifty years. Eye pressure is currently measured a few times a year; these are "snapshots", because eye pressure varies continuously and depends on many internal and external factors. So measuring eye pressure must be improved.

Currently, the only way you can measure brain pressure is with an epidural. That is an unpleasant procedure and is not done in our clinic. This leads to two questions, 1) how can we better measure eye pressure? 2) How could we measure the brain pressure less invasively? "

Using a pressure sensor in diagnosing glaucoma

"One EGRET's partners is a German company that produces a small pressure sensor that is implanted in the eye during cataract surgery. This sensor provides information into which factors are important for eye pressure. As a result, we can better advise patients with high intraocular pressure on what they should and shouldn't do to keep their eye pressure as low as possible."

Mrs. Smeding participated a year ago in an audiological study at the UMCG. Soon she will participate in a study where she will spend a day in the hospital, having her intraocular pressure measured every two hours. She has a low intraocular pressure and this study checks for spikes in eye pressure. "I think it's important to participate in research, glaucoma is common in my family," she says. If my children also get it when they are older, they might be helped by this research. Mrs. Smeding has had glaucoma for 20 years. She has a visual field loss in both eyes; reading and cooking is difficult for her. "I sometimes tell her to put a miner's lamp on," her husband jokes, her support, refuge, and "private driver." The couple goes to the workshop about glaucoma and the brain. "I always said it comes from my head," says Ms. Smeding. "I would participate in that study with the epidural to measure the brain pressure. No problem."

Measuring brain pressure via the ear

"Before we can say if brain pressure really plays an important role in glaucoma, we must be able to measure it first. We are working on this in the Audiology department in the UMCG and Echodia in France. The pressure in the brain is also found in the inner ear. Our ears not only hear sounds, they also produce sounds themselves. We can measure the brain pressure based on these measured ear sounds. This was discovered a while ago, but combining this information with glaucoma research is new."

Blood pressure and glaucoma

"A question that has been around for a while, is if blood pressure important in developing glaucoma. We are investigating this in LifeLines by looking at blood flow to the retina in people with very low or very high blood pressure. Nowadays we can visualize blood vessels within the eye very nicely. We then use this information in different types of analyses to see if there are indeed differences in ocular blood circulation of people with high or low blood pressure. In particular we look at the area around the optic nerve. From previous studies, people with very low or very high blood pressure may get glaucoma sooner. Currently we are trying to explain why this may be the case through taking pictures of the blood flow in the retina."

Visual field examination in the elderly

"Proper monitoring of glaucoma is very intensive for both the patient and the person performing the tests. The visual field test is the most important test for monitoring glaucoma, But visual field research was actually developed in young people. Glaucoma is most common in people between the ages of 80 and 95; an obvious question arises, how are we going to properly measure the visual field of this older population?

One answer is comparing the experiences elderly study participants have with older and newer visual field test technology to obtain the best approach to measure visual fields in a geriatric population. You can also have someone watch a movie and record their eye movements, how and where their eyes move while watching says something about their visual field. You can also do this with virtual reality. Currently, half the morning is spent going to the hospital to measure your visual field. Maybe in the future, a visual field test will be possible by a tablet in the comfort of your own home. This is still a far way off, but we are working on it."

Mr. Van Diepen will soon participate in the fitness to drive study. “I have glaucoma, it was found about 15 to 20 years ago. I have a visual field defect in my right eye, but I am still driving, I can do just fine. What do I think of this evening? I think it takes a little too long. The break could have been a little shorter.”

Traffic participation in glaucoma

“This is a very important topic for glaucoma patients. Because once your vision is below a threshold, you automatically lose your driver’s licence. Currently in the Netherlands if your visual field and visual acuity are sufficient, you can drive, in principle. If your visual acuity is too low, which is not common in glaucoma, then you can no longer drive. If the visual field is too small, but visual acuity is good, then you can drive after taking a test. This test is extremely time-consuming and stressful. With visual field equipment that responds to the responsiveness of a participant, we may be able to predict who can and cannot drive safely. This is important because it is dangerous to allow glaucoma patients with severely affected vision to drive. However, we need to give glaucoma patients who can safely drive the freedom to do so. For many people, the ability to drive means maintaining their independence.”

Improvement of the retinal scan (OCT)

“Five years ago we thought the retinal scan (OCT) would make visual field research no longer useful. This is certainly not the case, OCT scans are not that advanced yet. Beautiful images of all retinal layers can be captured with an OCT scan, and we can see exactly how far the glaucoma is progressing. But this only works in patients with mild glaucoma. A lot can be improved upon in OCT research, and much of this work is being done within EGRET.”

Psychophysical research

“We also explore new methods to diagnose glaucoma through advancing visual field testing (looking at flashing lights and moving lines) in normal and low light conditions. From previous research we know glaucoma patients have a lot of trouble seeing in low light.

We are now researching the benefits of binocular vision (seeing things with both eyes at the same time) . We have thought in the past that as long as have one good eye, or if you are missing a piece of vision in both eyes, both eyes together will mean your vision is complete and normal. But is that true? This research is very important, not only to better understand glaucoma patients, but also to show that a person has two eyes for a reason. We try to clarify that two eyes offers more than one, or two half eyes.”

A virtual reality device presented by PhD students Rijul Soans and Jacqueline van den Bosch demonstrating a visual field defect being demonstrated on an attendee during the break of the 2019 glaucoma evening

Eyes and brain

“With glaucoma we not only look at the eyes, but also the brain. If glaucoma alters something in the eye, then something changes in the brain. Or maybe something changes in the brain, you would then get glaucoma.

We look at this in two ways. A person with glaucoma sees less, and will have less visual information that enters the brain. How does the brain deal with this? How does information processing change? Also, can you look at a brain scan and determine whether there is glaucoma? Imaging techniques and resulting data analyses are getting better. There are clear changes in the brains of glaucoma patients and we are increasingly successful in seeing this in individual patients.

We also look at how other brain diseases, like Parkinson's, affect the eyes. In the eyes of Parkinson's patients, things happen that look like glaucoma. These findings show us that when something changes in the brain, there may be consequences in the eyes.”

Both Mr. and Mrs. Vos don’t have glaucoma. Mrs. Vos had cataract surgery in both eyes and can now “look into the neighbour’s house across the street” she says. Mr. Vos has a slight cataract in the right eye that was surgically corrected, and a ‘lazy’ left eye. “I participated in a study of the brain and eyes,” he says. “For that study I was in an MRI scan for a while.” What do they think of the evening until now? “Very good,” said both. “The Jansonius story is very interesting. He can explain it well.”

Information about the brain is crucial for glaucoma research, says Dr. Jansonius. “One of the critical things that we currently don’t know is if we can repair glaucoma damage in the brain. Right now the answer is no. If we can repair this damage in the future, then we need to know how the brain has changed because of this damage. If we can eventually repair the brain, can we still interpret the things we see in the same way as before the damage happened.”

Grow ganglion cells

“We now manage, in collaboration with the Amsterdam Medical Center, to grow ganglion cells from stem cells in a dish. Ganglion cells are the cells that die in glaucoma. It is a very big step forward that we can recreate the cells that were no longer there. The next step would be to put these cells back into the eye and see if they connect to the brain . However, it will take decades before the time comes.”

Part 2: the workshops

Attendees pre-registered to participate in one of the following three workshops:

Workshop 1: Visual field research and images of the retina

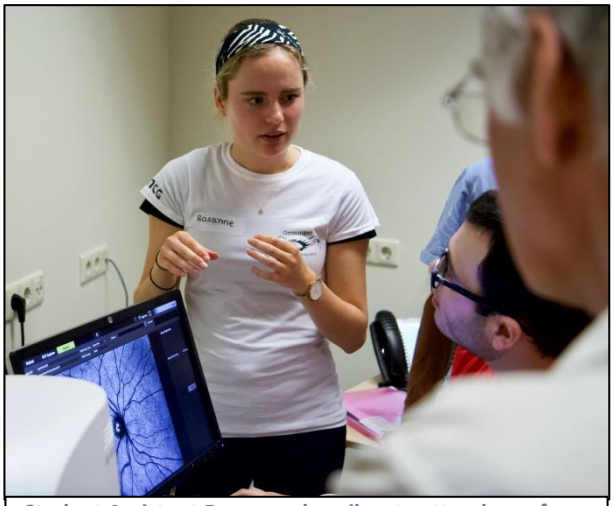
EGRET PhD students Giorgia deMaria and Konstantinos Pappelis gave lively demonstrations of current visual field research (HFA), and retinal scan (OCT). Both machines are currently used in patient care, so this was nothing new for glaucoma patients attending this workshop. During the workshop, they received and in-depth explanation about how the devices work, and what researchers can do with the results.

Visual field examination

The HFA, the device for visual field examination, measures both the peripheral and central vision. Measuring the visual field is fairly intensive, the patient covers one eye, and with the other looks concentratedly at a fixed point in a hemisphere. Light then flickers at various places in that hemisphere. The patient presses a button when he sees the light. During the workshop, visitors were shown the results of a glaucoma patient and a person with healthy eye to see how they differ.

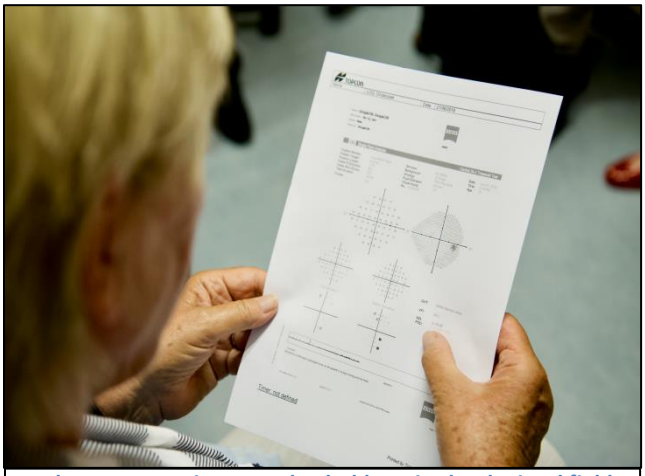
Retinal scan

The second device that was shown, the OCT, renders a 3D image of the retina (the light-sensitive layer inside the back of the eye) and the optic nerve. First, the eye is prepared with drops to dilate the pupil to allow for more light to enter the eye, resulting in higher quality images. Glaucoma can be detected at an early stage with the OCT. The structure and thickness of the different retinal layers are clearly visible on an OCT scan, and thinning in these layers may be an indication of glaucoma.



Student Assistant Rosanne describes to attendees of Workshop 1 what is seen in an OCT scan

The researchers also demonstrated how you can visualize the small retinal blood vessels with the OCT. This does not take place in the clinic yet, but is primarily part of experimental research.



A glaucoma evening attendee holds an in-depth visual field report

Workshop 2: Mobility and glaucoma

By Koninklijke Visio; the center for education, care, and services for people with visual impairment.

Clinical physicist Anne Vrijling gives a lecture about glaucoma and mobility at the glaucoma evening

Clinical physicist Anne Vrijling and occupational therapist Marie-Louise Kamps (Visio) presented on visual rehabilitation, with a focus on glaucoma and mobility.

“My eye doctor says that I can no longer drive; what are my options? ”This is the question many glaucoma patients ask Visio when they have been referred by a medical specialist. The answer depends on a number of factors, and starts with a holistic overview of the patient. What suits their lifestyle? What can they see? What can they not see? What obstacles do they experience? And how can these visual barriers be compensated for?

Visual rehabilitation runs in parallel with treatment by an ophthalmologist or neurologist. The most important starting point for visual rehabilitation is giving the patient insight into what they can and cannot see, through investigating the visual field. This makes it clear if the obstacles experienced by the patient are due to visual field loss or, for example, clumsiness due to aging.

Then, viewing strategies that help compensate for what someone no longer sees are investigated. For example, physically looking more to the right compensates for vision loss in the right eye. Depending on the obstacles that a patient experiences as well as the visual problems they have, they can also use compensation strategies when driving, such as keeping more distance to the car in front of them, taking a different route or avoiding certain situations. Visio offers a rehabilitation program that is aimed at advising people who participate in traffic. The goal of AutO-Mobility is to enable patients to participate safely and responsibly in traffic in a way that suits their lifestyle.

Workshop 3: Glaucoma and the brain

EGRET PhD students Shereif Haykal, Joana Carvalho and Azzurra Invernizzi present their research

PhD student Shereif Haykal presents his research about glaucoma and the brain to the glaucoma evening attendees during Workshop 3

Glaucoma is a disease of the entire visual system

We use our eyes as well as our brain to perceive and interpret the world around us. The eyes pass what they see to the brain, and then you perceive what your eyes see. How is the information from the eyes sent to the brain? If your eyes were a camera and your brain was a computer, you connect the two with a cable. This cable, running from the eye to the brain is called the visual lane. Researchers use MRI scans to see what, and why, changes take place in the visual pathway in glaucoma patients. We now know that in glaucoma, damage isn't just in the retina, it extends to the entire visual system, from the eye to the visual brain. This is important to know when developing not only novel glaucoma treatments, but also for new diagnostic tests. Current diagnostic tests (see "Part 1, the Lecture") aren't always satisfactory as they depend on the light that reaches the retina. This light can be blocked by cataracts or corneal damage. MRI may be a better alternative.

"Filling-in": the brain fills in missing information

The brain compensates for the loss of visual information through a process called 'filling-in'; the brain fills in missing areas that the eyes do not perceive. An early diagnosis of glaucoma can be missed because of 'filling-in', as the brain masks defects in the visual field caused by glaucoma.

Our brain has the capacity to infer information that we lack. A functional MRI scan shows how visual information in the brain is processed, and which receptors do the processing. Researchers can then determine exactly how and what an individual sees. On an MRI scan of someone with healthy eyes, we can see how the brain displays visual information. The eyes and the brain work well together. In glaucoma, the brain fills in missing visual information; an MRI scan can show where this filling in occurs. The cells in the visual brain respond to a larger portion of the visual field in glaucoma, thus these cells complete the image.

The brain "at rest"

Our brain is never still. If it is supposedly 'at rest', so it is not actively involved in a task, it consumes no less than 20 times more energy as when it processes external stimuli. Also in this resting mode - think of daydreams or not thinking about anything specifically - different areas in the brain continue to communicate with each other. The signals sent back and forth keeps the brain ready in case a task needs to be performed, things like waking up for example, or picking up a pen, etc. Using functional MRI scans, researchers see that these communication signals are continuous, and in cycles of 10 seconds.

Researchers performed functional MRI scans on both glaucoma patients and people with healthy eyes while their brain is 'at rest'. There may be a difference in activity in the visual brain when comparing people with and without glaucoma. Researchers do not yet know why this is, or exactly what it means. Much more research is needed - with more healthy test subjects - to draw any conclusions.

Part 3: the panel

After the break, it was time to answer the questions the attendees asked the expert panel. The panel included expert Lies Toren from the Glaucoma Interests Association, Anne Vrijling, clinical physicist at Royal Visio, Nomdo Jansonius, ophthalmologist and professor at the UMCG, and experience expert and glaucoma patient Marion van Arragon.

Mrs Fledderus participated in three studies at the UMCG. “I just don't know exactly which anymore,” she admits. “Something with VR glasses and a test of responsiveness.” Mrs. Fledderus signed up for the fitness to drive study . “I also went to the workshop about mobility and glaucoma. I think mobility is a very important theme.” What does she think of this evening? “Very interesting,” she says. “What strikes me is that a number of people who are here tonight experience much more problems with glaucoma than I do. I don't notice much of it yet. Only that sensitivity to light, I notice that.”

Dr. Jansonius responds to attendees’ questions at the 2019 Glaucoma evening question and answer session

Question 1:

Why is the data that is collected during scientific studies, like visual field exams and MRI scans, not added to the patient file? Would this not prevent duplicate exams?

Answer Jansonius:

"It is against the law to exchange data from research to care, or vice versa. If we need information from your regular medical record for a scientific examination, you must sign a statement of consent. Only then can we look into your medical file for that examination. This makes the research better. Conversely, you cannot simply add information that was collected during a scientific investigation to a medical file. Tests performed for research are often more experimental, they are not the standard for medical examinations. There are exceptions; sometimes you find something very unexpected and it's better for the patient and their doctor to know. With these medical exceptions, the information will eventually end up in patient's medical file. But generally there is no direct link between research and medical records."

Question 2:

Is research being done into brain injury as a cause of glaucoma, for example after an accident or whiplash?

Vrijling Answer:

"That certainly happens. Brain injury can indeed be the cause of glaucoma; it depends on the location of the injury. At Visio we look at people with brain injuries, what effect that has on visual impairments, and the compensation strategies they need so they can do the things they want to do again."

Question 3:

Is there a good nutrition list for people with glaucoma?

Answer Toren:

"That does exist for the Macula Association, but not yet at the Glaucoombelangen. I will bring this up to the Glaucoombelangen to see if they want to get started with it. In EGRET, two researchers are looking into nutrition, with what is good for glaucoma, so there is development."

Question 4 came out spontaneously:

Is there a clear relationship between food and glaucoma?

Answer Jansonius:

"As far as we know, not yet. One of the forces of EGRET in combination with LifeLines is the ability to investigate this on a large scale. But there is nothing more difficult than researching diets; how many people know exactly what they have eaten recently? If there was a strong relationship with glaucoma and nutrition, it would have been found. The same applies to alcohol, where current investigations between glaucoma and alcohol is particularly disappointing. In other words: there is no direct connection between glaucoma and nutrition. Everything in moderation is our advice."

Question 5:

What is normal pressure glaucoma and what is the relationship with brain pressure?

Answer Jansonius:

"Glaucoma has always been associated with high eye pressure. But one third of glaucoma patients don't have high eye pressure, these patients have normal pressure glaucoma.

These patients can have high eye pressure at other times in the day that can be detected by an implantable eye pressure monitor.

Eye pressure is not the only risk factor for glaucoma. Possible other risk factors include low blood pressure or low brain pressure. In people with normal pressure glaucoma, it could be that one of these factors plays a role. However we do not see normal pressure glaucoma as a separate clinical picture, which is still important to mention."

Question 6:

Nowadays research is mainly done in the north, could it also be expanded?

Answer Arragon:

"Yes, if people are willing to travel. I live two and a half hours away and I think it's great to travel that distance. If people are willing to do that and make a nice day out of Groningen, I would say: expand the group."

Jansonius: "We notice that people are willing to participate in research. Not because they expect to be helped with it themselves, but for the next generation of patients.

It is much more difficult to find control persons (those that do not have glaucoma), especially older people. I understand that too, glaucoma means nothing to many people. But if you have it yourself, then life goes on. When inviting for research, we will look a little further than just regional areas. Travel expenses for research studies are always reimbursed."

Question 7:

The eyeball pressure increases with a horizontal position. Is it advisable to sleep with the head higher than the rest of the body?

Vrijling Answer:

"The difference in eye pressure between lying and standing is not that big. What is important is that when you lie down do not press your eyes into the pillow, because that certainly has an effect on the eye pressure."

Question 8:

Are people with tinnitus (ringing in the ears) more susceptible to glaucoma?

Answer Jansonius:

"I told you earlier this evening that we are researching brain pressure based on sounds produced by the ear. A number of participants thought that they would be unsuitable for this study because they suffer from ringing in the ears. The researcher who set up this study delved further into this. She discovered that people with ringing in the ears have glaucoma twice as often. There is a clear relationship between the two, but currently we don't know why."

Question 9:

Can severe glaucoma also lead to major depression in patients?

Answer From Arragon:

"Yes, that's possible. I can only speak of my own experience. I regularly surround myself with people who are visually impaired or blind to learn from them that there is a life after. That helps me a lot. There is a very nice museum in Nijmegen, that is called MuZIEum, where you are shown around in the dark by people who are visually impaired or blind. I think it is important to seek out situations like this, as well as these people. This will enable us not to get stuck in the loss, but also to have some sort of perspective. Many advancements have been made in the field of visual aids. I find that hopeful, it gives me a new perspective on things while my vision is deteriorating."

Question 10:

Is glaucoma hereditary and what has been done with the blood collected a few years ago in search of glaucoma genes?

Answer Jansonius:

“Glaucoma has a hereditary character, but it is not easily inherited. There are many genes that contribute a little to glaucoma. We currently know 72 of them. That is why it is impossible to say if the father has glaucoma, the children will get it too. The more you have these genes, the more likely you are to get glaucoma. So in a family with a lot of glaucoma, you are more likely to get it. If it does occur in the family, it is important to have first-degree family members (brothers, sisters, children) regularly checked for glaucoma.

Ultimately, we want to be able to use blood to predict who will get glaucoma and who will not. That was also the reason why we collected genetic material from 1,000 glaucoma patients a few years ago. The aim is to compare this with the participants of LifeLines. We are a long way from that. At LifeLines, however, the numbers are so big that it takes a while before all the material that we conduct research with is ready. Then we can compare 1,000 glaucoma patients with 80,000 people without glaucoma.

In general you have a 2 percent chance of getting glaucoma. If your father, mother, brother, or sister gets glaucoma, then your chance is 5 times higher, between 5 and 10 percent. That still means that 9 out of 10 don't get it, but 5 times more often than if glaucoma is not in your family. The sooner you find glaucoma, the better. That is why we advise you to have it examined.”

In 1999, Mrs. Jagersma suffered a serious accident in which she suffered brain damage. At first she did not realize that her injuries were serious. But when she started seeing black spots after the blow on her head, it turned out to be glaucoma. “I always participate in scientific research,” she says. “I think that's important; it is my social duty. Moreover, I find science interesting. I just signed up to take part in the fitness to drive test.” Her glaucoma has improved a lot over the years, Ms Indijk notes. “Through the grapevine I received all kinds of exercises to stimulate your brain. I do that, and it helped me a lot. It is not nearly as bad as in the beginning.”

Flowers given as thank-you gifts to the expert panel at the end of the 2019 Glaucoma evening

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Thanks to everyone who helped make this evening a success!