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Exploring Vestibular Dysfunction in Pediatric Developmental and Learning Disorders

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Welcome everyone and thank you very much for joining us, for joining this live session and for being part of Inventis Academia. I'm especially pleased to say that today's webinar is the first international English language event of Academia in this 2026 and we are delighted to open the year with such a meaningful topic. It's a real pleasure to welcome back Dr. Jaya Sati, pediatric otorhinolaryngology surgeon at the University of Malaya. She's now new, she's not new, sorry, to academia. And her work continues to be a reference point, I would say, in pediatric adult vestibular care, particularly for her pioneering approach to vestibular and balanced assessment in children.

Well, today's webinar will explore the role of vestibular dysfunction in pediatric development and learning, looking beyond balance to its impact on motor skills, language, attention and cognition. We'll also discuss clinical assessment strategies and the importance of early identification within a multidisciplinary framework. You are welcome to submit your questions via the chat during the session and we will address them at the end of the webinar. Keep in mind that after the webinar you will receive a short survey and your feedback is extremely valuable to us. And now it's my pleasure to hand over to Dr. J.

Enjoy the webinar and see you later.

Thank you. Thank you. Anna. Hello. Good afternoon, good morning, Good day to everyone.

I'm Jay Shakti. I'm a pediatric ENT consultant here in University Malaya, Malaysia. I run, I would say a pediatric vestibular service and it's probably the first service that we started and it has been three years now. I'm really honored to be given this opportunity to talk and share what I know. Today I want to share on vestibular dysfunction or vestibular's role in pediatric development and learning disorder.

Now, before a child takes the first step, an entire neural network of an entire orchestra of neural network has been fine tuned and the conductor of this neural network is the vestibular system.

Now, the hidden force of vestibular system plays a crucial role in development of the child and as and also learning. Now why do we, why do we always think that vestibular system is magical, mystical or, you know, an intriguing organ? One key thing that I found is vestibular that we all know is vestibular system has neural projections to every organ in the body. Now when we talk about vestibular system, we know that it is critical for providing sensory input. It tells us where we are in response to the environment.

Vestibular system is, has been regarded as our sixth sense. It helps to maintain gaze stabilization during hip motion and it's an essential component of balance system together with vision and proprioception. I would say vestibular system, it, it acts as a biological gyroscope. It's like a gps. So it tells us where we are in relation to our environment and helps us process it.

Now, vestibular dysfunction or vestibular research in the adult population has been, I would say thoroughly investigated. You know, there's, there's a lot of research publications from the theory, presentation, assessment and treatment. But vestibular dysfunction or manifestation in children differs in comparison to adults similar to that in children and adolescents. Vestibular manifestations are also not the same. Now just briefly, prevalence of dizziness in children ranges between 0.7 and 15%.

But then the numbers may actually be higher. Now you may wonder, when I say that the numbers may be higher, why do you not frequently encounter them? The fewer factors? Well, first and foremost, a child finds it difficult to verbalize vestibular related symptoms. Whether it's dizzy or lightheaded or headache, they don't know how to say it.

Next, vestibular symptoms are short lived and there's rapid compensation in children. Children tends to tolerate dizziness very well. And I've seen that a lot of times in my clinic where you know, child comes to the clinic and I say, and I ask the child, are you dizzy? And she says yes, I'm dizzy right now. But

she's just, well, she's able to go to school and carry on with daily activity.

Next is lack of awareness among parents and also physicians as well as lack of expertise in pediatric vestibular. So this, this are the reasons why the prevalence among, prevalence of dizziness in children is still low. Having said that, I conducted this systematic review and meta analysis which was published three years ago now and we found that the pool prevalence of vestibular dysfunction was 30.4%.

Now the etiologic factor or the most common cause of vestibular condition in children can vary according to age between the children and in adolescent. In the younger children it's the congenital or titus media with a fusion and older children it's the vestibular migraine and 3 PD. Having said that, we've really, we've recently realize that there are younger children's, I would say about four to five that presents with vestibular migraine as well. Now children, like I said, children may not present with typical presentation of vestibular dysfunction. So they May not be able to tell you that yes I'm dizzy or yes, I'm feeling lightheaded.

And they may present with atypical presentation such as appearing clumsy. Parents would tell you my child is three or four and keeps bumping into cupboards because you know, when there is vestibular dysfunction, the depth of perception gets affected. So the child may not know what you know, how far is the cupboard or the door. Child can just imagine child disliking swings and playground. This is something that we've seen among our children.

With congenital vestibular hypofunction. There's exaggerated motion sickness. Simple traveling in the car to school can be bothersome, difficulty to learn a bicycle, hearing loss and developmental delay which or delay in achieving milestone. This can be isolated or multiple.

Now in older children or children attending school, vestibular manifestation can present with several of these. Notably poor handwriting, struggle to copy from the board because there is poor eye hand

coordination, problems with spatial concepts. You know, vestibular plays a huge role in visual spatial skills. So right and left sequencing and all of this gets affected. There's poor memory, poor concentration, inability to perform dual tasks, which is really essential for school learning.

Child, child easily gets tired and there is avoidance of sports and playground activity. Now all of this, a child with vestibular dysfunction appears clumsy, restless, inattentive, and the root problem is not laziness or lack of intelligence. And oftentimes they are being dismissed or appear as psychosocial or behavioral issue. Now it's really sad. A lot of times these children get sent to the pediatric developmental specialist for assessment for autism or ADHD and they undergo unnecessary investigations and assessments.

What actually happens is the brain is constantly trying to compensate for faulty balance signal. So there's fewer mental resource to remain fewer mental resource just for learning, memory and problem solving.

So why do we worry so much about this? There's, there's a lot of. There are some thoughts that child will eventually catch up because of the compensatory mechanism, especially from visual and somatosensory and also the sensory reweighting which helps to catch up. But the length of this delay of catch up compared to typically developing children is still unknown. And they are missing out.

Certain they are, they are crucial period of learning and reading. Now we know that the impact of vestibular dysfunction in children is devastating. They've got delayed motor imbalance, learning disabilities, which leads to isolation. This overall impairs psychosocial and overall quality of life. Not only the child, but also the parents or the caretaker and there's significant implication to the individual, family and society.

So let's talk about the role of vestibular system in development and in learning. So when I talk about developmental milestone, this basically are things that Most children, about 70% of or so can do by certain age. Now there's a lot of website and CDC has come up with simple ways for parents or physicians to assess the child's development. When we say developmental delay, what this means is child fails to attain developmental milestone in comparison to a typically developing child from the same population. This can be isolated, multiple or global.

And then there is this catch up phase that you know are all going to discuss about. So what are the developmental milestone that can be affected by children with vestibular hyperfunction? This includes physical, social, language and cognition. So I've actually summarized what are the normal developmental milestone in a child. So failure, you know, like hit control, for instance.

Typically by four months, you know, before three months, child should be able to achieve. And based on the American association of Pediatric Failure to achieve head control by four months is regarded as abnormal. Then this age group can change according to the population. Now, development of balance and gross motor functions such as head control and independent walking are heavily reliant on vestibular visual proprioception and also the motor system. And lots of studies and lots of papers has actually highlighted this.

Now the vestibular reflexes, this plays a key role in moto development of the childhood. Whether it's V or vestibular ocular reflex that regulates the eye, head coordination of gaze, vestibular spinal reflex that maintains postural control, and vestibular colic reflex that stabilizes muscle in the neck in addition to routine neurological examination. Labyrinthine wiring reflects the VOR and VSR should be repeatedly assessed during early childhood so that we're able to pick up any form of delay or dysfunction.

Now a little bit about vor. When VOR is lacking, oscillopsia or unstable gaze will occur while the HIT is moved. And this affects difficulty in everyday school. So a child develops difficulty with drawing, writing,

reading, resulting in sloppy hand and impaired reading performance. What about visual spatial skills like grasping a pencil or buttoning shirt?

These are all necessary scholastic achievements which are, which has been seen to be impaired among children with vestibular delay or vestibular hypofunction. Now, fine motor skills. This V is crucial for optimal eye hand coordination and is also necessary for several fine motor performances. And what happens is these children are labeled, you know, when, when there is some form of an abnormality or or, you know, child is unable to carry out any school or basic performing tasks. These children are labeled as clumsy or having behavioral problem.

Vestibular system. I think one thing it's important to realize, the vestibular system has reciprocal projections with neural networks. So again, like I mentioned, vestibular system has neural projections to every system in the body. So similar to it, it has neural network involving social cognition and emotional processing to look at cerebellum and dorsal raphe nucleus. And what happens in children with vestibular hyperfunction is they often get dismissed by professional and symptoms, you know, are being attributed to some, some form of behavioral issues.

So again, I highlight this repeatedly because a lot of children are, are being delayed in diagnosis, which means the assessment and the treatment is also being delayed because they are being sent for counseling. They are being sent to the developmental specialist for psychosocial and behavioral problems. So when vestibular symptoms are misunderstood or overlooked, child's compensatory effort is mistaken for behavioral dysfunction. Now, one other thing. Children who have experienced vestibular hypofunction from birth or infancy may not recognize the symptoms as abnormal and have learned to compensate their dysfunction.

Now, this probably sounds like a good news because they get to carry on their daily life every day. But then robust neuroplasticity among children with compensation from vision and proprioception leads to

delay, further delay in diagnosis of vestibular dysfunction. There's this paper which was one of the earlier papers on vestibular compensation in infants and children, but both congenital and acquired vestibular loss, and based on this author, motor skills due to vestibular compensation depends on integration of, you know, compensatory input from visual somatosensory and proprioception and the maturation of the cerebellum, basal ganglia and motor cortex. So it's not a terribly straightforward occurrence. Now, there's mounting evidence on the effect of developmental delay and learning disorder.

Based on this author's. Bilateral loss of vestibular function at birth results in motor developmental delay. And we've actually noticed that it's not only bilateral loss, it's unilateral loss. But bilateral loss may present earlier, compensated with a return to normal postural and oculomotor function. Observation may reveal many of these vestibular loss, and they exhibit with learning disabilities and poorly adapted strategies for overcoming their sensory deficit.

So as a part of compensation, the adaptation that the children has learned or acquired is also a struggle. And that's how they manifest with learning disorders in school. Now, gaze fixation problem leads to reading problems requiring specific therapy. So this is a study by the Brazilian group and it's also one of one of the studies that was published in 2008 and the authors have found that there's vestibular hypo function in underperforming children. So almost 70% of these underperformers had peripheral vestibular alterations.

This is another paper that has mentioned that reading equity scores were significantly worse in children with vestibular hyper function and this reading equity scores actually correlated with dynamic postural stability.

So what are the vestibular conditions that can impact developmental milestone? So these are the conditions that has both, that has, that affects the vestibular and also subsequently causes a delay in

development and also learning disorders. So one of the most prevalent causes that has been really looked into is hearing loss and vestibular function. So the prevalence of concomitant dysfunction, vestibular dysfunction in children with sensory neural hearing loss ranges from 15 to 85%. And this, this may also depend on the severity of the hearing loss.

And you know, when I talk about 15 to 85 and this, this sounds like a huge wide range. Why, why is there a wide range is because there's differences in defining what constitutes vestibular dysfunction. So we have to know that pediatric vestibular medicine, it's a relatively new and a developing field. So lots of research are still ongoing and being done. And also one of the, I think one of the factors is there's variation in the testing methods and interpretation of test results.

So just a quick one about hearing loss and vestibular function. So why, why is, why is the vestibular system affected or especially why the vestibular end organs are affected when the cochlea or the hearing loss occurs is because the cochlea and the vestibular end organs, which are the semicircular canal, utricle and saccule, they are embryologically from the same origin. The blood supply is the same, the internal environment are the same. And there's now new research that the mechano electrical transduction or how the impact that affects the hair cells of the cochlea gets to the similar impact or even worse happens to the vestibular hair cells. So this, this was a paper that was published in 2024 where 592 children with bilateral profound hearing loss with vestibulosis.

They found that 44% of the children had vestibular impairment. And delayed postural motor development in these children is a direct consequence of vestibular impairment, particularly congenital bilateral vestibular loss.

So this is another study. This, this is a systematic review of vestibular dysfunction and gross motor milestone in children with hearing loss. So 11 studies were included and if you see here, the most common testing measures were CVM which assesses saccule function, rotatory chair, lateral

semicircular canal and also calorics which assesses the lateral part of the semicircular canal. And when we talk about gross motor milestones, typically what was investigated was age of development of head control, sitting, independent walking and so on. And of the 10 studies association between vestibular function and acquisition of gross motor milestone were seen and, and there's, there's a possible dose dependent impact of vestibular dysfunction on gross motor milestone acquisition.

Now this is another study by Kimura et al from Japan which looked into the relationship between inner ear malformation and vestibular function. They actually followed up this children so from birth and later on. And CT scans were also done to examine the cochlea and the vestibular organs. And they used head control and independent walking as indicators for gross motor development. And they found 15.9% had an abnormal vestibular function.

Children had reduced VOR response. Children with a reduced VOR response showed significant delay in acquisition of head control and independent walking. So this is another recent paper that looked into children with neurodevelopmental delay. So the neurodevelopmental delay that has been assessed were autism and ADHD and so on that exhibited so they did vestibular assessments or quantification of the vestibular function and they found significant higher inter peak amplitudes on both of the VEMP tests, the CVEMP and OVEMP compared to the control. So it's a typically healthy group.

No significant differences were found in groups that were measured based on VHIIT that assesses the semicircular canal. Among the children's with neurodevelopmental delay, 39% showed atypical vestibular response. Additionally, 8 of this showed abnormally elevated otolith amplitudes. Now so there's increase in otolith reactions in this children with neurodevelopmental disorder.

This is another interesting research about congenital vestibular hypofunction in children with speech and language delay. So I run a pediatric clinic, a general pediatric ENT clinic and children's presenting with isolated speech delay or speech delay as a whole has increased rapidly over the past couple of

years. And one of the research that we did, which I'm going to share shortly, is on what is the role of vestibular or how severe is vestibular function impacted in this children? So speech and language development require effective sensory processing and sensory integration and we know an intact vestibular function is crucial for both the sensory integration and sensory processing. What about specific learning disorder?

This is characterized by significantly lower educational skills like reading, writing, mathematics and prevalence in school age children is about 5 to 15% because this tends to affect the postural stability, the motor coordination, spatial orientation and oculomotor function. So Leveson was one of the first that suggested that there is a cerebella vestibular deficit in children with dyslexia. Literature on vestibular involvement in cognitive function also has emerged and this has been linked with visual spatial skills. Functional vestibular system is important for normal cognition, cognitive development and also learning. So a little bit from our data, so the first study, this is something that we worked on to look at the association between children dyslexic group and also an age and sex age gender matched control group of a typically developing child and to look at their vestibular function.

So the vestibular examination that we assessed was vhit, CVEMP and svv. So just, just to mentioned that all these children had normal hearing and we found that there is a prolonged latency in CWMP and reduced amplitude when the saccule was assessed. What about subjective visual vertical? So this assesses the utricular function and there is significant association. There's higher SVV score which tells you that the vestibular function is worse in dyslexic group in comparison to normal group.

So children with dyslexia should prolong latency impact SVB perception suggesting dysfunction in the ortholith organ processing and there's altered vestibular contribution to spatial orientation.

So the other study, so the next study that we conducted is to look at children with isolated speech delay. So this, this are otherwise healthy children and the only anomaly or the only condition that a child

has is speech delay. And this was also a control group. So we had a typically developing children which is age and gender matched and the mean age in this group was about 4.4.5. There is a higher predominance of male gender and what we have found is the latency.

There's again the autolith seems to be affected and there's hyperactivity in the cvamp. There's higher inter amplitude between the children with isolated speech delay and typically healthy children and the latency is actually shorter so or dysfunction. There's immaturity of the vestibular colic reflex pathway, likely reflecting the delayed myelination, reduced neural synchrony and subtle secular deficits. So overall, mild vestibular impairment may compromise the coordination of oropharyngeal respiratory muscle required for intelligible speech.

So how to approach or you know, just what, what sort of assessments can be carried out? You know, when, when I was early in developing the clinic, One thing that a lot of physicians fear is vestibular assessment. The time that it takes, the lengthy period. And I think it's important that we identify what are simple, basic bedside tests that can be carried out in our everyday clinic. So in approaching, in approaching children and you know, to diagnose vestibular hypofunction, there's two things.

One of the foremost things that we can do is screen. We can come up with your own criteria for screening. So these are the kids that I would definitely screen for vestibular function. So children with hearing loss, developmental delay over vestibular conditions, slow learners, learning impairment, those with neurodevelopmental disorders, and children with motion sickness. So vestibular and motion sickness is an entire topic by itself, which we are still working on our data and I'll be happy to share next time, But I think to come up with your own, who are the high risk groups that you want to screen?

Now, vestibular assessment should be done as a part of a routine assessment. It's important that we teach the junior doctors, residents and incorporate it as a part of national curriculum. So why do we emphasize so much on this then? We're able to detect early and rehabilitate these children early. For

instance, a child that comes with isolated speech delay to an ENT clinic.

Typically what happens is we assess hearing function and child goes to a speech therapist. But what happens in our center is we do a vestibular hypofunction, we do vestibular assessments, we co manage with our pediatric rehab colleagues, we assess with our pediatric development and also our occupational therapist. So hand in hand, when the child is receiving speech therapy, the child is also receiving some form of vestibular rehabilitation therapy, which tends to aid the child in gaining speech and language.

So talking about assessments, this is the Internet. A consensus that was carried out with the IPO group, the International Pediatric ORL group, which I'm really honored to be a part of. You can read this paper, I'll be happy to share on. The experts have shared all suitable vestibular assessments according to age.

So this is something that I'm a fan of the single Leg raising test and heel to toe test. It's a very simple test. You basically ask the child to stand on one foot with eyes open and then you can alternate, you need to alternate to the other leg with eyes open and followed by eye closed. In older children you can incorporate foam. So this is the duration in seconds.

This I took from Sharon Cushing's paper. I would suggest you, you can come up with a normative group for your own population. So one thing about vestibular assessments is the normative data you need to assess, you need to come up with a normative data for your own populations.

So this is a paper that I found. This is by the team in Belgium who's been actively doing research in Peet's vestibular. This is a protocol that they developed that they're working on in to assess children with vestibular and its motor and cognitive development.

So in terms of management, so we've diagnosed and we say okay, we've quantified the vestibular function and say there is a vestibular delay. So what's next? There's been a lot of study on outcome of vestibular rehabilitation therapy in children with hearing loss and vestibular loss. What about other conditions and are, are the outcomes similar? So this, this and all needs, you know, we need to look into all of this a little on VRT or vestibular rehabilitation therapy.

This is an exercise based approach which uses neuro plasticity and neural network of the brain to improve functional activity and quality of life. One thing about VRT in children of course it differs in adults. It's. It's really important that when we incorporate this exercises, it's interesting. And one other thing is I think it's really important that we get the parents or the caretaker as a part of the therapy so that it's actually carried out back at home as well.

And of course it is quite a challenge. But to get the child to pay attention for entire two hour session may not be entirely easy. And when you look at certain group of children, they may not be in the mood or you know, probably upset. But I think it needs a lot of work. But I have to highlight that VRT when carried out and when performed has a very successful outcome.

So this was a paper that I found that showed a very good outcome. 21 children with sensorineural hearing loss and vestibular impairment were assigned to two groups. The exercise group, the group with vestibular rehabilitation and a placebo group. The exercise intervention had compensatory training, focused on visual somatosensory function and balance training. And what they found is there is significant improvement in the motor developmental score and improvement in posturography in the exercise group compared to the placebo group.

Again, there's this other paper by the similar group in Belgium that looked into that have come up with this protocol for vestibular rehabilitation therapy. And their outcome measure assesses gait stability, postural stability and motor performance and also to look into the overall quality of life.

Now vestibular hyperfunction has delay in gross and fine motor function and also in it from what I have looked into there is significant delay in developmental milestone and also it leads to learning and also cognition delay. So we need to pay close attention to children with catch up developmental milestone. Make vestibular assessment a routine assessment in your practice. Come up with your own protocol or simple assessments. Probably the first visit, a single leg raising test and heel to toe test.

Then the next assessment when they come over is when you do the vestibular quantification routine assessments in high risk, for instance hearing loss. And in our group we look, we do a routine vestibular assessments in children with learning impairment, with motion sickness and so on. One thing that I have to highlight is multidisciplinary team in assessment and management. It will be great if you have a pediatric rehabilitation team that is interested in vestibular rehabilitation in children to get pediatric neurologists. It's always good to rule out other conditions to get pediatric developmental team involved as well.

So early detection and early vestibular rehabilitation is associated with improved psychomotor development in children with vestibular impairment.

This is just to say that pediatric vestibular medicine is relatively new and there's still ongoing research. So it's really important that we come together and collaborate so we can share knowledge on each other.

It has been quite a journey for me. I would like to sincerely thank all my mentors. I'm. I'm still learning. There's a lot for me to learn.

And I would like to acknowledge our audiologists, our, our MDT team and with that, thank you.

If at all there's any comments, feel free to email me. This is my email that I've attached here.

Thank you so much. Dr. J, can you hear me now? Right. Yes, I can hear you. Yeah.

Okay, fantastic. Thank you so much for this insightful and inspiring presentation. I think that you have given us a clear perspective of the crucial role of the vestibular function in pediatric development. So thank you so much. I strongly encourage the audience to type the questions on the zoom main bar.

And Dr. J is here with us for answering all your questions.

Let's see if questions are coming. Okay, well, I do have to say this. It is a relatively new. Sure, Dr. Jack. Okay.

There is one question. Dr. Ja.

Okay, thank you. Okay. Yes. So thank you. So I'm just gonna read.

Thank you for the great presentation. Thank you so much. Thoughts about pediatric vestibular dysfunction following cochlear implantation. So, so we know pediatric vestibular dysfunction has been well established in children with congenital hearing loss. And there has been a lot of research on following cochlear implantation.

So we did do a study on children's vestibular dysfunction. So we know that children with profound hearing loss. So now let's say it's profound, profound hearing loss, has vestibular impairment and this children undergoes cochlear implantation. And what is the effect of cochlear implantation on. In this vestibular hyper function?

What we've realized, we compared the switch on and switch off and we, we have found that switch on following cochlear implantation improves hearing. Although, you know, we, we're still, it's an ongoing study. I'll be happy to share in this. But there has been quite a number of groups that has done quite a number of studies to assess cochlear implantation in their group. Yeah.

So I, you know, just, just a little bit. I'm, I don't do cochlear implant. I'm a pediatric airway surgeon. I airway and aerodigestive. But I've developed pediatric vestibular because, you know, no one is there to look at them.

And I find it extremely interesting. So yeah, it'd be good to see. So there's this other question. If a child refuses to do tests like rotatory chair, what strategies do you recommend? Okay, so that's a very interesting question.

So I think it's really important to engage parents. The first thing is to get tell parents what are the tests for and show the child, get the parents to sit on the chair itself. And then when the child, you know, gains a bit of trust and the parents are having fun, they would also want to try. So I think that that's one thing that, that helps me. But I do have to say some children's, you know, if especially your clinic is in the late afternoon and they have already seen two other teens for appointments, you may need to reschedule.

You know, take note of this child, reschedule the appointment and do it early in the Morning and tell the parents to, you know, preempt this child. Tell. And also one of the things that helps is if you were to give them a little bit of a sticker or something, it really makes lightens them up. So. Yeah.

Thank you, Dr. J. Fantastic. Other questions from the audience?

Okay, thank you so much.

We always have a fantastic audience here in academia. Yes, we do. And let me say that we will welcome Dr. J again on September 22 this year for an Inventis Academia webinar titled Vestibular Migraine in Children. And in the meantime, another question for you from Cameron. Sure.

Advice for a new service that embracing an mdt. It seems like ent, audiology and other therapists are all required. Okay. So I'll just share how it worked for me. So it was a slow process.

So we have an audiologist on board with us. Then the next step will be to incorporate occupational therapists. And then it's by you approaching them slowly and getting. So if you go to the occupational therapist is to find the person responsible and to get them, you know, to sit and to talk to them on a day that all of you all can get together. It is.

It is a bit of work, I must say, but I think once you have started it, it's so exciting. And you know, when the team sees how much impact and how it changes the child's life, they would all come in.

Thank you, Dr. Ja.

Okay, so yeah, just to. Just to highlight about the mdt. So it's one of the teams that we have. We have the audiologist, we have our occupational therapist, we have our pediatric rehab. So the occupational therapist comes under the rehab team, but we also have a separate rehabilitation specialist for pediatric vrt.

And then we have our pediatric neurologist, also a pediatric developmental specialist. So they don't have to come each time, but they are there when you need them.

Okay, let's see.

Thank you.

Anyway, if any additional questions come in after the webinar has closed, I will forward them to Dr. J so that you can receive a response. Okay, no more questions. So let me say one more time that we will welcome again Dr. Ja next September 22nd for a webinar dedicated to the vestibular migraine in children. Our next next Inventis Academia webinar will take place on February 12, titled the Caloric V Heat A Deeper look into the problem with Dr. Nicolas Peretz Fernandez. So thank you all for joining us today.

Thank you. One more time. Dr. J. You are a fantastic vestibular professional and we are very happy, happy to welcome back you here in academia for this new academia educational year. So have a great day or afternoon and see you all at our next academia session.

Thank you.