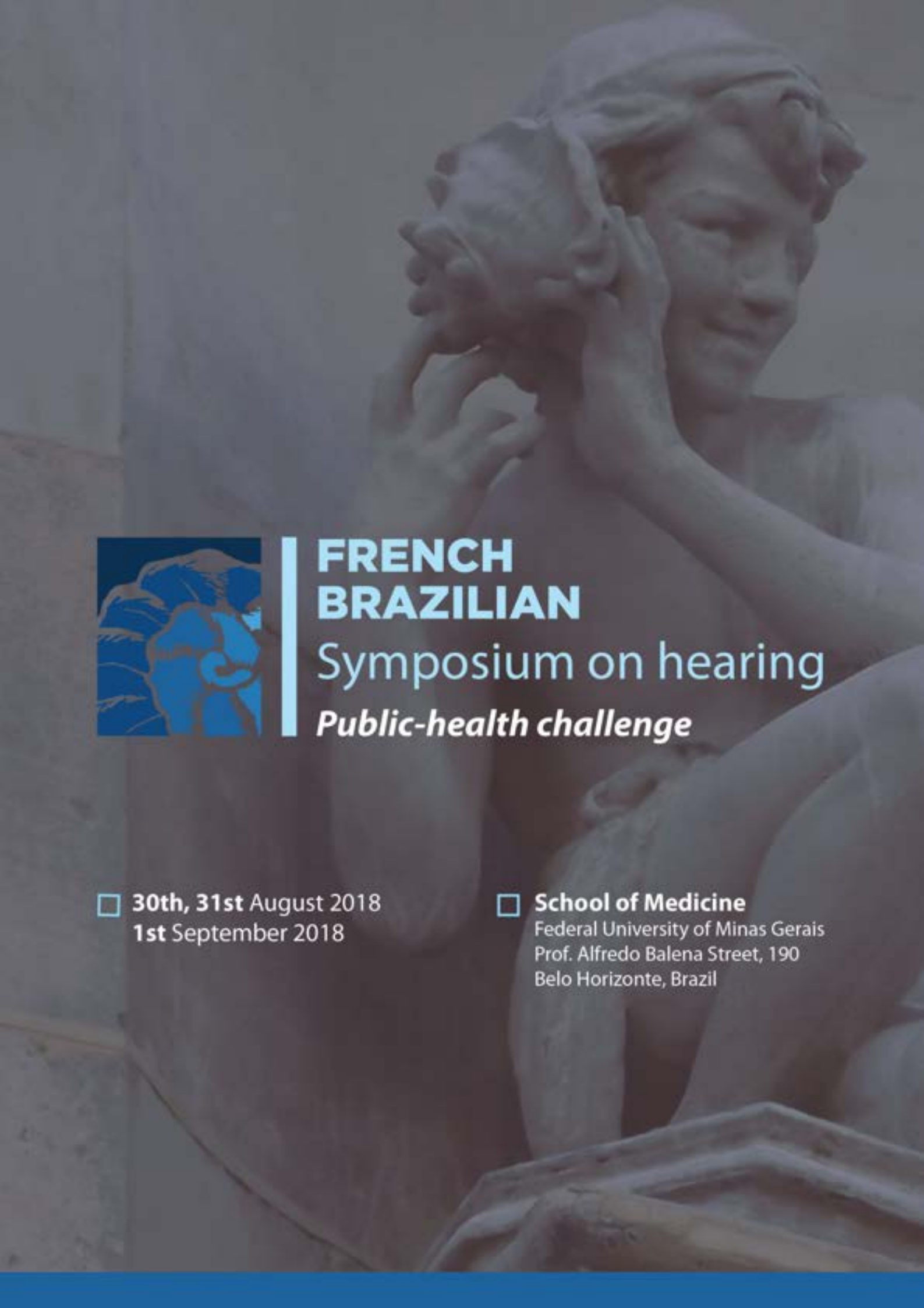

FRENCH BRAZILIAN
Symposium on hearing
Public-health challenge

30th, 31st August 2018
1st September 2018

School of Medicine
Federal University of Minas Gerais
Prof. Alfredo Balena Street, 190
Belo Horizonte, Brazil

Local

Faculdade de Medicina
Universidade Federal de Minas Gerais
Avenida Professor Alfredo Balena, 190

Brasil

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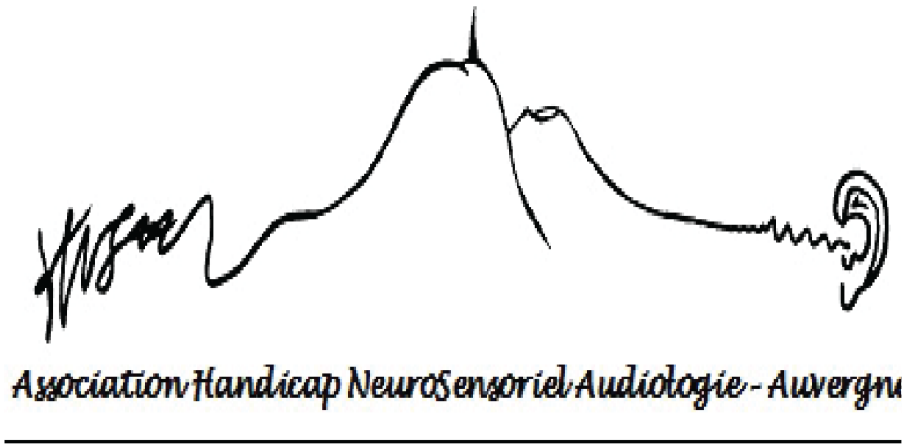

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Introduction

French-Brazilian Symposium on hearing: Public Health Challenges
International Workshop: From hearing loss detection to early intervention.

In 2014 the Université D'Auvergne and the Universidade Federal de Minas Gerais started a cooperation through a Capes Cofecub project coordinated by professors Paul Avan and Sirley Carvalho. Throughout these 4 years, researchers and professors from Brazil and France have carried out about 20 missions and have developed research on hearing in animal and human models.
This event was proposed to celebrate the success of this cooperation and also to broaden the discussion on what should be done after universal neonatal screening of hearing loss for ensuring early intervention, a public health challenge for several reasons.
The first issue is the detection of late-onset sensorineural hearing loss in babies in the first years of age. A second issue is the diagnosis of less frequent forms of impairment with temporal, rather than spectral disorders (auditory neuropathy spectrum disorders) for which the intervention must be nonconventional. It was be emphasized why the intervention itself must occur as early as possible once the diagnosis is established, and preferably be bilateral. These requirements raise economical and ultimately political concerns, those of overtaxing the existing human and financial resources even in the richest countries. On the other hand, delayed or improper intervention induces huge protracted financial problems in relation to the indirect cost generated by persisting handicaps. Current figures for cochlear implantation, for example, show that, with around 10 cochlear implants / million inhabitants in Brazil, as against 60 / million in the USA and Western Europe, there is still a wide margin for improving the universality of early intervention.
The goal of this congress was to provide the audience with international consensus, evidence and tools for convincing their governing bodies of the advantages, both for the patient and the State, of a speedy transition from early diagnosis to intervention, using cost-effective protocols.
This archive presents the summary of the discussions that took place during the event as well as summaries of the works presented in poster sessions and the outcomes of the DANPE's project.
We hope in this way to perpetuate what was brilliantly discussed in these days of events.

Professor Paul AVAN and Professor Sirley CARVALHO

Photos: Carol Morena

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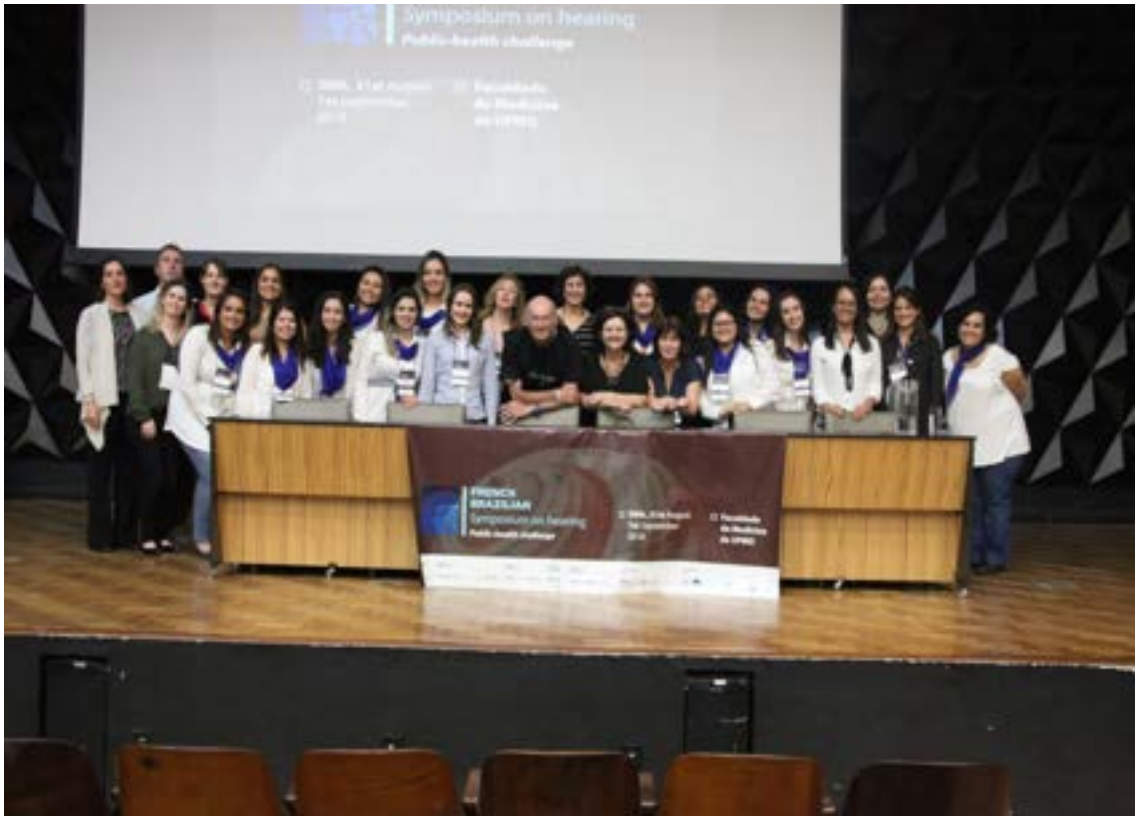

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Photo: Carol Morena

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Program

Thursday, 30 August:

Schedule	Theme	Speeches
1:00 pm	Check in	
1:30 pm	Welcome	
2h – 2:30 pm	Prof. Paul AVAN - Clermont Auvergne University (UCA), France	Hearing impairment and diagnosis, challenges for Public health
2:30 - 3:10 pm	Prof. Lionel COLLET – State Councillor - France	Public health policies in France
3:10 – 3:50 pm	Prof Beatriz NOVAES – PUC-SP- Brazil	Advances in Hearing Health in Brazil: from Hearing Screening to Cochlear Implant
3:50 – 4:40 pm	Coffee break, poster exhibition part 1, guided visit by the poster committee	
4:40 – 5:20 pm	Prof. Thierry MOM – Clermont Auvergne University (UCA), France	From hearing loss screening to auditory rehabilitation in neonates: how we do it in France?
5:20 – 6:00 pm	Prof. Celso BECKER – Federal University of Minas Gerais (UFMG), Brazil	The reality of the early cochlear implantation in Brazil

6:00 – 6:40 pm	Musical group Chorinho style: Cadê o Pano

Friday, 31 August:

Schedule	Theme	Speeches
8:30 – 9:10 am	Dr Arnaud COEZ	President of the French Society of Audiology (SFA) Title: "From basic sciences knowledges (genetics, cochlear implants, neuro-imaging) to hearing function development in toddlers: new clinical challenges identified by the French Society of Audiology"
9:10 – 9:50 am	Prof. Andrej KRAL – Medical University Hanover, Germany	The role of hearing in brain development and plasticity
9:50 – 10:40 am	Coffee break, poster exhibition part 2, guided visit by the poster committee	
10:40 – 11:20 am	Prof Renata MAMEDE CARVALLO – University of São Paulo (USP), Brazil	Early hearing diagnosis in children
11:20 – 12:00 am	Prof Naïma DEGGOUJ – University Louvain-la-Neuve, Belgium	Artificial intelligence as a guide for cost-efficient cochlear implant fitting
12:00 – 12:30 am	MEDEL – Marcela R Stefanini PLACA	When is the hearing aid not the solution?

12:30 am – 01:30 pm	Lunch break	
01:30 pm – 2:00 pm	OTICON MEDICAL – Sabrina Suellen ROLIN FIGUEIREDO	System implantable Oticon Medical and eABR in Cochlear Implant users
02:00 – 03:00 pm	Round Table 1 – Early diagnosis: what's new? Patrícia MANCINI - coordinator (Fabrice GIRAUDET & Marion SOUCHAL – UCA France, Danilo MELGES - UFMG Brazil)	
03:00 – 03:40 pm	Dr. Joel LAVINSKY – Federal University of Rio Grande do Sul, Brazil	Genes and Networks contributing to complex traits involving hearing and balance?
03:40 – 04:10 pm	Coffee break	
04:10 – 04:40 pm	AB – Renata MULLER	Technological innovation
04:40 – 05:10 pm	Dr Lucas Bevilacqua Costa USP- Bauru, Brazil	Reimplantation
05:10 – 06:10 pm	Round Table 2 – Hearing screening: challenges in Brazil Denise GONÇALVES – coordinator (Luciana MACEDO de RESENDE – UFMG – Brazil , Gabriela JANUÁRIO - State Secretary of Health, Elaine SOARES - President of the Hearing Screening Support Group in Brazil)	
06:10 – 06:40 pm	COCHLEAR – Fábio Heleno LOPES	Bone-anchored hearing aid (BAHA) in the pediatric population

06:40 pm	Announcement of poster prize ranking

Saturday, 01 September:

Schedule	Theme	Speeches
8:30 – 9:30 am	Round Table 3 - Cochlear implant - Helena BECKER – UFMG Brazil– coordinator (Mariana DENARO – UFMG Brazil, Marco Aurélio ROCHA SANTOS – UFMG Brazil, Arnaud COEZ – French Society of Audiology (SFA), France.	
9:30 – 10:10 am	Dr Nicholas S. REED – Johns Hopkins University, USA (Dr Frank Lin's group)	Hearing Loss and Healthy Aging: Hearing Aid Usage in the Elderly and Cost Effective Strategies
10:10- 10:50 am	Coffee Break	
10:50 – 11:40 am	Round Table 4-Speech therapy Intervention - Amélia Augusta de LIMA FRICHE – coordinator (Ana Cristina MARES GUIA – UFMG Brazil, Erika PARLATO- University Paris Diderot France and Ludimila LABANCA – UFMG Brazil)	
11:40 – 12:10 pm	Round Table CREFONO6: Research, Management and Services: Intersectoriality – Stela Maris Aguiar Lemos (UFMG, coordinator); Janaina Maria MAYNARD MARQUES (CREFONO 6); Daniela Souza Lima Campos (SES-MG), Lorena Bicalho (UFMG)	
12:10 am – 12:40 pm	HGC Saúde: Hearing aid and speech mapping – Fábio Heleno LOPES	
12:40 –	Oral presentation for poster prize winners	

01:10 pm	
01:10 – 01:30 pm	Farewell ceremony
01:30- 02:15 pm	Lunch break
02:15 – 04:30 pm	Satellite symposium - DANPE's results: In this session, results of the post-doctoral, doctoral and master's research projects in cooperation between UCA and UFMG will be presented - Coordinators: Prof. Paul AVAN and Sirley CARVALHO.

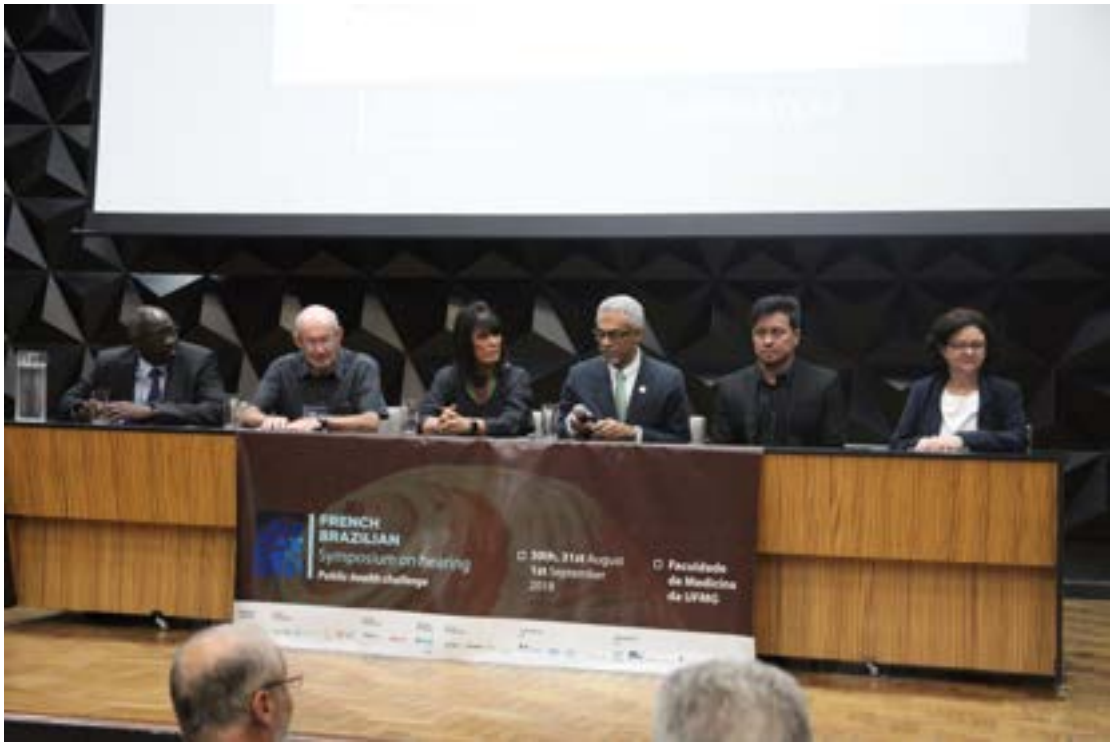
Opening Ceremony, Conferences, Round Tables and Sponsors Lectures

Opening Ceremony

The opening ceremony was attended by representatives from various segments, besides the French and Brazilian presidents of this symposium :

- Prof. Paul AVAN, president of this symposium from University of Clermont-Auvergne, France.
- Prof. Sirley CARVALHO, president of this symposium Federal University of Minas Gerais, Brazil
- Dr. Philippe MAKANY, The ambassador of France in Minas Gerais.
- Prof Humberto José ALVES, Director of School of Medicine of UFMG
- Prof. Maria Cecilia MARTINELLI, The president of the Brazilian society of Audiology
- Ms. Raimundo OLIVEIRA NETO, The President of the 6th Regional Speech Therapy Council

Prof. Paul Avan opened the ceremony talking about how the collaboration between universities contributes to advances in the area and exchanges between countries. Also, the treatment of hearing loss requires many skills and different technical solutions, hence the importance for researchers to be able to meet and discuss which direction their studies in the area must take. Dr. Philippe Makany explained how such symposiums contribute to seeking solutions which are important for public health in our two countries. The reciprocity of the partnership was stressed too by the director of the Faculty of Medicine, Prof Humberto José Alves.
Prof. Maria Cecilia Martinelli, emphasized that the area of speech therapy is expanding in the country and in the world. Despite this, there are still gaps between universal neonatal hearing screening and time of intervention. Thus, this type of event is extremely important by building partnerships with other countries, and delineating guidelines that will differentiate the performance of speech-language and audiologist professionals. Ms. Raimundo Oliveira Neto also commented about the public health impacts in Brazil, especially in Minas Gerais.
Finally, Prof. Sirley Carvalho explained that the event was the result of a collaborative project between the Master's Program in Science Speech-Language Pathologists and Laboratoire de Biophysique Neurosensorielle, in France. The symposium has been designed for fostering reflection on the future of research in this field and encouraging exchanges between researchers for the development of a research network.



Left to Right - Dr. Philippe Makany, Prof. Paul Avan, Prof. Maria Cecilia Martinelli, Prof. Humberto José Alves, Ms. Raimundo Oliveira Neto and Prof. Sirley Alves Carvalho.

Opening Ceremony - 30th august, 2018
Photo: Carol Morena

Conferences

Photo: Carol Morena

Hearing impairment and diagnosis, challenges for Public health

Prof. Paul AVAN – Clermont Auvergne University (UCA), France

With the combination of many different fields of basic and applied science, audiology has just entered a new era, with genuine cures and targeted therapies soon available, and increasingly efficient and cost-effective hearing aids (including implantable devices). However, diagnostic methods need to be refined for the complexity of sensorineural hearing loss (SNHL) to be unraveled and for an efficient personalized audiology to be launched. In this new framework, among other improvements including genuine cures of SNHL, regardless of their specific difficulties, more patients would get a significant benefit from their hearing aids. Many recent advances have come from the use of genetic methods to manipulate the auditory system and shed light on the part played by molecules, cellular subsystems and systems in guaranteeing a fine auditory performance even in noisy environments. If restricted to explaining hearing impairment in rare congenital conditions, these advances would have a limited clinical interest. Yet there is increasing evidence that our understanding of the most frequent causes of hearing loss (presbyacusis, noise-induced hearing loss) is about to greatly increase, and that we are on the verge of establishing a rationale for recommending specific, personalized hearing-aid settings; personalized training; or drug prescription. To reach this stage, we will need to develop methods allowing a much more detailed diagnosis to be established, a challenge that this meeting will try to tackle.

Public health policies in France

Prof. Lionel COLLET – State Councillor - France

Photo: Carol Morena

France's health-care system offers high-quality care and the health of french people is good. According to OECD, France is at the 5th rank of the OECD countries, according to life expectancy, but France needs to improve the life expectancy in good health at 65 years old, to reduce mortality related to tobacco and alcohol, to reduce obesity and to increase the coverage of infants for several vaccines including vaccines against measles or meningitis.
A national strategy for health has been adopted by the government, giving the priorities for the 2018-2022 period. The first axis is to implement a promotion of health including prevention. So, the price of tobacco has significantly increased, tax has been augmented on alcohols, a nutriscore is printed on food packaging, an obligatory sanitary service has been created for health students, and a law has extended the vaccination mandates to 11 vaccinations.
In the field of hearing, independently of universal neonatal hearing screening which has been officialised in 2012, two main measures have been taken: to prevent hearing risks in young people and to reimburse totally the hearing aids.

Advances in Hearing Health in Brazil: from Hearing Screening to Cochlear Implant

Prof. Dra. Beatriz C Novaes PUC-SP Brazil

Photo: Carol Morena

The conference aims at discussing the process from hearing screening to early Intervention in the historical perspective of a university clinic since the lmplementation of Hearing Health Policy. Based on the experience of Centro Audicao na crianca/ Derdic/PucSP (2004 -2018) it will point out major challenges and processes management that can shed light to further lmprovement of the process of referral to early intervention.

From hearing loss screening to auditory rehabilitation in neonates: how we do it in France?

Prof. Thierry MOM – Université Clermont Auvergne (UCA), França

Photo: Carol Morena

Hearing loss in neonates can lead to dramatic alteration of the language acquisition as well as the quality of life. Universal screening has proven to limit the burden of deafness, by detecting as soon as the first days of life severe or profound hearing loss. The challenges are, first to achieve an exhaustive hearing screening in neonates, second to ascertain the diagnosis of hearing loss among the neonates who did not pass the hearing screening; third to propose the hearing rehabilitation adapted to the type of hearing loss, as soon as possible.

In order to achieve an exhaustive hearing screening, it has been decided in France, to only perform it with automatized (A-ABRs) or transient otoacoustic emissions (A-TOAEs) before the neonate is given discharged from maternity.

A two-step hearing screening program is offered, most often with both techniques, one at first step, the second at the second step. When the two steps are positive, then the baby is referred to a reference center where the diagnosis has to be confirmed or eluded.

Because audiometric testing remains difficult and uncertain in neonates, a panel of objective hearing tests are then being done, consisting of ASSRs, TOAEs, ABRs, this time not automatized.

The next step, is then to test the efficacy of hearing aids, most often external but in cases, through bone conduction. In the mean time, the morphologic and genetic diagnosis is being achieved.

Last in children who have no benefit of hearing aids, a unilateral or bilateral cochlear implant will be proposed.

The experience of Clermont-ferrand, a French city of about 200 000 inhabitants will be presented, highlighted the hints and pittfall of both hearing screening and diagnosis of hearing loss in neonates.

The reality of the early cochlear implantation in Brazil

Prof. Celso BECKER – Federal University of Minas Gerais, Brazil

Photo: Carol Morena

Discusses the advantages of diagnosis and early intervention in hearing impairment. Advantages of early cochlear implantation, before one year of life. Difficulties and barriers that delay the early implantation in the Brazilian reality. Auditory Health Care Network in the state of Minas Gerais.

From basic sciences knowledges (genetics, cochlear implants, neuro-imaging) to hearing function development in toddlers: new clinical challenges identified by the French Society of Audiology

Arnaud Coez - President of the French Society of Audiology (SFA)

Audiology in France is the result of the interaction of 4 kinds of professionals: ear nose & throat doctors, who make the diagnosis of hearing loss and prescribe hearing aids, the "*audioprothésistes"* who choose the correct hearing aid, fit it, and assume the follow up of the fitting after a trying period and different auditory evaluations, the speech therapist who is responsible of the training of the patient and researchers of different fields who studied many scientific aspects.

The French society of audiology (SFA) is the meeting point of these different professionals working in different fields.

During the last meeting organised by SFA in 2017, in Paris, a major challenge emerged from basic sciences for the clinicians:

The discovery twenty years ago of the first gene of deafness, and in 2017, hundred of genes identified in isolated deafness (Pr C PETIT, Pasteur, France).

Twenty years of clinical genetic consultation, 90% of monogenic isolated genetic deafness, among them, 70% were recessive deafness (Dr S MARLIN, APHP-Necker, France).

Thirty four years of the French experience of in vitro fertilization (Dr E ADDA-HERZOG, Hospital Foch, France), and Seventeen years of the French experience on genetic diagnosis on embryos obtained by in vitro fertilization applied to genetic diseases (Pr J STEFFANN).

In Paris, pre implantatory diagnosis in case of risk of genetic deafness represented 3 % of the activity of this hospital specialized in medically assisted reproduction.

The challenge for the clinical teams in contact with deaf people is now to be able to speak about pre implantatory diagnosis if patients ask for.

A working group of SFA is developing in collaboration with AP-HP (Necker-Imagine institute) a document for patients that should be given by the clinicians. This document will explain what is a genetic consultation in case of genetic diagnosis but also in case of risk of deafness for a primary pregnancy.

The clinicians must be able now to respond to demand on antenatal diagnosis or on in vitro fertilization and to address the patient to a geneticist medical team.

Hearing aids and brain plasticity

Andrej Kral – University of Hannover - Germany

Photo: Carol Morena

Neuroscience of deafness: mechanisms, implications and treatment

In children, brain development continues for many years after birth. Much of this development depends on sensory input. Our lab investigates consequences of congenital deafness in animals and humans. We are working with a higher mammal model of inborn deafness, the congenitally deaf cat, and test the morphology and function of the brain in hearing animals, congenitally deaf animals, and animals born deaf but equipped with a portable signal processor and a cochlear implant at different ages. Extensive functional deficits in the brain of deaf animals were demonstrated and could be compensated by an early, but not by late, cochlear implantation. There was excellent correspondence between electroencephalographic findings in cochlear-implanted children with the findings in deaf cats exploring the neuronal mechanisms of developmental plasticity (Kral & O'Donoghue, 2010, New Engl J Med, Kral and Sharma, 2012, Trends Neurosci). Following early single-sided deafness or single-sided cochlear implantation, the brain reorganizes towards the only hearing ear, generating a stronger and a weaker ear representation in the cerebral cortex (Kral et al., 2013, Brain, Tillein et al., 2016, Cereb Cortex). Furthermore, we described visual cross-modal reorganization in the completely deaf animals (Lomber et al., 2010, Nat Neurosci) and its limits and interaction with the cochlear implants (Land et al, 2016, J Neurosci). Serious deficits were observed in congenital deafness in the microarchitecture of the cortical column, a prerequisite for comparing the sensory input with the (top-down) predictions about it (Kral et al., 2017, Hear Res). This is an essential mechanisms controlling adult learning. We observed loss of induced oscillatory responses corresponding to the deficit (Yusuf et al., 2017, Brain). Finally, in children high variation in cognitive functions are associated with early deafness, indicating consequences also on non-auditory functions (Kral et al., 2016, Lancet Neurol).

The need for early intervention in congenital deafness results from a multiplicity of developmental mechanisms dependent on sensory input, combining developmental molecular changes in synapses, deficits in their plasticity, reduced informational capacity of the deaf auditory brain, reduced auditory feature sensitivity, cross-modal takeover and deficits in brain mechanisms required for control of learning and behavior.

Supported by Deutsche Forschungsgemeinschaft (Exc 1077) and MedEl Comp., Innsbruck.

Early hearing diagnosis in children

Prof Renata MAMEDE – University of São Paulo, Brazil

Photo: Carol Morena

The early identification of hearing loss has been given significant importance in the literature and has consequently been reflected by the implementation of newborn hearing screening programs in many countries. Newborn hearing screening is a critical strategy to provide timely diagnosis of hearing loss and to guarantee optimal benefits of early intervention for the development of language, educational and socio-personal skills. Evoked otoacoustic emissions (EOAEs) are sounds in the external ear canal in response to acoustic stimulation and can first be recorded at 28–29 weeks postconception. The EOAE amplitude increases up to postconception week 38 and decreases to adult-like values by the age of 3 years. Generated by normal nonlinear mechanisms within the cochlea, EOAEs are thought to be the result of motile activity by the outer hair cells, which are innervated by the efferent nerve fibers of the medial olivocochlear bundle. Newborn hearing screening test can be influenced by transient conditions in the ear canal and middle-ear. Wideband reflectance (WBR) emerges as a diagnostic tool that provides objective measures of the status of the middle-ear and can explain variations in how it receives, absorbs and transmits sound energy. Thus, has potential for detection of middle-ear disorders in newborns.

Artificial intelligence as a guide for cost-efficient cochlear implant fitting

Prof Naïma DEGGOUJ – University Louvain-la-Neuve, Belgium

Photo: Carol Morena

Programming cochlear implants with artificial intelligence

J. Wathour*, P. Govaerts°, N. Deggouj*.
* Saint-Luc University Hospital, Brussels, Belgium.
° Eargroup, Antwerp, Belgium

Introduction: Fitting a cochlear implant (CI) is challenging because of the variability in the functional results observed between patients, the complexity of the programmable parameters and the increased number of implanted subjects consuming more and more time and money. There is a clear need of artificial agent to offer the most efficient CI fitting at lowest costs. Machine or deep learning are applications of "Artificial Intelligence" (AI) that use predictive algorithms based on data-driven models to predict the optimal solution for a problem. This help to decision-making is used in various medical fields to improve diagnosis, therapeutic targets or health care system processing (Nakajima 2017, Hamel 2017).

Aim: Does AI help CI fitting and does it improve CI outcomes? To respond two methods of programming cochlear implants are compared: the manual fitting method (the audiologist looks for the level of electrical stimulation producing an effective and comfortable hearing perception at each electrode) versus the programming with artificial intelligence FOX. Various CI outcomes are studied in various CI implanted populations to demonstrate the eventual plus-value of AI-Fox: tonal, and speech audiometries, phonetic discrimination, loudness growth, number of fitting sessions.

Results: Manual fitting parameters are rarely statistically modified with time in 40 CI adults followed during 5 years, except for the C-levels. It emphasizes the complexity of the various parameters interactions and changes for the human brain.

AI-Fox proposes the same initial fitting parameters to all the subjects and surprisingly they suite well to the majority of them. It is neuropsychologically interesting. Many parameters are modified in the next sessions taking account of the measured outcomes.

The functional results are good in the 2 methods: tonal thresholds reach normal levels since 1 Month of CI activation, and speech understanding scores since 3 months. But these functional outcomes are more rapidly obtained with less manpower after AI-Fox aided than manual fitting.

Conclusion: AI is approaching and sometimes surpasses human decision-making in CI fitting with reduction of the fitting time. It is still in learning and optimization.

Cochlear implant and Hearing aids

Dr. Joel LAVINSKY – Federal University of Rio Grande do Sul

Photo: http://lattes.cnpq.br/5329081726918975

Genes and networks contributing to complex traits involving hearing and balance

Abstract: In this research we aimed to identify genes and pathways that confer susceptibility to age-related, noise-induced hearing loss and vestibular disease. Our overriding hypothesis was that, among inbred strains of mice, there are genetic variants relevant to the molecular mechanisms and pathways underlying susceptibility to these complex traits. We described, for the first time, the mapping of several loci for susceptibility to noise-induced hearing loss in inbred strains of mice, through association analysis with correction for population structure. Then, we combined this phenotype, genome-wide association study, and cochlear transcript levels to demonstrate a gene-by-environment interaction and identify several candidate genes and pathways that are novel. We also performed a large-scale phenotyping for these 100 strains, identified several distinct patterns of baseline hearing impairment/noise vulnerability. We then described the first application of GWAS with correction for population structure to the mapping of loci for vestibular functional variation in inbred strains of mice, and provided evidence for the role of *Dcc* in the normal innervation of the peripheral vestibular system. Recently, based on a peak SNP interval on chromosome 8 identified in our previous mouse GWAS on age-related hearing loss, we generated and characterized an inner ear-specific *Nrp1* conditional knockout (CKO) mouse.

Photo: Carol Morena

Reimplantation

Dr. Lucas BEVILACQUA COSTA – USP, Brazil

The impact of CI on the rehabilitation of hearing impaired individuals is well known among audiology / otology specialists. However, its use requires attention and care not only of the user, but also of the professional, since, as an electronic device, from malfunction to full shutdown. Thus, reimplantation becomes part of the reality of these patients and studies on the impact of this new surgical approach should be constantly analyzed.

Importance of hearing-aid fitting in the elderly and of cost-effective strategies

Dr Nicholas S. REED – Johns Hopkins University, USA (Dr Frank Lin's group)

Photo: https://www.jhucochlearcenter.org/nicholas-reed.html

Hearing Loss and Healthy Aging: Hearing Aid Usage in the Elderly and Cost Effective Strategies.

A growing body of epidemiologic evidence suggests broader health-related implications of age-related hearing loss, including independent associations with cognitive decline, incident dementia, and poorer physical functioning. The mechanistic pathways through which hearing loss may contribute to cognitive decline, in particular, include increased cognitive load, social isolation, and increased neural atrophy and structure changes. Hypothetically, these pathways may be amenable to hearing loss treatment and thereby interventions such as hearing device fitting, aural rehabilitation, and communication strategy approaches may mitigate the influence of age-related hearing loss on cognitive decline. Epidemiologic data suggests positive effects of hearing loss treatment on cognition and quality of life; However, there are few well-controlled trials from which to draw conclusions. With a majority of older adults affected by age-related hearing loss and less than a quarter of those adults accessing rehabilitative hearing care, we must look to novel approaches to reach more adults and enhance healthy aging. This session will discuss recent epidemiologic research, results from current and planned studies to investigate the impact of rehabilitative hearing intervention on reducing cognitive decline and the risk of dementia, provide evidence from novel community based hearing intervention programs within a public health approach to treating age-related hearing loss.

Round Tables

I Early diagnosis: what's new?

Ms. Isabella Marques PEREIRA RAHME- coordinator - UFMG – Brazil

The main topic was new techniques that can be used to the diagnosis of hearing loss. Dr. Marion Souchal (Université Clermont Auvergne) presented her PhD research concerning a cochlear tonotopia disorder caused by alterations of the outer hair cells. Dr. Fabrice Giraudet (Université Clermont Auvergne) introduced new points of view in Auditory Neuropathies (fatigability, hidden hearing loss), and Dr. Danilo Melges (Universidade Federal de Minas Gerais) presented statistical techniques for the detection of the auditory evoked responses from a technical point of view.

Dr Fabrice GIRAUDET - University Clermont Auvergne, France

Dr Marion SOUCHAL – University Clermont Auvergne, France

Prof Danilo MELGES – Univerisidade Federal de Minas Gerais- UFMG, Brazil

Photos: Carol Morena

II Hearing screening: challenges in Brazil

Prof. Denise UTSCH GONÇALVES – coordinator - UFMG – Brazil

Photo: http://lattes.cnpq.br/2330509846581060

The main topic was the challenges of implementing and maintaining hearing screening at three levels: municipal, state and federal. Prof. Luciana Macedo de Resende presented the Newborn hearing screening in the Clinical Hospital of the Federal University of Minas Gerais. Ms Gabriela Januário presented the Newborn hearing screening program of the health care network for people with disabilities in Minas Gerais state and Dr Elaine Soares presented the universal newborn hearing screening in Brazil and the new resolutions of the Multiprofessional Committee on Auditory Health – COMUSA.

Prof. Luciana MACEDO de RESENDE – UFMG – Brazil

Photo: Carol Morena

Ms Gabriela JANUÁRIO State Secretary of Health, Brazil

Photo: http://lattes.cnpq.br/8407752739114873

Dr Elaine SOARES - President of the Hearing Screening Support Group in Brazil

III Cochlear implant

Helena BECKER – UFMG – coordinator UFMG – Brazil,

Photo: http://lattes.cnpq.br/7165309884613944

"What does it mean when 'it doesn't work' with a cochlear implant: functional neuroimaging evidences"
The purpose of this Round Table, coordinated by Prof Helena BECKER, discussed about challenging cases when the cochlear implant does not work. Dr Mariana DENARO showed a bilateral progressive hearing loss (at the worse side, the patient did not have hearing aid and showed a middle ear atelectasis with a surgical difficult mastoid; at the better side she already have a mastoidectomy and she was using a hearing aid) and recently, she had an herpes zoster infection and lost completely the hearing in the better side. It was discussed about the surgical difficulties of one side and the poor prognostic expectations on herpes zoster side. Dr Marco Aurélio ROCHA SANTOS, presented a progressive hearing loss in a teenager, who have Large Vestibular Aqueduct Syndrome and had a bilateral BAHA before and is now showing a cochlear implant indication. The discussion was about the difficulties of a cochlear implant over a skin that had a BAHA. Mr Arnaud COEZ showed his experiences with functional neuroimaging evidences when the cochlear implant does not work.

Dr. Mariana DENARO - UFMG, Brazil

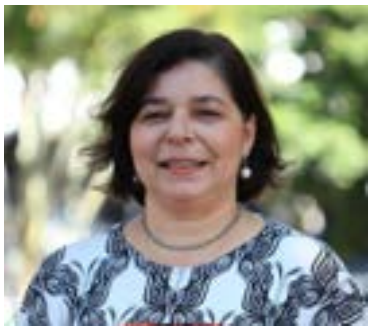
Dr. Marco Aurélio ROCHA SANTOS – UFMG, Brazil

Photo: http://lattes.cnpq.br/1880462842245332

Dr. Arnaud Coez- President of the French Society of Audiology (SFA)

IV Speech therapy Intervention

Prof. Amélia Augusta de LIMA FRICHE – coordinator, UFMG – Brazil



The main subject of this Round Table was “Speech therapy Rehabilitation in hearing loss patients. The speech therapists Dr. Erica Parlato, Dr. Ludimila Labanca and MSc. Ana Cristina Mares Guia presented two cases of profound bilateral pre-lingual hearing loss in children with cochlear implant. The main discussed points were: speech therapy approaches; the family role during therapeutic process; the importance of motivation in the therapeutic process; the auditory abilities and how make use of them in the therapeutic process. In this round table there were also experience exchanging and reflections on hearing loss rehabilitation.

Ms. Ana Cristina MARES GUIA – UFMG, Brazil

Prof. Erika PARLATO University Paris Diderot - France

Dr. Ludimila LABANCA – UFMG, Brazil

CREFONO6: Research, Management and Services: Intersectoriality

Photo: Carol Morena

Stela Maris Aguiar Lemos coordinator, UFMG – Brazil

The round table of the CREFONO-6 was chaired by speech therapist Stela Maris Aguiar Lemos main theme was Research, Management and Services: Intersectoriality. The representative of the Speech Therapy Council, Janaína Maria Maynard Marques, reported the importance of Educational Speech Therapy, Daniela Souza Lima Campos, from the State Department of Health, presented the health program at the school and the Speech Therapist Lorena GR Bicalho de Castro presented the children's hearing screening instrument – ITAI.

Janaina Maria MAYNARD MARQUES CREFONO 6 - Brazil

Lorena Bicalho UFMG-Brazil

Photo: Agencia Minas

Daniela Souza LIMA CAMPOS SES-MG - Brazil,

Sponsors Lectures

The sponsors spoke about their products and the relationship with intervention clinical.

COCHLEAR/ POLITEC - Bone-anchored hearing aid (BAHA) in the pediatric population

HGC Saúde - Hearing aid and speech mapping
Fábio Heleno LOPES

AB - Technological innovation
Renata MULLER

Photo: Carol Morena

MEDEL - When is the hearing aid not the solution?
Marcela R Stefanini PLACA

OTICON MEDICAL - System implantable Oticon Medical and eABR in Cochlear Implant users
Sabrina Suellen ROLIN FIGUEIREDO

Award winning posters

P 1

CORTICAL HEMODYNAMICS RESPONSE IN INFANTS WITH CONGENITAL TOXOPLASMOSIS THROUGH AUDITORY STIMULATION

Ana Lívia Libardi Bertachini, Luciana Macedo de Resende, Gabriela Cintra Januário, Gláucia Manzan Queiroz de Andrade, Débora Marques de Miranda

INTRODUCTION: The hearing is a fundamental component of the complex human communication system. Speech and language recognition consisted networks of neurons distributed in different brain regions and are related to speech perception, being dependent on peripheral and central auditory integrity. The maternal voice is primordial to the acquisition of language as much as biological questions. **OBJECTIVE:** Describe the difference in auditory sensory processing in response to stimulation of the mother's voice and identify areas of cortical activation. **METHODS:** Research Ethics Committee of UFMG nº 45493415.6.0005149. Consists of evaluating cortical hemodynamic activity in response to auditory stimulation of the mother's voice (spontaneous conversation), using the near-infrared spectroscopy technique (NIRS). Auditory evaluation through Immittanciometry, evoked otoacoustic emission (EOE) and brainstem evoked responses audiometry (BERA). **RESULTS:** 41 children (26 with congenital toxoplasmosis and 15 without the infection) were evaluated between October 2016 and January 2018. It was found that none of the children groups have alterations in EOE and Immitanciomentria. In the BERA exam 53,34 % of subjects in the control group had increased V-wave latency in the left ear (two scans at 40dB) and in the congenital toxoplasmosis group 61.53% of the children had an increase in V-wave latency in the right ear (two scans at 40dB). It should be noted that of the 26 children with congenital toxoplasmosis, 13 had neurological abnormalities confirmed by transfontanel ultrasound, such as calcifications and ventriculomegaly. In the analysis of the NIRS in the total activated channels, in the congenital toxoplasmosis group the activations are more diffuse compared to the control group (point activations). When comparing the regions of interest (ROI) of the temporal, frontal and parietal channels in the right and left hemispheres with voice stimulation of the mother, it was possible to verify a change in the hemodynamic response of frontal and parietal regions. **CONCLUSION:** children with congenital toxoplasmosis and neurological sequelae present a higher risk of alterations in sensory processing, an altered development in a specific brain structure such as cerebral calcifications caused by congenital toxoplasmosis, may reduce the resources available in these cortical regions, that is, other regions will be recruited permanently.

P-2

CORRELATIONS BETWEEN AUDITORY PERCEPTION, DEPRESSIVE SYMPTOMS AND QUALITY OF LIFE IN THE HEALTHY AGING

Leticia Pimenta Costa Guarisco; Mariana Fuzaro

INTRODUCTION: Aging causes physiological changes throughout the organism, among them age-related hearing loss, which is very prevalent in the elderly, and which affects mainly the communicative process. In these cases, it is common social isolation, feelings of devaluation, decreased self-esteem, difficulties in family relationships, which justifies research on the association between hearing loss, depression and quality of life. **OBJECTIVE:** to verify the relationship between auditory perception, depressive symptoms and quality of life in the elderly in a healthy aging context. **METHOD:** the sample consisted of 68 elderly people attending a companionship center. The research consisted of the application of subjective hearing evaluation composed by auditory anamnesis (complaint), Subjective Faces Scale (hearing satisfaction), Hearing Handicap Inventory for the Elderly - Screening version (HHIE-S) and auditory thresholds; evaluation of depressive symptoms through the Geriatric Depression Scale (GDS-15); and quality of life assessment through the instrument (WHOQOL-bref). To analyze the results, the Correlation Matrix (Sperman Correlation) was applied between the quantitative variables (age, GDS, HHIE-S, Subjective Faces Scale and Quality of Life). The GDS variables and quality of life were compared in relation to the results of the auditory tests (Mann- Whitney or T test). **RESULTS:** Of the elderly evaluated, 11.8% had depressive symptoms (GDS-15), 50% had a hearing complaint, 26.5% had a hearing handicap (HHIE-S), 33.8% had hearing dissatisfaction (Subjective Faces Scale) and 72.1% had alteration in hearing thresholds. Statistical analyzes did not show differences between the groups for GDS variables and quality of life in none of the auditory tests analyzed. A trend ($p < 0.2$) was observed for higher score GDS, indicating the presence of depressive symptoms in the altered group for the Subjective Faces Scale and HHIE-S. **CONCLUSION:** there is no evidence of a relationship between auditory perception, presence of depressive symptoms and changes in the quality of life in the elderly in the context of healthy aging. This project was approved by the Committee on Ethics in Research, under CAAE: 58776416.1.0000.550 and was carried out through the assistance of CNPQ (scientific initiation).

P-3

FACTORS ASSOCIATED WITH SELF PERCEPTION OF NOISE IN A URBAN CENTER: "THE BH HEALTH STUDY"

Marina de Figueiredo Colla, Waleska Teixeira Caiaffa, Fernanda Abalen Martins Dias, Dário Alves da Silva Costa, César Coelho Xavier, Fernando Augusto Proietti, Amélia Augusta de Lima Friche

INTRODUCTION: Noise exposure can cause non auditory effects, such as fatigue, lack of concentration, irritability, stress and changes in mood, impacting health negatively. **OBJECTIVE:** Evaluate self-perception of noise and its association with gender, age, self-evaluation of quality of life, mental disorders, psychological well-being and satisfaction with life. **METHODS:** Household-based health survey with a population based complex probabilistic sampling. The studied population was composed of 4.048 adults who answered a questionnaire with aspects related to self-perception of noise in the neighborhood, quality of life and its generating sources. The response variable self-perception of noise was measured with the question: "does noise bother you?". The self-perception of quality of life was measured by the question: "How would you evaluate your quality of life?", evaluated with a scale 0 to 10. Early warning signs of mental disorders was measured with the questionnaire SRQ-20 and psychological well-being by the face scale. The data analysis was assessed through descriptive analysis and association performed through univariate and multivariate logistic regression. **RESULTS:** Among the participants that could notice noise as a problem 57.8% were female: 57.7% classified their quality of life as bad; 72.8% are dissatisfied with life; 32.8% showed early warning signs of mental disorders and 27.2% reported psychological illness. The multivariate model indicated that being female (OR=1.2;CI=1.0-1.5), presence of early warning signs of mental disorders (OR=1.6;CI=1.3-2.0) and being dissatisfied with life (OR=1.28;IC=1.05-1.55) were associated to the perception of noise as a problem. The others variables were not associated to this perception. **CONCLUSION:** Being female, presenting early warning signs of mental disorders and being dissatisfied with a life are associated with noise nuisance.

Abstracts symposium

P-01

AGED PATIENTS COGNITIVE ABILITIES PROFILE'S BEFORE AND AFTER ADAPTATION WITH HEARING AIDS

Beatriz Rezende Matos de Sousa, Érica de Araújo Brandão Couto e Lílian Felipe

INTRODUCTION: Currently, a larger portion of the population has been favored with the hearing aids adaptation process due to the Unified Health System making this process viable. This has contributed to the improvement of the population life quality, especially the elderly with presbycusis. However, further studies are needed to demonstrate the interference of sound amplification provided by hearing aids in the cognitive abilities and mood of the adapted elderly. The establishment of a more consistent interrelationship between hearing and cognition, and of these with humor, can contribute to safer decisions in clinical practice. **PURPOSE:** To verify if the use of hearing aids allows improvement of the cognitive abilities in elderly patients with presbycusis and to verify the presence of depressive symptoms in the population studied and possible improvement of these symptoms after the optimization of the communicative capacity, promoted by the use of hearing aids. **METHODS:** An experimental descriptive longitudinal study was accomplished with a sample constituted by nine elderly with presbycusis, of both sex and with age varying from 73 to 82 years. The study occurred in two stages. In the first one, the individuals were assessed before the adaptation process with their hearing aids and, in the second stage, these individuals were assessed again after a time of use of the hearing aids, which varied between 39 and 170 days, with an average of 114,1 days. In both of the stages, the same evaluation instruments were used to assess the cognitive abilities – Mini-Mental Stage Examination, Clock-drawing, Verbal Fluency Test, Delayed recall subtest of CERAD – and the mood – Geriatric Depression Scale with 15 items. **RESULTS:** The descriptive analysis of the data allowed to evidence that, after the use of the hearing aids, the performance of the individuals, in the instruments of evaluation of cognitive abilities, improved or was kept. Regarding the mood, almost half of the sample reduced the positive answers of the depressive symptoms. **CONCLUSIONS:** The results of the present study demonstrated that the use of the hearing aids can improve positively the cognitive abilities and contribute for the reduction of the depressive symptoms in elderly with presbycusis.

P-02

AUDITORY COMPLAINTS IN INDIVIDUALS SUBMITTED TO OTONEUROLOGICAL EXAMINATIONS

Marlon Bruno Nunes Ribeiro

INTRODUCTION: It is known that there is an intimate relationship between the auditory system and the vestibular system, both through anatomy and innervation. This intimate relationship may lead individuals who have changes in the vestibular system to report auditory changes as well, and vice versa. Hearing loss is reported by the patient as a mild, moderate or severe impairment of his ability to listen and may be associated with difficulty understanding speech, intolerance to sounds, pressure in the ear, distortion of sound sensation or attention deficit. Tinnitus is the sensation of noise in the ear, it can be reported in some other part of the head. Noises can be of various types. Both hearing loss and tinnitus can be uni or bilateral. These symptoms are due to affections of the external ear, middle ear, labyrinth or cochlear branch of the VIII nerve (peripheral auditory system) or central location (nuclei, pathways and interrelations in the central nervous system). **OBJECTIVE:** To verify the auditory complaints of individuals from an academic community who underwent otoneurological examinations. **METHODOLOGY:** Cross-sectional, qualitative study. Before the otoneurological exams, a detailed anamnesis was carried out, which contained questions about the auditory system and the subjects' responses were analyzed in this study. (COEP nº CAAE 56877316.1.0000.5149) **RESULTS:** Of the 91 subjects who underwent otoneurological exams, 19 (21%) reported hearing complaints. The age of this sample ranged from 24 to 79 years with an average of 57 years. With regard to sex, 16% were males and 84% females. According to the auditory complaints it was verified that 63% reported difficulty in hearing, 16% reported as worse ear to the left and 5% to the right; 32% have already worked in a place with high noise, with an average of four hours of exposure per day; 63% reported tinnitus and 16% said tinnitus is bilateral, 21% in the right ear and 5% in the left ear. **CONCLUSION:** Individuals with otoneurological alterations in this study had auditory alterations. This reveals the importance of carrying out a detailed anamnesis that addresses hearing health issues.

P-03

AUDITORY REHABILITATION IN ADULTS: RESULTS FROM A TRAINING PROGRAM

Cristiane Bueno Sales, Luciana Macedo de Resende, Carlos Faria Santos Amaral

INTRODUCTION: Hearing is fundamental to human communication. The impact of hearing loss can cause biological, psychological and social consequences. The auditory process of rehabilitation aids individuals with hearing loss to improve communication performance present in daily life situations. There are good reasons to believe in physiological changes of the central auditory system due to its stimulation after auditory adaptation associated with hearing training. **OBJECTIVES:** To describe the findings of behavioral tests of auditory processing in patients with mild to moderate neurosensory hearing loss and to verify if the auditory rehabilitation produces changes in the response patterns to these tests. **METHODOLOGY:** The research project was approved by COEP of UFMG on June 29, 2011 (Opinion No. ETIC 0192.0.203.000 - 11). This is an experimental study in which the findings of behavioral assessment of auditory processing of 22 patients with mild or moderate post-lingual hearing loss were compared before and after rehabilitation. We studied all the mechanisms involved in the behavioral assessment of auditory processing of the four major functional categories proposed in the literature. **RESULTS:** Auditory rehabilitation in patients with mild to moderate hearing loss caused significant improvement of auditory processing. Unlike previously published studies, the comparison of the results of the initial and final evaluations did not suffer influence of other variables. These results suggest that the response patterns of the adult central auditory system may change with auditory rehabilitation. **CONCLUSION:** The results emphasize the importance of routine indication by Health Care Hearing Services of behavioral assessments of auditory processing and auditory rehabilitation, including the hearing aid fitting and the training of listening skills, regardless of patient age. The hearing aid fitting associated with improvement in the speed of auditory processing may contribute to better prepare patients to daily life situations, resulting in more adequate social integration.

P-04

BRAZILIAN RESEARCH ON AUDITORY TRAINING PROGRAMS CONDUCTED WITH HEARING AIDS USERS: SYSTEMATIC REVIEW

Beatriz Rezende Matos de Sousa, Renata Jacques Batista e Fernanda Abalen Martins Dias

INTRODUCTION: The rehabilitation of the hearing impaired had significant progress with the development of hearing aids. However, even with the technological advancement of these devices, there is a huge number of hearing aids users that remain with complaints of difficulty in communication. It is in this context that the auditory training becomes a useful tool, as it seeks to improve the performance of auditory skills, which are essential in a communicative process. **PURPOSE:** To verify, through a systematic review of the literature, what has been researched in Brazil regarding auditory training performed in adults and elderly individuals, post-lingual hearing impaired, users of hearing aids. Furthermore, it was intended to provide a clear relation about the methods of auditory training that were found in this systematic review, in order to assist the professionals in choosing their clinical management. **METHODS:** The bibliographical research was done through an electronic search, in databases in the Virtual Health Library and PubMed, for articles published in the last ten years (2002-2012). The descriptors characterizing the theme were determined and articles were searched in Portuguese, English and Spanish. **RESULTS:** We found 94 articles in the Virtual Health Library and 295 in PubMed. After the analysis of these articles, to select those that were in line with the proposed objective, we obtained the final selection that consisted of four articles. The doctoral thesis " Musical auditory training: a proposal for elderly hearing aid users " was included by the relevance of their data for this research. The articles presented proposals for formal auditory training methods and the doctoral thesis proposed informal auditory training. **CONCLUSIONS:** The selected studies proved that auditory training promotes the improvement of central auditory abilities and psychosocial aspects of hearing impaired, ensuring greater success in the process of hearing aid fitting.

P-05

CENTRAL AUDITORY FUNCTION IN ANIMAL MODEL: ELECTROPHYSIOLOGICAL EVALUATION

Aline Rejane Rosa de Castro; Ludimila Labanca; Marco Carfagno; Denise Utsch Gonçalves; Luciana Macedo de Resende; Sirley Alves da Silva Carvalho; Paul Avan; Fabrice Giraudet

INTRODUCTION: The auditory middle latency response (AMLR) is an evoked potential related to thalamic and subcortical activation due to an auditory task. Its investigation in animal model can subsidize the better understanding of the pathophysiology of certain diseases. **OBJECTIVE:** The present study aimed to describe a technique for the collection and recording of AMLR in mice. **METHODS:** Experimental study with adult male mice from the CBA/j (n=10) and C57Bl (n=10) strains (CEP: APAFIS #4812-2016040l7417255v7). Different protocols were performed in order to define best testing conditions. Normal hearing was confirmed by the presence of otoacoustic emissions. Neuropack Nihon-Kohden system was used to record AMLR with tone burst stimulation of 10,000Hz at 90dB through a probe positioned inside the right ear. Auditory brainstem response was collected simultaneously as a quality criterion of the registry. Rectal temperature was monitored at 37°C ± 0,5°. **RESULTS:** Mice presented mean age of 22 weeks and mean weight of 28.4 grams. A solution of Ketamine + Xylazine at 0.1ml/25g dose was effective for recording AMLR in mice. The best Pa wave recording occurred approximately 30 minutes after the injection (mild sedation). Using Dexmedetomidine caused a delayed sedative effect and prolonged adverse reactions (diuresis and decrease in body temperature). There was a greater reproducibility of tracing and an increase in AMLR amplitude in the records obtained by chronical electrodes and under mild sedation. The latency and amplitude values of the Pa wave presented no significant difference when compared to the records obtained without anesthesia. **CONCLUSION:** AMLR is a feasible measure for the investigation of central auditory function in animals. Our study advances by comparing the responses with and without anesthesia effect and under different test conditions, presenting several possible scenarios for the acquisition of AMLR in mice. It shows the ideal situation for future studies to be performed. The presented technique proved to be a useful tool to evaluate the central auditory pathway of animal models. Its use may promote the knowledge and investigation of neglected central auditory changes in clinical practice.

P-06

COCHLEAR IMPLANT IN ELDERLY: CASE REPORT

Pedro Lança Gomes; Vanessa Ribeiro Orlando Galli; Marcelo Castro Alves de Sousa; Marconi Teixeira Fonseca; Renata Koza de Mota; Gabriela Gonçalves de Freitas; Renata Victoria Tassara; Ronara Angélica de Souza.

INTRODUCTION: according to the World Health Organization (WHO), one third of people over 65 and half of those over 75 years old have some degree of hearing impairment. Hearing loss in the third age demands attention and redoubled care, as it can lead to depression, a greater risk of dementia and cerebral atrophy, through the reduction of social stimuli. Studies have shown that the use of early hearing aids, or of cochlear implants, in severe and deep losses can minimize these risks. **CASE REPORT:** we report the case of a 70-year old male patient complaining of progressive hearing loss in the past 10 years, secondary to presbycusis and bilateral chronic otitis media. He became anacoustic first to the right, in 2014, and to the left in 2015. Physical examination elicited bilateral central perforation of the tympanic membrane, with purulent secretion and thickened middle ear mucosa. His Audiogram revealed bilateral deep sensorineural loss. Computed tomography of temporal bones showed veiled and well pneumatized mastoids without bone erosions and ossicular chains apparently intact. Patient was submitted to closed tympanomastoidectomy in 2016, first on the left side and then on the right. In September 2017, patient was submitted to a cochlear implant on the left side with activation 30 days after surgery. After 10 months, patient showed an excellent adaptation to the cochlear implant with great auditory performance and improved social interaction. He returned to his dancing classes, was able to communicate through cell phones and presented with a clear improvement in overall quality of life. **DISCUSSION AND CONCLUSION:** benefits of using cochlear implant in elderly patients have shown improvement in quality of life, auditory thresholds and central auditory abilities. Associated to constant intellectual stimuli, it may increase cognitive reserve and delay, or even prevent, depression and Alzheimer's onset.

P-07

CO-EXISTING IPSILATERAL CHOLESTEATOMA AND VESTIBULAR SCHWANNOMA: CASE REPORT

Pedro Lança Gomes, Vanessa Ribeiro Orlando Galli, Marcelo Castro Alves de Sousa, Marconi Teixeira Fonseca, Renata Koza de Mota, Gabriela Gonçalves de Freitas, Renata Victoria Tassara, Ronara Angélica de Souza.

INTRODUCTION: Cholesteatomas refers to keratinized, desquamated epithelial collection in the middle ear or mastoid, which may occur as a primary or secondary lesion. Vestibular schwannoma is the most common tumour of the cerebellopontine angle. Co-existing contralateral cholesteatoma and vestibular schwannoma was previously reported, however, to our knowledge, no patient with ipsilateral cholesteatoma and vestibular schwannoma has been previously described. **CASE REPORT:** We report the case of a 42-years-old male patient who presented with progressive right hearing loss and episodic vertigo. He did not complain of headache, nausea or vomiting and had no history of previous otological procedure. He had history of right ear persistent otorrhea since childhood. He had no relevant family history. Examination revealed intact facial mimic and right external auditory canal polyp without direct tympanic membrane visualization. No cerebellar signs or focal neurological deficits were elicited. Audiogram con□firmed a right deep sensorineural hearing loss. Right temporal bones computed tomography demonstrated a poorly pneumatized mastoid, erosion of the spur of Chausse, opacification of right mastoid antrum, epitympanic space and middle ear, eroded tegmen tympani and ossicular chain, eroded lateral canal resulting in labyrinth fistula and eroded canalis nervi facialis. Due to tegmen tympani erosion, a magnetic resonance imaging of the inner ear (MRIIE) was performed in order to rule out meningoencephalocele. Exam of the right side revealed inflammatory changes in mastoid with isointense material in T1 and T2, no contrast enhancement and high diffusion sinal (indicative of cholesteatoma). Furthermore, a lesion with regular contours was observed in the internal auditory canal, isointense in T1, hyperintense in T2, with intense contrast enhancement and measuring approximately 4,71x8,74 mm (vestibular schwannoma). Patient was submitted to subtotal petrosectomy followed by extraction of the cholesteatomatous lesion on June 24th, 2017, and radiological follow up with MRIIE. After one year, patient presented clinically improved and without cholesteatoma relapse or schwannoma growth, being kept under conservative care. **DISCUSSION AND CONCLUSION:** As the case reported illustrates, MRIIE is an essencial diagnostic method for ruling out other or concomitant pathologies that might be causing asymmetric sensorineural hearing loss.

P-08

COMPARATIVE BRAINSTEM EVOKED RESPONSES IN A GROUP OF YOUNG ADULTS EXPOSED TO AMPLIFIED MUSIC

Jenyfer Josiebia Batista Pereira, Larissa Resende Assumpção, Patrícia Cotta Mancini, Sirley Alves da Silva Carvalho, Luciana Macedo de Resende

INTRODUCTION: Recent studies report associations between exposure to elevated sound pressure levels and structural lesions of the auditory nerve. The most frequent finding in these studies is wave I amplitude reduction. The non identification of threshold shift in tonal audiometry may lead to an equivocal conclusion that certain sound pressure levels do not damage the auditory system, masking a possible progressive auditory neurodegeneration. This condition has been called hidden hearing loss. Towards an early identification of such changes in nerve function, auditory brainstem potentials should be included as a routine exam to enhance diagnosis in this population at risk. **PURPOSE:** Characterize the audiometric profile of young adults exposed to amplified music through earphones and their most common hearing complaints, and to compare such results with the exposure dose and the electrophysiological responses obtained. Methods: This was an analytical cross-sectional observational survey of undergraduate students aged between 18 and 25 years. Participants answered a questionnaire and were submitted to audiometry, immittance measures and electrophysiological assessment with the Auditory Brainstem Evoked Potentials. Students were divided into two groups; G1 consisting of headset users in intensities up to 50% of the total volume of the device and G2 by individuals who use the headset on an intensity greater than 50% of the total volume. **RESULTS:** Difficulty on communicating in noise and intolerance to loud sounds were the most reported complaints by individuals of both G1 and G2, and tinnitus was reported only by G2 individuals. Abnormal contralateral acoustic reflex was identified in both groups, with the highest frequence of alteration in G2. In the electrophysiological evaluation, there was an observable change in the mean amplitude ratio between V/I wave in G1 and G2, with no difference between groups. **CONCLUSION:** Results suggest primary lesion of the central auditory nervous system in young adults exposed to amplified music. Research in this population should be continued to verify the influence of exposure on the auditory system, and to identify the prevalence of hidden hearing loss in this population.

P-09

COMUNICA PROJECT – GRADUATION STUDENT'S PERCEPTION ABOUT DEAF COMMUNITY

Jonathas Teixeira Salles; Erika Maria Parlato Oliveira; Cristiane Andrade Viana; Barbara Kaori Miranda Sato; Julia Gomes Cerqueira; Andre Mende Maciel; Marina Ribeiro Bartholo; Mariana Rodrigues; Tenoch Cruz Fontes; Raiane Alves de Matos; Jenifer de Melo Gonzaga; Sirley Alves da Silva Carvalho

INTRODUCTION: Comunica is a project which purpose is to improve the integration between deaf and academic communities. Moreover, the project enhances the perception of health professionals about the medical care challenges with deaf community. Comunica activities try to make students aware of medical aid for deaf community in Brazilian public healthy, and to provide information for deaf people about health topics. **OBJECTIVE:** The purpose is to improve the awareness about challenges on medical aid for the deaf, inside Brazilian public health. **METHODOLOGY:** Firstly, a dynamic is realized with students of the health area, all belong the Universidade Federal de Minas Gerais (UFMG), aiming to introduce the discussion about how the health care appointment is for a hearing-impaired person. This dynamic consists in a series of activities that seek the student to reflect on the difficulties experienced by the deaf in health care. In the first activities, students are asked to interpret roles, sometimes as a doctor/health care professional or as a patient, in which they are not allowed to use oral communication. Secondly, another situation is proposed. The students play the role of deaf patient and the doctor. They communicate without external interference and the dialogue between them is interpreted by the group that drives the dynamics. Before the beginning of the activities and after their accomplishment, the students answer two questionnaires, containing the same questions. It was evaluated their perception before and after the dynamic. Results: On questionnaires answered before the project presentation, most of the students believed that they can do a medical appointment to a deaf patient, using usual tools for communication. However, after the presentation, they changed their opinion, because the challenges identified in interactions with deaf patients. **CONCLUSIONS:** Therefore, the project has achieved its goals by promoting the awareness of future health professionals, in which it is expected to improve accessibility in future care for the deaf patient. It is believed that the project provides an environment for reflection on the difficulties faced by the deaf in using health services and it has contributed to the training of health students.

P-10

FROM IMPLEMENTATION TO THE STATUS OF REFERENCE IN A NEONATAL SCREENING AUDITORY SERVICE (BETIM/MG)

Damares Camila de Cássia Costa da Silva, Sílvia Franca e Ferreira

OBJECTIVE: the present study aims to publicize the services of the public maternity hospital of Betim/MG from its implementation to data base monitoring, as well as to correlate the results with literature and statistics achieved by the neonatal auditory screening (NAS) programs. Implementation occurred at October 1st, 2018 and, in 2012, the program was accredited by Secretaria Estadual de Saúde de Minas Gerais – SES/MG (Minas Gerais State Health Care Bureau) which promoted it to a status of reference service of NAS. **METHODS:** Joint Committee on Infant Hearing (2000) protocol was adopted relatively to risk or indicative factors of deafness. **RESULTS:** During 09 years of NAS, a monthly mean of 400 and a total of 50,042 tests was performed (until May 2018). There was a low retest rate and a high rate of normality (99.6%) at the first test, which confirms and relates to existing literature. There were 170 retests and reassessments with altered results (3.3%). Therefore, there was a low rate of referrals to auditory diagnosis. In other words, if auditory loss incidence occurs for 3 in 1,000 newborns, there should be a confirmed auditory loss diagnosis of 150 children. As such, nearly all the 170 referrals were diagnosed with auditory alteration by the State Reference Hospital. **CONCLUSION:** In Brazil, mean age for diagnosing severe neurosensory auditory loss is too tardy, around 4 years old. A NAS service with lower rates of false positives and fails will reduce costs of Universal NAS program and the number of referrals to auditory diagnosis reference service. Therefore, there will be a significant improvement in auditor assessment of Universal NAS services in the cities of public health care system and also a decrease in referrals to auditory diagnosis services, which are already overfull.

P-11

HEARING HANDICAP SELF PERCEPTION IN THE ELDERLY

Sabrina Martins da Mata, Larissa Beatriz Oliveira Neves, Yasmim Carvalho Telson, Danielle Cristine Marques, Aline Silva Lamounier Moura, Luciana Macedo de Resende

INTRODUCTION: Permanent hearing loss negatively impacts life quality for the elderly. It's relevant to understand this influence in social and emotional aspects to help guide counseling and also monitoring progress in hearing aid acclimatization. An important tool to analyze this influence is the questionnaire Hearing Handicap Inventory for the Elderly (HHIE-S) that assesses individual's perception regarding the negative impacts caused by hearing loss in daily life activities. **OBJECTIVES:** To describe hearing handicap perception in elderly patients from a hearing health care service from a public university hospital with HHIE questionnaire results. **METHODS:** Qualitative, cross-sectional study in which 37 patients, 24 women and 13 men, were included. Mean age of participants was 76 years old. All patients included in the study were hearing aid users and gave signed consent. To verify handicap perception HHIE short version was used, with 10 questions. Questions should be answered considering situations in which the patient was not using the amplification device. Results analysis was descriptive. Study had ethical approval from the institution (no 400119). **RESULTS:** From the 37 interviewed patients, 15(41%) had severe or significant hearing handicap perception, 14 (38%) mild to moderate perception and 8(21,62%) had no perception. In a group of patients that used at all times hearing aids (n=13), only two didn't have handicap perception, one started using hearing aids one year ago and the other uses for five years. The remaining 11 patients had significant perception, and most of them had over five years of hearing aid use. **CONCLUSIONS:** According to collected data, 71% of the elderly had hearing handicap perception in daily life activities.

P-12

INVESTIGATION OF DIFFICULTIES THAT MAKE UNFEASIBLE THE ACCEPTANCE OF THE MODULATED FREQUENCY SYSTEM

Cristiane Bueno Sales Francielly, Alves Xavier, Josiane Aparecida Silva Dias, Luciana Mendonça Alves

INTRODUCTION: The National Policy on Hearing Health Care in Brazil provides to hearing impaired children technological resources, such as Hearing Aids, Cochlear Implants and the Modulated Frequency System. The Modulated Frequency System reduces noise and reverberation masking effects on the speech signal. It should be used primarily inside the school environment, considering that its application implies directly in the learning process, facilitating the information grasp of the spoken message. However, providing the Modulated Frequency System by Brazil's Public Health System is no guarantee of this device acceptance, because many situations can prevent its effective use. **OBJECTIVE:** To know the profile of the users benefiting from the Modulated Frequency System, assisted by a Hearing Health Care Service, and to elaborate a quantitative overview of the problems pointed out by parents or guardians regarding the usage of the device. **METHODS:** This study was approved by the Research Ethics Committee under the number 33723414.7.0000.5096. Inclusion criteria: being adapted with the Modulated Frequency System from a Hearing Health Care Service. Telephone calls were made to the parents or guardians of these patients from August to October / 2017, with the goal of collecting data and identifying cases that demanded more attention or technical assistance. **RESULTS:** There were 260 successful telephone connections. It was observed that 59.6% of the users were male. It was learned that 68.8% of the Modulated Frequency System efficient users did not present complaints of any kind and 31.2% did not use their devices. Problems encountered in not using the device include technical problems, psychological interference, external interferences, patients who believe to be unnecessary the usage of the device and patients who do not use them because of loss or theft. **CONCLUSIONS:** The access grant to the FM system is now assured by the legislation, however, there is a demand of greater care projects directed to this group so that this benefit can be definitively assured and above all with efficient results over socialization, learning and full inclusion of the hearing impaired process.

P-13

LANGUAGE AND HEARING SCREENING AT PRESCHOOL

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INTRODUCTION: Early detection of language and auditory impairments at preschool enable timely intervention for developing psychosocial and cognitive aspects, and reading and writing learning of children. **OBJECTIVE:** To identify the prevalence of possible hearing and language alterations in preschoolers. **METHODOLOGY:** Observational and transversal study, approved by the Ethic Committee on Researches under number 931.831. There have been performed auditory and language evaluation in 73 children aging from 24 months to 5 years old, regularly enrolled in a preschool. The auditory evaluation followed these steps: external acoustic meatus inspection; timpanometry, acoustic reflexes tests, liminar tonal audiometry; transient otoacoustic emissions. The reception, emission and cognitive aspects of language were evaluated through Children's Behavior Observation Test. After the evaluations, the feedbacks were given to the parents by orientation lectures and the children who presented alterations were sent to diagnosis. **RESULTS:** External acoustic meatus inspection showed the presence of cerumen in 37% (n=27) of children. After otorhinolaryngological intervention all children have taken through auditory and language evaluations. In auditory evaluation 15% (n=11) failed and the diagnosis showed 1 child with possible bilateral neurosensory impairment of mild level and 10 children with conductive impairment from mild to moderate levels. Language evaluation showed 20% (n=15) of possible alteration, with predominance in the language emission aspects. **CONCLUSIONS:** Language and hearing screening in preschool indicated the presence of possible alterations among children. Early intervention in preschool may contribute to children's personal and academic development and, as a result, for their quality of life.

P-14

NETWORK CARE FOR HEARING IMPAIRED PEOPLE IN BRAZIL

Marlon Bruno Nunes Ribeiro, Patricia Cotta Mancini

INTRODUCTION: Children may experience hearing loss caused by a variety of factors such as hereditary diseases, genetic problems, acquired diseases during pregnancy, and childhood infections. Hearing loss impacts the development of newborns and impairs the development of hearing abilities. People aged 60 years have a 5 to 20% chance of hearing loss and can reach 70% in the elderly population. More than 15 million Brazilians have hearing problems, according to the World Health Organization. In this way, it is verified that hearing loss is an important issue for Public Health and requires a structured health system. **OBJECTIVE:** To verify the health care provided to hearing impaired people by the Unified Health System (SUS) in Brazil. **METHODOLOGY:** Literature review with search on scientific articles and online documents provided by the Brazilian Ministry of Health. **RESULTS:** The National Policy on Hearing Health Care, according to its Article 3, was organized based on the needs of health care: basic, medium, and high complexity. Brazilian Federal Law number 12,303 of August 2, 2010, established the obligation to perform the Neonatal Hearing Screening using Otoacoustic Emissions. Ordinance number 589, published on October 08, 2004, guarantees the evaluation, diagnosis and adaptation of hearing aids to the hearing impaired people, and Ordinance number 1,274 published on June 25, 2013, includes the Personal Modulation Frequency System (FM), a device that assists children and adolescents who are under formal education. Finally, the most recent law number 18 published by the Brazilian Ministry of Health on June 10, 2014, makes public the decision to incorporate procedures related to hospital care for the hearing impaired (cochlear implant and hearing aid anchored in the bone). All the mentioned directives provide the speech and language rehabilitation of these patients, aiming at the quality and effectiveness of the resources offered. **CONCLUSIONS:** Brazilian Unified Health System provides and guarantees hearing care including diagnosis, clinical and surgical treatment when necessary, and rehabilitation to hearing impaired people. Hearing aids, cochlear implants, and FM are available, together with speech therapy, to the hearing impaired population in Brazil.

P-15

POWER REFLECTANCE TESTING IN NEWBORNS AND INFANTS

Ticianna Garambone de Cerqueira Lima; Helena Maria Gonçalves Becker; Celso Gonçalves Becker; Daniele Barreto da Cunha Ferreira; Camilo Brandão de Resende; Roberto Eustáquio Santos Guimarães.

INTRODUCTION: Nowadays, the audio trial in newborns allows us to detect hearing problems early in life. However, middle ear diseases can make the diagnosis more difficult. **OBJECTIVE:** To evaluate the power reflectance measurement based on the wide band reflectance as an indicator of the middle ear disease and to compare it to the tympanometry. **METHOD:** Observational transversal study in 105 newborns who participated in the audio trial at the Clinics Hospital from the Federal University of Minas Gerais – Brazil, in 2013. The following exams were performed: transient otoacoustic emissions, power reflectance and tympanometry. **RESULTS:** about 95% past the otoacoustic emissions evaluation; the specificity of power reflectance in all frequencies researched ranged from 75.3% to 95.9%, and the specificity of tympanometry in 1.000 Hz ranged from 83% to 87.2%, and there was a concordance amongst the exams. **CONCLUSION:** The outcome of the power reflectance exam in 2.000Hz and 3.000Hz showed a correlation with the results of tympanometry and otoacoustic emissions, and those were the most adequate frequencies to determine the middle ear disease through power reflectance measurement. It was also observed that the values of power reflectance above standards suggested the presence of liquid in the middle ear, thus changing the procedures.

P-16

PROFILE AND AGE OF AUDIOLOGICAL DIAGNOSIS IN CHILDREN ASSISTED BY HEARING HEALTH CARE SERVICE IN BRAZIL

Lorena Luiza Costa Rosa Nogueira, Aline Vieira da Silva, Ana Cláudia Araújo da Silva, Cristiane Bueno Sales.

INTRODUCTION: The National Auditory Health Care Policy was instituted by ordinance 2,073 of September 28, 2004 (Ministry of Health / Brazil), favoring the prevention, treatment, habilitation and rehabilitation of hearing impaired patients, seeking to establish an active and efficient regionalized network of services that intend to minimize the damage caused by hearing impairment. The diagnosis should be ideally unravelled until the third month of age and the auditory therapy should start until the sixth month of age, since this is an important phase in language acquisition and development. **OBJECTIVE:** The objective of this study was to investigate the average age at which the audiological diagnosis was identified in children linked to a Hearing Health Care Service (SASA), in high complexity, in Belo Horizonte / MG / Brazil, as well as to establish their audiological profile. **METHODS:** Consists of a descriptive cross-sectional study, approved by the Research Ethics Committee of Izabela Hendrix Methodist University Center, under Statement No. 1,712,442. The data gathering was based on the analysis of medical records of children between ages of 0 and 12, that are under treatment at a Hearing Health Care Service (SASA) in Belo Horizonte / MG / Brazil, between January 2014 and June 2016. The following data was taken under consideration: chart opening date; date of birth; gender; Neonatal Hearing Screening undergoing or not; date of audiological diagnosis conclusion; type and degree of hearing loss. **RESULTS:** 253 patients participated in this study. Amongst those involved, only 2.8% had the audiological diagnosis established until 3 months of age. Most children had their audiological diagnosis up to 5 years of age (60.9% of those involved), 70.8% underwent the Neonatal Hearing Screening, and 15.8% did not. **CONCLUSION:** It is necessary to investigate the causes of the late arrival of the population for specific diagnosis in this Hearing Health Care Service (SASA), in order to get closer to the guidelines established by the Ministry of Health.

P-17

PROFILE OF THE AUDITORY THERAPY IN CHILDREN OF AGE IN HEARING HEALTH CARE SERVICE

Cristiane Bueno Sales, Edna Carvalho Felix, Ruth dos Santos Moura, Lorena Luiza Costa Rosa Nogueira

INTRODUCTION: Hearing plays a fundamental role in one's interaction and adaptation to their surrounding environment. Hearing impairment may compromise one's general performance, interfering with the speech, reading and writing acquisition processes of the individuals with this diagnosis. Auditory therapy performed by a professional audiologist is imperative in the recovery progress of the altered abilities. **OBJECTIVE:** The objective of this study was to investigate whether the auditory therapy is being provided by the Hearing Health Care Service (SASA) in children up to six months of age, as recommended by the Brazilian guidelines, according to the Administrative Rule MS / GM 835, dated April 25, 2012, and the Administrative Rule MS / GM 1,278, of October 20, 1999. **METHODOLOGY:** The project was approved by the Research Ethics Committee of the Izabela Hendrix Methodist University Center of Belo Horizonte / MG, CAAE 57279416.4.0000.5096 and Statement: 1,712,442. This was a retrospective, quantitative and descriptive study, which intended to delineate the profile of the auditory therapy performed in hearing aid or cochlear implant users between the ages of 0 and 12, carried by the Hearing Care Service (SASA) in the city Belo Horizonte, Minas Gerais, Brazil. The following variables were analysed: age of admission; gender; type and degree of the hearing loss; being a hearing aid or cochlear implant user; auditory therapy. **RESULTS:** The studied group consisted in 253 patients. Regarding this group, it was observed that the adaptation occurred in 151 patients (59.7%). The age range with the highest concentration of participants was from 0 to 4 years old. The most frequent type of hearing loss was sensorineural, and the most prevalent degree of hearing loss was the moderate one. The adaptation frequency in patients up to six months old occurred in only 9 of 151 of the adapted patients. Patients who were submitted to auditory therapy as treatment reached 35.6% of the total. **CONCLUSION:** Auditory therapy intervention has not occurred in an effective way, it is necessary to identify the flaws according to the guidelines of the Brazilian Ministry of Health.

P-18

PROFILE OF USERS OF THE MODULATED FREQUENCY SYSTEM OF A HEARING CARE SERVICE

Cristiane Bueno Sales, Ellen Mara de Souza Almeida, Guilherme kretli Silva, Luciana Mendonça Alves

INTRODUCTION: The Frequency Modulation System (FM) is a resource that allows better attention in the sound stimulus of interest and provides signal-to-noise ratio favorable to the hearing impaired. The results of students with hearing loss in their school activities after the use of the Modulated Frequency System are efficient, because this resource allows better access to the content taught, excluding adversities such as distance from the sound source and background noise. The FM became available through the National Health System of Brazil, through Ordinance No. 1,274, dated June 25, 2013. **OBJECTIVE:** The purpose of the present study was to describe the profile of users of the Frequency Modulation System of a Hearing Health Care Service. **METHODOLOGY:** The study was approved by the Research Ethics Committee of the Izabela Hendrix Methodist Institute, under protocol number 33723414.7.0000.5096. This is a retrospective and descriptive study in which 309 medical records of patients using the Frequency Modulation System were analyzed. The variables considered were: age, gender, type and degree of hearing loss, electronic device used, oral language established or under development and whether patients underwent speech therapy. The information collected was compiled into a database established in Excel 2010 and analyzed by the statistical program SPSS version 16.0. **RESULTS:** The sample was comprised of participants from 5 to 17 years old, with a mean age of 11.7 years and a prevalence of males. The most common loss type was moderate and sensorineural. Regarding the electronic device used, there were more individuals using the hearing aid. The highest percentage of patients in the analyzed group are oralized and do speech therapy. **CONCLUSION:** The study contributed to the importance of knowing the profile of hearing impaired patients who use the Frequency Modulation System. Although most of the patients are oralized and are taking speech therapy, the number is still lower than expected. It is hoped that this study contributed to a review of the legislation, decree n. 1274, in order to benefit the next patients who will acquire the Frequency Modulation System by the Unified Health System.

P-19

SCREENING OF HEARING IN ELDERLY: ACCURACY AND REPRODUCIBILITY OF THE WHISPERED VOICE TEST

Ludimila Labanca, Fernando Sales Guimarães, Letícia Pimenta Costa-Guarisco, Erica de Araújo Brandão Couto, Denise Utsch Gonçalves

INTRODUCTION: Given the high prevalence of presbycusis and its detrimental effect on quality of life, screening tests can be useful tools for detecting hearing loss in primary care settings. **OBJECTIVE:** This study aimed to determine the accuracy and reproducibility of the whispered voice test as a screening method for detecting hearing impairment in older people. **METHODOLOGY:** This cross-sectional study was carried out with 210 older adults aged between 60 and 97 years who underwent the whispered voice test employing ten different words or phrases and using audiometry as a reference test. The phrases used were: “What is your name, How old are you, The bus is late, It looks like it’s going to rain, Shoe, Window, Rain, Key, Does, and Chalk”. Sensitivity, specificity and positive and negative predictive values were calculated and accuracy was measured by the area under the ROC curve (AUC). The test was repeated on 20% of the ears by a second examiner to assess interexaminer reproducibility (IER). The study was approved by the Ethics Committee at the Federal University of Minas Gerais (CAAE 05608012.4.0000.5149). **RESULTS:** The words and phrases that showed the highest area under the curve (AUC) and IER values were: “shoe” (AUC = 0.918; IER = 0.877), “window” (AUC = 0.917; IER = 0.869), “it looks like it’s going to rain” (AUC = 0.911; IER = 0.810), and “the bus is late” (AUC = 0.900; IER = 0.810). **CONCLUSION:** The whispered voice test is an acceptable screening test to detect hearing loss in the geriatric population. The speech stimuli “shoe”, “window”, “the bus is late”, and “it looks like it’s going to rain” should be included in the whispered voice test protocol. The suggested expressions are phonetically balanced and highly used in the speeches. They also include high frequency sounds, which are the most affected by presbycusis.

P-20

TECHNOLOGY FOR USE IN THE REHABILITATION OF BALANCE DISTURBANCES

Márcia Cristina de Paula Rosa, Lidiane Menezes Bento, Micaela Geane Santos Lima, Patríca Cotta Mancini

INTRODUCTION: Vestibular Rehabilitation promotes the functional recovery of balance through exercises that stimulate afferent systems, and provide compensation mechanisms for the restoration of body balance. In this context, the use of technology for the stimulation of ocular movements has shown to be promising in the clinic. **OBJECTIVE:** To develop and test a Digital Versatile Disc (DVD) with images that stimulate oculomotor movements of saccadic, smooth pursuit tracking, and optokinetic to enhance vestibular rehabilitation. **METHODS:** a pilot longitudinal study was conducted in a group of 8 patients with motion sickness. The research was approved by the Ethics Committee under number 17853713.0.0000.5149. Three Graphics Interchange Format (GIF) images were selected, transformed into MP4 videos using Windows Movie Maker software, and recorded in a DVD by the software ConvertX. The DVD was tested in 8 patients with motion sickness during 4 weeks. Participants were instructed to practice selected eye movements on the DVD three times every day during three minutes. Visual analogue scale (VAS) and Diziness Handicap Inventory (DHI) were assessed before and after 4 weeks of treatment. **RESULTS:** The developed DVD contains three categories of ocular exercises in videos of one minute duration each, presented at three different speeds: 20 degrees/second (slow), 40 degrees/second (medium) and 60 degrees/second (fast). All patients reported remission of symptoms of motion sickness at 4 weeks treatment. Mean VAS was 7.6 before and 3.1 after treatment, while DHI mean scores were 21.8 before and 5.5 after using the DVD. **CONCLUSIONS:** In this preliminary study the developed DVD demonstrated to be a helpful tool to improve symptoms of motion sickness. It is a low cost, easy access technology in clinical practice, and can become an effective tool in vestibular rehabilitation.

P-21

TEST-RETEST VARIABILITY OF DISTORTION PRODUCT AMPLITUDES AND EFFERENT INHIBITORY EFFECT

Ana Carolina dos Santos, Larissa Resende Assumpção, Ludimila Labanca, Patrícia Cotta Mancini, Sirley Alves da Silva Carvalho, Luciana Macedo de Resende

INTRODUCTION: Noise exposure and acoustic traumas may negatively affect cochlear function over time. Distortion product otoacoustic emissions (DPOAE) recording is a sensitive method to identify cochlear functional changes, since it investigates the integrity of outer hair cells in distinct frequencies. The use of contralateral noise in this recording may allow the analysis of medial olivocochlear function (efferent system). Though promising, this technique still raises doubts as a routine test with clinical validity. **PURPOSE:** The present study aimed to evaluate, in young adults, the test-retest DPOAE amplitude repeatability as well as inhibitory effect of the efferent pathway. Methods: This was a descriptive, cross-sectional, pilot study with undergraduate students aging 18 to 30 years old. After participants answered a standardized questionnaire with questions regarding auditory habits (use of earphones, preferred volume, etc) and also hearing health, distortion product otoacoustic emissions were tested. Immittance measures were conducted to ensure no conductive hearing problem was present. DPOAE tests were performed twice, without changing probe position and also twice with contralateral suppression noise in the same condition. 86 ears were included in the study. Each ear was evaluated independently since there was no significant difference between ears using Paired T test. Analysis of inhibitory effect was performed as absolute value of amplitude and also percentage of inhibitory effect observed. Study had ethical approval from the study institution (1.918.514). **RESULTS:** DPOAE amplitude and inhibitory effect test-retest comparison did not show statistical difference in the analyzed frequencies ($p>0.05$). Inhibitory effect percentage study indicated no difference except for the frequency of 1000 Hertz, in which the retest showed lower values in comparison with the test situation ($p=0.046$). **CONCLUSION:** Results indicate there is good repeatability for DPOAE measures and that the inhibitory effect of the efferent system is also replicable, even though showed lower percentage at 1000 Hertz. This demonstrates the relevance and applicability of DPOAE and DPOAE suppression in monitoring hearing of individuals exposed to elevated sound pressure levels constantly over time.

P-22

THE SCHOOL PERFORMANCE OF CHILDREN AND TEENAGERS EQUIPPED WITH COCHLEAR IMPLANTS

Lorena Gabrielle Ribeiro Bicalho de Castro, Ana Cristina Cortes Gama, Sirley Alves da Silva Carvalho

OBJECTIVE: Evaluate the academic performance of subjects with cochlear implant. **METHODS:** This work compiles of a series of case studies. They included 10 subjects with cochlear implants aged from 09 to 18. The subjects underwent a structured questionnaire, visual acuity evaluation, school performance test, rapid automatized naming test, expository text reading comprehension test. Then, a descriptive data analysis was conducted. **RESULTS:** 100% of subjects had diagnosis of hearing impairment before two years of age, but only 20% underwent cochlear implant surgery by that age. In the school performance test 70% of subjects showed lower performance in the final classification. In rapid automatized naming test, 70% of subjects had underperformed when compared to their related listener examples. In expository text reading comprehension test 90% of subjects had read, most of the time, through lexical route. In relation to understanding, 70% of subjects had partial understanding of the text read. **CONCLUSION:** children who received cochlear implants before 2 and half years of age had better results in relation to academic development then the older ones. In addition, children going to private schools with regular schedules had yet greater benefits in their literacy process.

P-23

TIME TO LATENCY BETWEEN SUSPECTED, DIAGNOSIS AND SPEECH THERAPY IN HEARING DEFICIENTS

Rafaela Carolina Lopez Silva; Rômulo Jr. Vieira da Silva ; Thayanne Siqueira da Fonseca

OBJECTIVE: To identify the time between suspicion, diagnosis and speech therapy pre-lingual deaf individuals Hearing Health Care Service in a nursing school of the Holy Spirit. **METHODS:** We conducted a descriptive quantitative study with parents / guardians of the deaf between the ages of zero (0) to 11 years, who were at the Hearing Health Care Service. The collection Data was obtained through a questionnaire answered by 25 parents of children with hearing impairment. Questions counted aspects of history and hearing the patient's history. **RESULTS:** It is shown that age as the suspicion ranged before the first month of life to eight (8) years of age, with an average of 26 months; going to the professional for the first time ranged from first days of life to nine (9) years of age with an average of 27 months; the diagnosis was made between one (1) month and nine (9) years, with an average of 32 months and the beginning of rehabilitation took place between six (6) months and ten (10) years, with an average of 39 months . **CONCLUSION:** The data demonstrate that the suspicion, diagnosis and intervention were made late, experiencing a period of significant latency between the suspect and rehabilitation which can cause developmental delays, especially in the acquisition of oral language.

P-24

YOUNG ADULTS' HEARING HABITS AND ITS EFFECTS OVER THE AUDITORY SYSTEM

Larissa Resende Assumpção, Ana Carolina dos Santos, Ludimila Labanca, Patrícia Cotta Mancini, Sirley Alves da Silva Carvalho, Luciana Macedo de Resende

INTRODUCTION: Exposure to amplified music and elevated sound pressure levels through ear phones is an increasingly prevalent habit, especially among the youngsters. Hearing damage may result from this exposure and, even with complete audiometric recovery, cochlear abnormalities and progressive auditory nerve lesions may occur. Tonal audiometry is the gold standard procedure in hearing loss detection, though not sensitive to initial cochlear lesions. Therefore, additional exams are necessary, such as Distortion Product Otoacoustic Emissions (DPOAE) which is sensitive to detect the first stages of cochlear functional changes. **OBJECTIVES:** Describe young adults' hearing habits and its effects over the auditory system. **METHODS:** Cross-sectional study conducted with 68 university students between 18 and 33 years old. Information regarding hearing health, use of ear phones, environmental noise exposure, listening music habits, and otologic conditions were collected through interview. All volunteers were submitted to audiometry, acoustic immittance measures and DPOAE recordings. Association analysis between each habit or auditory complaint and general results from the auditory tests were examined with chi-square test. Study had ethical approval from the study institution (1.918.514). **RESULTS:** History of previous middle ear conditions, family history of congenital hearing loss, acoustic trauma, tinnitus, dizziness, sound intolerance, and difficulty understanding speech in noise were the most prevalent complaints and symptoms. 90% of the students listen to music daily through ear phones with increased volume (more than 50%). Minimum time of exposure was 25 minutes and maximum was 10 hours daily. Regarding audiological exams, all audiometric results were within normal limits and 78% of participants had absent DPOAE in at least one ear. Statistical analysis showed relevant association among acoustic trauma, sound intolerance and DPOAE results. Other correlations were not significant. **CONCLUSION:** No association between sound exposure dosage and hearing abnormalities were observed, nonetheless some complaints and auditory symptoms were highly prevalent. Results indicated that although normal auditory thresholds were present, individuals with acoustic trauma and sound intolerance showed greater incidence of absent DPOAE. Such results corroborate with the hypothesis of primary lesions in the auditory pathways in individuals exposed to non-occupational noise, although they present normal auditory thresholds.

DANPE'S abstracts

Proposal of a child hearing screening questionnaire

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Introduction: In view of the relevance of early childhood hearing impairment diagnosis, its impact on the overall development and quality of life of the child, it is evident the need to seek strategies for the development of prevention, diagnosis and intervention at all levels of attention to hearing health. Considering that risk indicators for hearing impairment may not be present in some children, additional efforts to detect early childhood hearing changes through a second phase of preschool screening appear justified.
Objectives: To validate questionnaires for hearing screening of children aged 12 to 48 months, enrolled in day care centers in the city of Belo Horizonte / MG.
Methodology: The present study is part of an international cooperation between the Federal University of Minas Gerais (UFMG) and the Laboratory of Neurosensory Biophysics of Auvergne University, project, Capes-Cofecub nº 861/15 and was approved by the Research Ethics Committee of the Federal University of Minas Gerais (COEP / UFMG), under opinion 931.831.
Firstly, In a master's research [1], also in this cooperation, the researchers developed specific questionnaires for the hearing screening of children from 12 to 48 months of age, validated by the Delphi method, for the Brazilian people, in Portuguese. The questionnaires contain binary questions (yes or no) about hearing and language child development in the following ages: 12 to 18 months – Form 1 (F1), 19 to 36 months – Form 2 (F2), and 37 to 48 months – Form 3 (F3). The questionnaires had ten questions divided in two: Axis I that was composed of four questions related to previous newborn hearing screening and the Axis II composed of six questions about the development of auditory and language landmarks in each age group that defined the risk factors for hearing loss. The Axis I was the same for all the three forms and the Axis II varied according to the landmarks of each age group.
The next stages, in the thesis project, was performed the content validation, in order to identify ambiguities and lack of clarity with 40 parents and the sensitivity and specificity were also validated. To validate sensitivity and specificity, 201 children aged 12 to 48 months enrolled in day care centers in Belo Horizonte were evaluated. The children were submitted to tests considered gold standard by the literature (Impedanciometry, audiometry and otoacoustic emissions).

Results: The first questionnaires version was slightly modified after the statistical analyses. In the Axis I the fourth question, about possible health problems of the mother during pregnancy or of the child at birth, was eliminated, and then, the final questionnaires (figure 1) contain three questions on Axis II and six questions on Axis II. The factorial analyses shown that to consider a child with risk to hearing loss the questionnaire should contain at least one question marked not on Axis II. After the audiological exams the instrument showed a sensitivity of 50.00% and specificity of 81.02% in the identification of children with bilateral conductive hearing loss. And in the identification of hearing loss of the type Neurosensorial found a sensitivity of 100.00% and specificity of 73.15%.

Conclusion: Through the instrument it was possible to identify 100% of hearing loss of the sensorineural type, considered permanent changes, proving the effectiveness of the instrument. Conductive hearing loss, as transient alterations, is often not easily identified by the family.

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Animal models for studying auditory damage related to Type 1 Diabetes Mellitus

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One of the metabolic systemic diseases that can result in sensorineural hearing loss is the Type 1 Diabetic Mellitus (T1DM). By losing beta cells, the production of endogenous insulin is severely reduced, leading to hyperglycemia and hypoinsulinemia. In this prospective study we aimed to investigate the pathophysiology of T1DM associated with hearing impairment by using two mice models: C57BL and CBA mice. T1DM was induced in both models through single intraperitoneal injection of streptozotocin (STZ) at 150 mg/Kg. Body weight, blood glucose, and auditory tests (Auditory Brainstem Response – ABR; Distortion Product Otoacoustic Emission – DPOAE) were evaluated at the baseline and every 2 weeks during a 6-week period. In T1DM groups, the body weight had a significant decline while in the control group it increased. Blood glucose levels were significantly increased in C57BL mice, one week after STZ injection and after two weeks in CBA mice. In the control group there were no changes. During the whole evaluating period, ABR and DPOAE tests did not show any significantly difference in thresholds, neither in CBA mice nor in controls. However, we found a significant increase in diabetic C57BL from the second week, after induction of STZ. Mean DPOAE amplitude was found to be significantly reduced in diabetic C57BL six weeks after STZ, but not in CBA mice. Our data suggest that C57BL diabetic mice are more susceptible to cochleae damage than CBA diabetic mice and that these animals models could be a good way for studying cochlear damage (C57BL model) and central auditory pathways (CBA model) related to T1DM.

Effect of acquired toxoplasmosis on auditory function in BALB / C mice

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Acquired toxoplasmosis can be a cause of hearing loss but it is not well characterized. The aim of the study was to describe the effects of acquired toxoplasmosis on the auditory system of BALB/c mice infected with *Toxoplasma gondii* (Brazilian TgCTBr5 strain). The hearing function was assessed by Distortion Product Otoacoustic Emissions (DPOAE) at 8, 12, 16, 24, and 32 kHz and Auditory Brainstem Responses (ABR) at 10, 16, 24, and 32 kHz. A histological study was also performed on mice cochlea using optical and electron microscopy. The results of DPOAE and ABR tests and of the histological analysis showed an absence of significant changes in the peripheral auditory system of the infected mice. Therefore, the infection of the mice with *Toxoplasma gondii* (TgCTBr5) seems to have no effect on the peripheral auditory system of BALB/c mice.

VEMP triggered by galvanic stimulation may reveal subclinical alteration in the postural reflex

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VEMP triggered by galvanic vestibular stimulation (galvanic-VEMP) evaluates the vestibulo spinal tract. **Purpose:** To use the galvanic-VEMP to test the postural reflex aiming at a precocious diagnosis of motor myelopathy. **Methods:**This cross-sectional study nested to a 20-years cohort included 25 individuals infected with human T-cell lymphotropic virus type 1 (HTLV-1) with the HTLV-1-associated myelopathy (HAM), 26 HTLV-1-asymptomatic carriers and 45 HTLV-1-seronegative individuals (controls). Galvanic stimuli (duration: 400ms; intensity: 2mA) were applied bilaterally to the mastoid processes and VEMP was recorded in the gastrocnemius muscle. The electromyographic parameters investigated were the latency and amplitude of the short-latency (SL) and medium-latency (ML) wave responses. **Results:** While SL and ML amplitudes were similar, SL and ML latencies were delayed in the HTLV-1 groups compared to the control group ($p<0.001$). Using neurological examination as the gold standard, ROC curve showed an area under the curve of 0.83 ($p<0.001$) for SL and 0.86 ($p<0.001$) for ML to detect altered postural reflex. Sensibility and specificity were, respectively, 76% and 86% for SL and 79% and 85% for ML. Galvanic-VEMP disclosed alterations that were progressive in HTLV-1-neurological disease, ranging from SL delayed latency in HTLV-1-asymptomatic carriers to absence of VEMP response in HAM group. **Conclusions:** The worse the galvanic-VEMP response the more severe the myelopathy was. Galvanic-VEMP alteration followed a progressive pattern according to the intensity of damage in the postural reflex and may be a prognostic marker of progression from HTLV-1-asymptomatic carrier to HAM. The implications are earlier diagnosis and better therapeutics strategies.

Audiological Evaluation in Children with and without Risk Indicators for Hearing Impairment

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Introduction: It is a scientific production that integrates the project "DANPE-Progressive Neurosensory Hearing Loss in Childhood: Monitoring, diagnosis and technological development". **Objective:** The present study presents the objective of evaluating the hearing of children aged 7 to 9 years with and without risk indicators for hearing loss at birth attended at a referral service in Belo Horizonte, Minas Gerais. **Methodology:** This research was approved by the Research Ethics Committee (COEP) of UFMG under the opinion nº 39000514.7.0000.5149. We considered as some sample children who underwent TANU between January 2009 and December 2009 with a total of 144 children. The level of significance was set at 5% ($p \leq 0.05$). Statistical significance was considered as a significant trend at the level of 10% ($p \leq 0.10$) in the evaluation in which 72 had at least one indicator of risk for hearing loss and the other 72 children with no risk indicator for hearing loss hearing loss, formed the study control group. **Results:** Unilateral sensorineural hearing loss was detected by means of pure tone audiometry in 1.4% in relation to the 72 children evaluated with a risk indicator for Hearing Impairment. Tinnitus audiometry was adequate for 99.3% of the children evaluated (total of 144 individuals). The group at risk for hearing impairment is 3,828 times more likely to present an inadequate ASPA result compared to the non-hearing-impaired group. The group at risk for hearing impairment is 5,068 times more likely to present a complaint of difficulty in school compared to the group without risk of hearing loss. In the group with risk for hearing loss, individuals with complaints of school difficulties are 20,357 times more likely to present inadequate ASPA when compared to individuals who have no complaints of school difficulties. **Conclusion:** Tympanometric alterations were found in 4.2% of the children evaluated and in the ASPA in 6.2%. There was unilateral sensorineural hearing loss detected by means of pure tone audiometry in 1.4% of the group with IRDA.

Prevalence of hearing loss in children in the age of 25 to 36 months resident in Belo Horizonte and vulnerability to health

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Objective: to describe the prevalence of hearing loss in children aged from 25 months to 36 months enrolled in day care centers in Belo Horizonte/MG as well as the spatial distribution according to the Health Vulnerability Index (IVS). **Method:** this is an observational descriptive and analytical cross-sectional study. The evaluations were carried out in nine nurseries, one from each region of Belo Horizonte/MG, from January to December 2017. Anamnesis was carried out with the children's caregivers and the children were submitted to Meatoscopy, Immitanciometry, Otoacoustic Emissions Transients and Threshold tonal audiometry. For each examination, the criterion of " goes " and " fails " was used. The child who presented change in at least one of the exams was classified as a “failure" and unchanged results were given the "pass" rating. The residential addresses of the children were georeferenced and a chloropletic map of the spatial distribution was constructed, considering the IVS. We performed an analysis of the association between the Health Vulnerability Index with the variables gender, audiological and regional domiciliary variables. Data analysis was performed using descriptive and univariate analysis using the Pearson's Chi-square test or the Fisher's exact test, considering as statistically significant associations the values of ≤0.05. SPSS software, version 21.0 was used for input, processing and data analysis. **Results:** a total of 95 children of both sexes were evaluated in the nine regions of Belo Horizonte. Of these, 44.7% presented alterations in at least one of the examinations performed, being referred for otorhinolaryngological evaluation and subsequent auditory reassessment. Of the changes observed, 36.9% were in the tympanometry examination and 7.8% in the Otoacoustic Emissions Transients. The otorhinolaryngological evaluation and speech-language reevaluation took place in the Hospital Geral de Hospital of São Geraldo/HC-UFMG from December 2017 to February 2018. Of the 44.7% of the children referred for reassessment, 9.7% presented a diagnosis of conductive hearing loss, 13.6% had normal results and 21.4% did not attend the reevaluation. The analysis showed that there was a significant result between IVS and the regional variable, with the majority of participants residing in the eastern region (15.5%). Of the 95 children participating in the research, 59.2% were classified as medium risk in IVS. Of the children who presented the final diagnosis of conductive hearing loss (9.7%), 1.9% were classified as low-risk IVS and 6.8% as medium-risk IVS. **Conclusion:** the results of this research showed that conductive hearing loss is the most common in the evaluated

age group, which corresponds to 40.0% of the children participating, evidencing the need for timely diagnosis to minimize possible data loss and favor to better school performance. The majority of children who failed screening in day care and diagnostic reassessment reside in medium and high /very high-risk census tracts of the IVS.

Instrument for hearing screening in children between 12-48 months of age developed by the delphi method

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Introduction: Screening is a process that applies fast and simple measures to identify pathologies in the function tested. It is a way to raise, among asymptomatic individuals, those suspected of having diseases that require more elaborate diagnostic procedures. Given the importance of detecting early hearing loss in childhood, its impact on the overall development and quality of life of the child, it is evident the need to seek strategies to develop actions of attention to hearing health. Auditory screening should be started and, consequently, by auditory evaluation to establish early diagnosis and intervention. **Objective:** To develop an instrument for hearing screening of children between 12 and 48 months of age, using the Delphi method for content construction and validating through audiological examination. **Methods:** Quantitative research, (COEP/UFMG ETIC 931.831), which integrated two complementary phases. Initially, an exploratory descriptive study was carried out with ten health professionals: nurses, speech therapists and physicians, who judged and adjusted the clarity and comprehension of the items of the instrument with a review of the researchers. The instrument elaborated included three forms divided by age group: 12 to 18 months, 19 to 36 months and 37 to 48 months of age, each containing ten questions regarding the development of hearing and language. After application of the forms to those responsible for the children of a children's school, they were submitted to hearing and language evaluation, gold standard, in order to correlate with the data of the applied instrument. **Results:** The final version of the instrument was applied to 38 subjects whose children were submitted to objective evaluation of hearing and language. Form with risk of hearing loss was found in 9 (24%) of the children and conductive hearing loss was confirmed in 2 (5%) children, obtaining sensitivity of 100%, specificity of 81%. **Conclusion:** The proposed instrument for children's hearing screening can be a tool capable of screening the hearing of children between 12 and 48 months of age, indicating a possible hearing loss by surveying the infant's previous and current history and being easily applied and fast by any professional who acts directly with this population.

The influence of back support on the sensor inputs

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Studies report that in the sensory motor period, the interaction between the organism and other elements of the environment occurs, where sensory-motor signals stimulate the psychic activity. These signs associated with tone variations allow the elaboration of representations of the movement, and finally the representations of movement effect. Postural control and tonic-sensory balance allow interaction with environment and social involvement. The back support method proposed by Bullinger is effective evidence as a clinical and educational method in promoting individual attention and interactions with the environment.

We will present two studies that used the variable back support. In the first research the objective of the study was to analyze the visual fixation time of autistic children in front of visual stimuli, with and without back support using eye tracking. The data were collected from eye tracking under two conditions: with and without back support and it was analyzed whether the duration of visual fixation was altered according to the situations presented. The results show a significant difference in visual fixations duration with back support fin both groups (autistic and control group).

The other study aims to evaluate the language, hearing and vision of babies with normal development at the ages of 4,6, 9 and 12 months using the variable dorsal support (with and without).This study is underway and our hypothesis is if there would be a better performance of this sample with the variable dorsal support? At the moment we perform the research with 13 infants and the analysis of the data will be performed through the software Elan.

Differentiating the causes of progressive sensorineural hearing loss with the help of distortion-product-otoacoustic-emission thresholds

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Subjects referred to our ENT outpatient clinics for an audiometric check-up volunteered for being tested with the help of distortion-product otoacoustic emissions (DPOAEs) (n = 107 subjects; 178 ears, age range 8-89 y, among whom 101 ears >60y). DPOAEs were measured in all ears with normal tympanometry, using equilevel pairs of pure tones (f2/f1 = 1.20) around 1, 2, 3 and 4 kHz. Stimulus levels were increased from 60-85 dB SPL in 3 dB steps and the first level at which a DPOAE was detected above noise threshold was defined as the DPOAE threshold at the tested frequency. At this level, frequency f1 was increased in 5 consecutive 12-Hz-steps with f2 fixed, and the DPOAE phase change was measured to evaluate DPOAE latency. Data in which this latency was < 1 ms were discarded as instrumental artefacts.

DPOAE threshold was plotted against audiometric threshold at stimulus frequency. From 1 through 4 kHz, DPOAE thresholds tended to increase with increasing hearing loss. DPOAE thresholds ≤ 65 dB SPL were always associated with normal auditory thresholds. Conversely, auditory thresholds > 60 dB HL always came with DPOAE thresholds > 85 dB SPL (i.e., absent DPOAEs). Regarding intermediate hearing losses, DPOAE thresholds predicted auditory thresholds within + or – 15 dB, and this in the same manner regardless of age or frequency.

Two types of discrepancies were noticed, the first one being the absence of DPOAE despite near normal auditory sensitivity. This happened at at least one frequency in 14 ears in subjects aged <60y, and 21 ears in subjects aged >60y. Either normal tympanometry (at 226 Hz) is not enough to guarantee normal sound conduction through the middle ear at DPOAE frequencies, or DPOAEs anticipate the onset of hearing loss, a less likely explanation. The second discrepancy was the persistence of DPOAEs despite quite significant hearing loss, which occurred at 3 and 4 kHz in 7 cases, all of them > 60y and with slowly descending pure-tone audiograms that reached 55-60 dB HL at 3-4 kHz. The possibility that this pattern of hearing loss represents strial presbycusis, with present yet inactive outer hair cells will be discussed. Data also indicate that outer-hair cell loss is the largely dominant cause of acquired, progressive sensorineural hearing loss.

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Diabetes and auditory neuropathy: a possible relation

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Introduction: Diabetes Mellitus (DM) is a highly prevalent metabolic disease. In France, 7.5% of the national population is diabetic, and estimates for the year 2035 show an increase up to 8.2%. In Brazil, the prevalence is as high as 9% with an estimated increase up to 12% in the next 15 years. Many aspects in overall health are affected by DM and the disease is also an important risk factor for the development of hearing loss. The nature, extension and pathophysiology of this disease in relation to the auditory system still raise questions. The purpose of this study was to describe the auditory function of diabetic patients and search for correlations among clinical status and hearing outcomes.
Methods: Auditory function was measured in a first stage through audiometry (a 4-frequency average was calculated for each ear, pure tone average - PTA), transient evoked otoacoustic emissions (TEOAE), tympanometry and acoustic reflexes. If the patient “failed” this screening, measures of auditory function were completed with distortion product otoacoustic emissions (DPOAE) and auditory brainstem responses (ABR). Results were compared to normative data and correlated regarding type of diabetes, age, presence of nephropathy, retinopathy, peripheral neuropathy scores, number of hypoglicemies and glycosylated hemoglobin.
Results: 104 patients completed the screening protocol and among these, 33% presented normal audiometric thresholds and absent acoustic reflexes, indicating some retrocochlear abnormality. Audiometric analysis showed that diabetic patients present an increased prevalence of hearing loss in relation to normative values according to age, starting at high frequencies. Diabetic patients also presented increased absence of TEOAE in the presence of normal audiometric thresholds (50%). ABR findings include increased absolute latency values for waves I, III and V; absence and/or reduced amplitude of wave I, even in patients whose thresholds were within normal values. Abnormal audiological results were present regardless of sex, age and type of diabetes. Nephropathy presented strong correlation with overall auditory outcomes. Results indicate that probable auditory neuropathy and cochlear pathology may coexist in this population.

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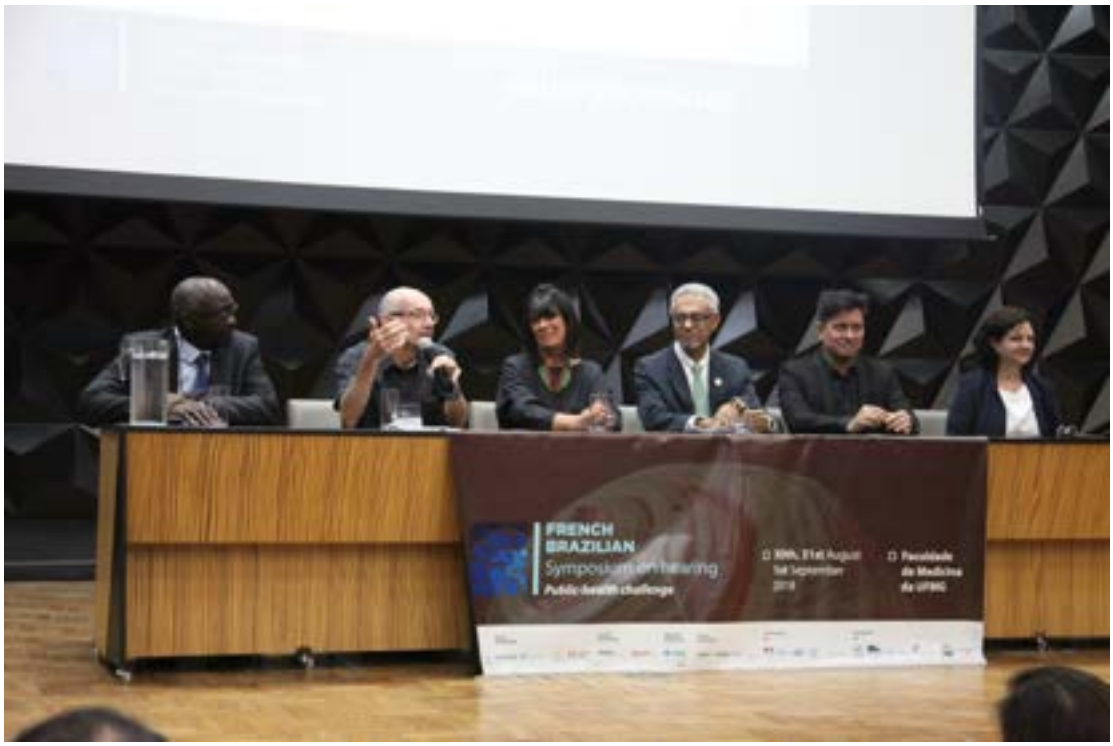

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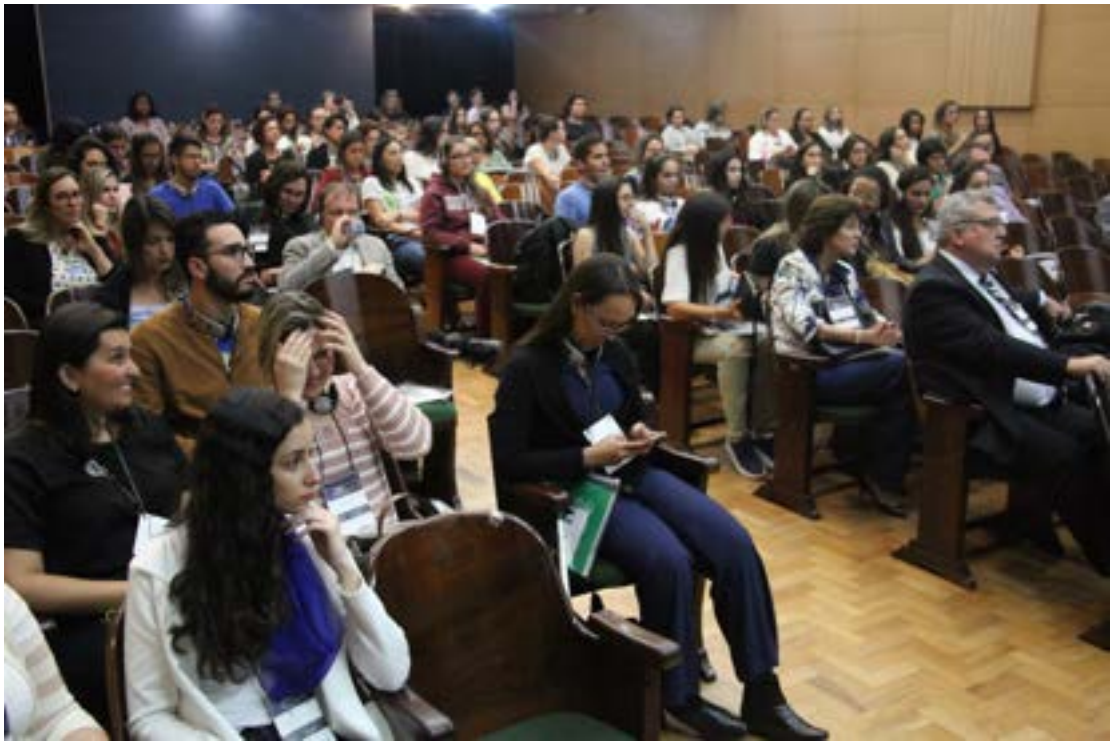

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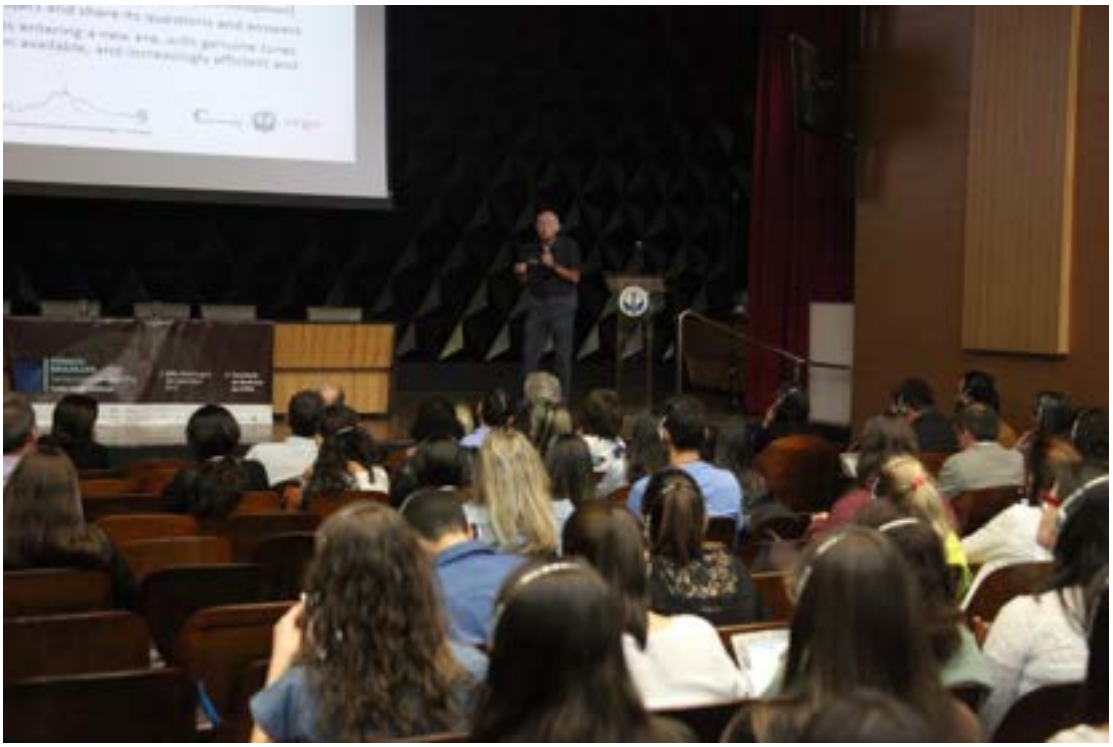

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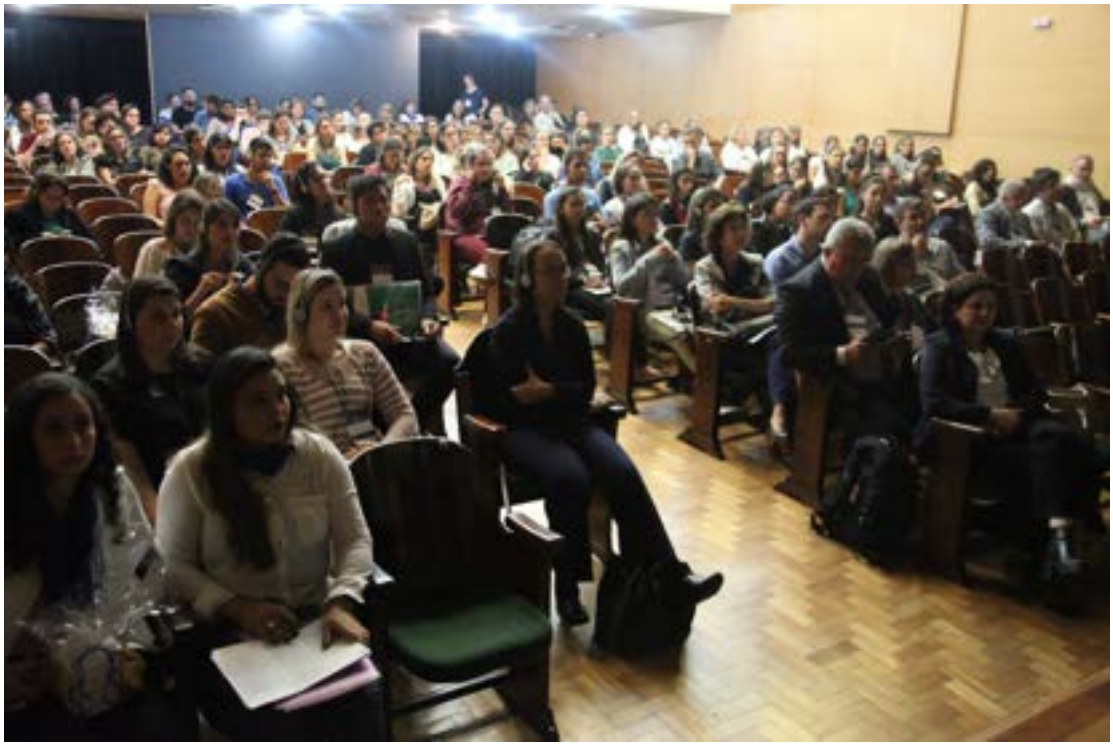

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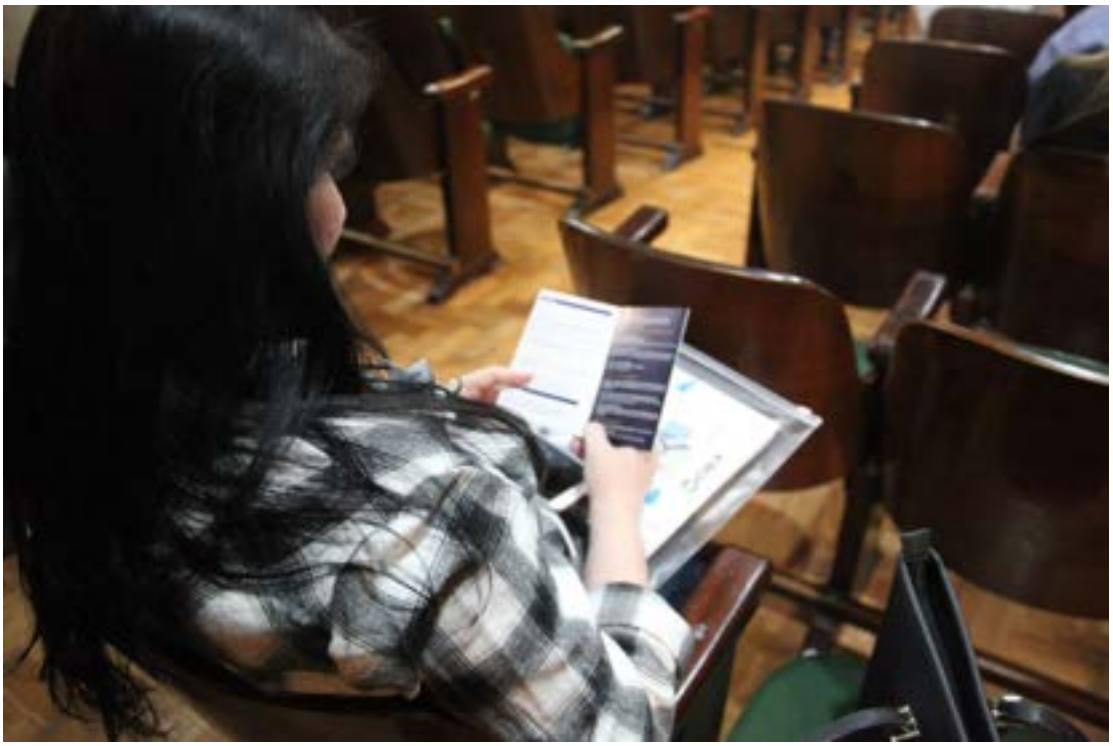

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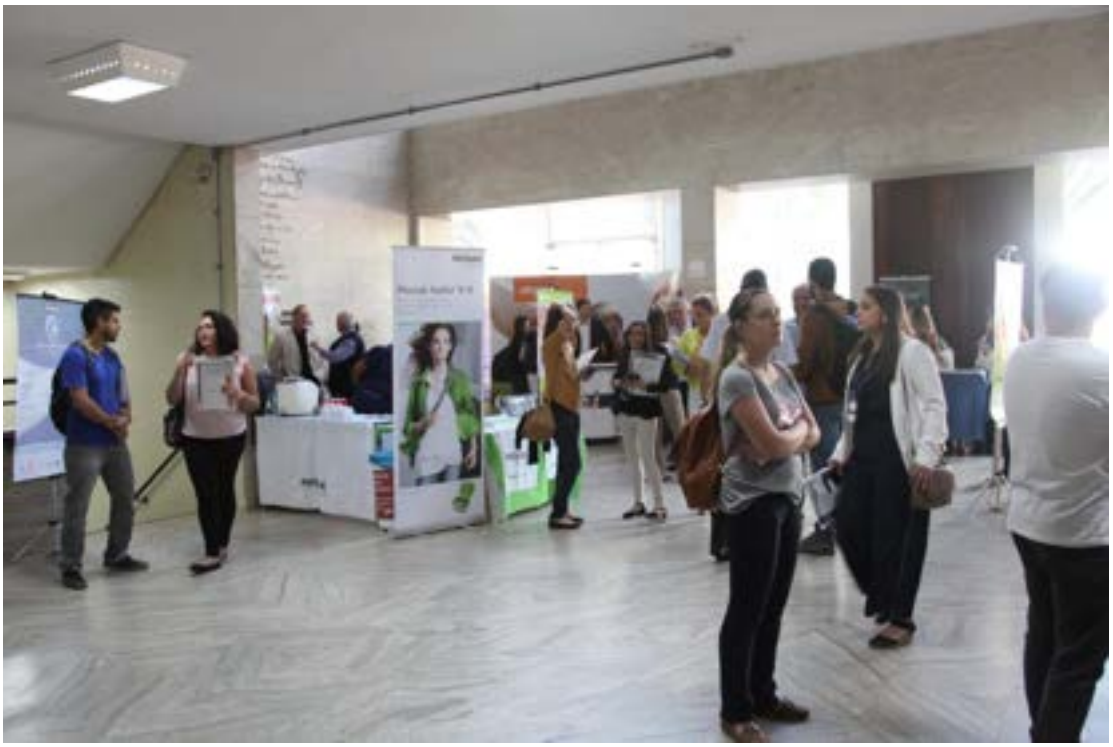

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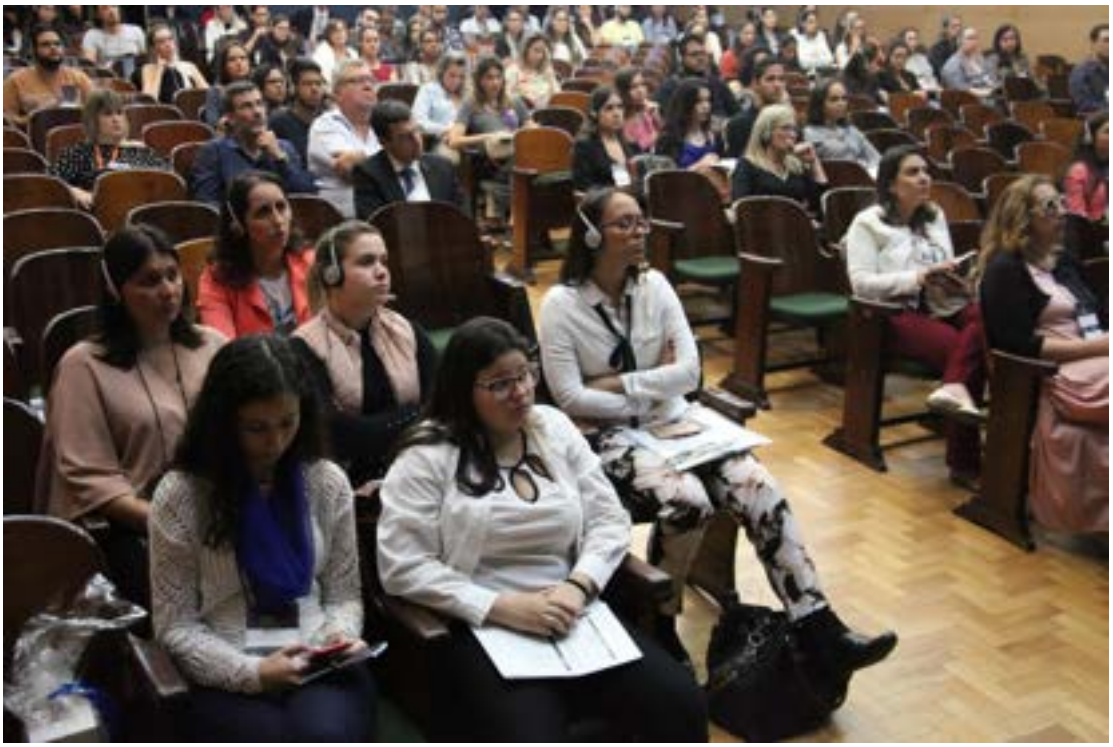

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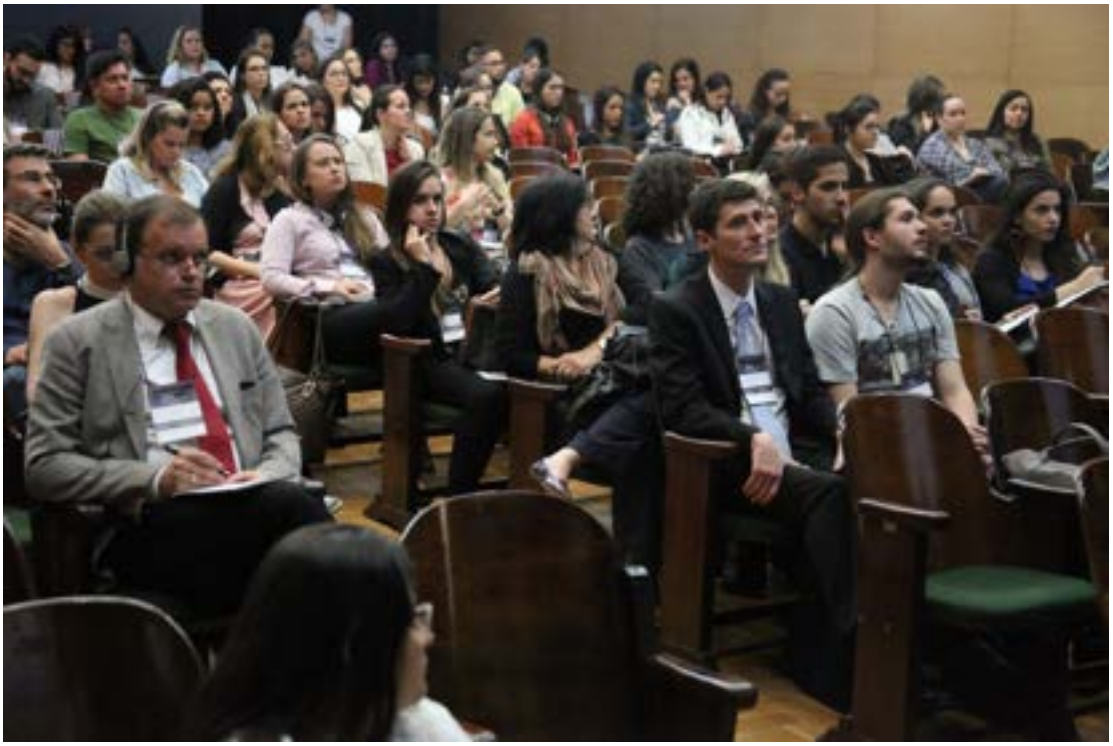

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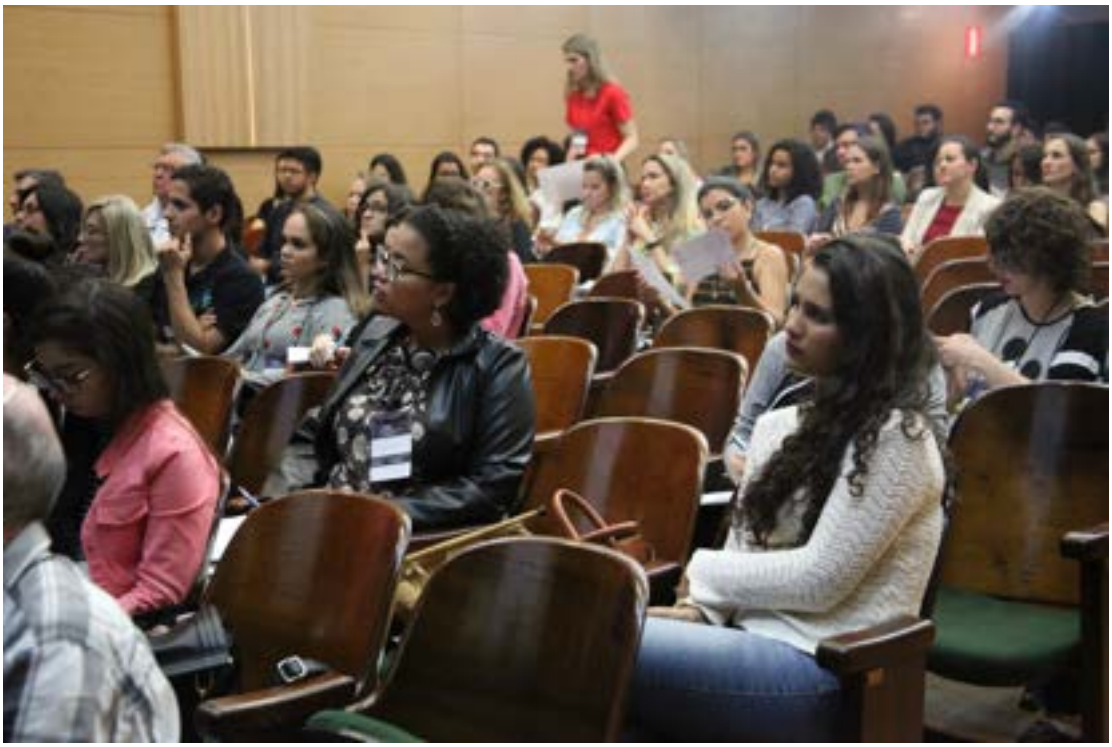

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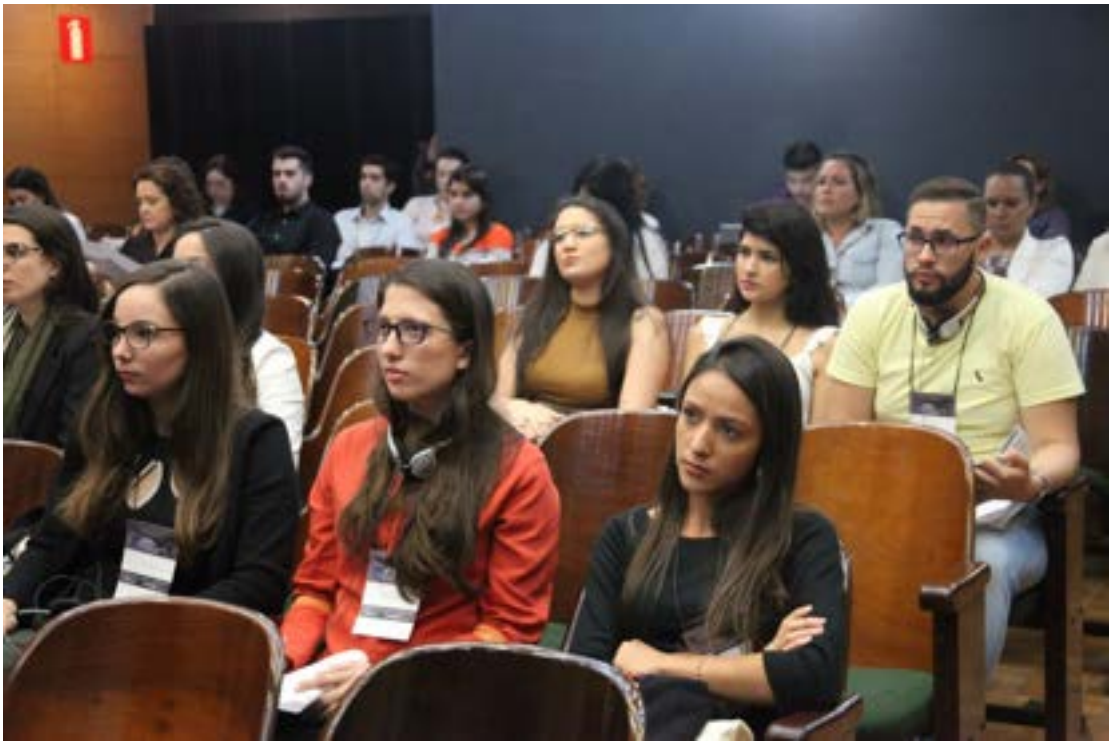

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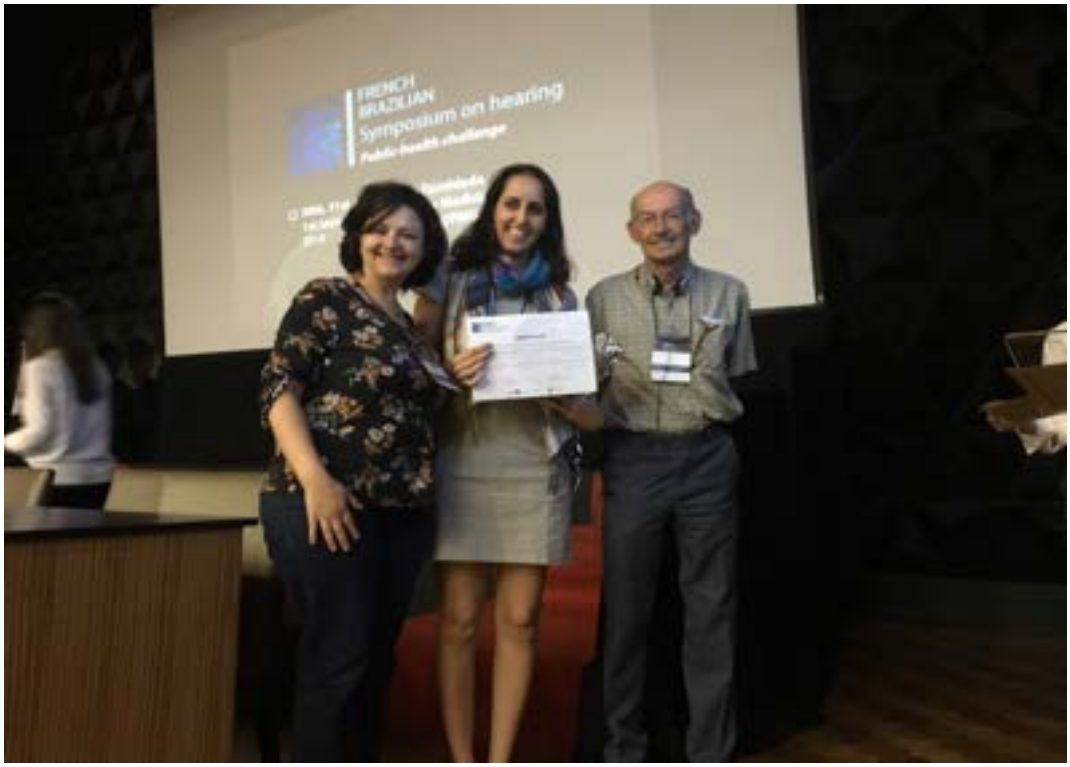

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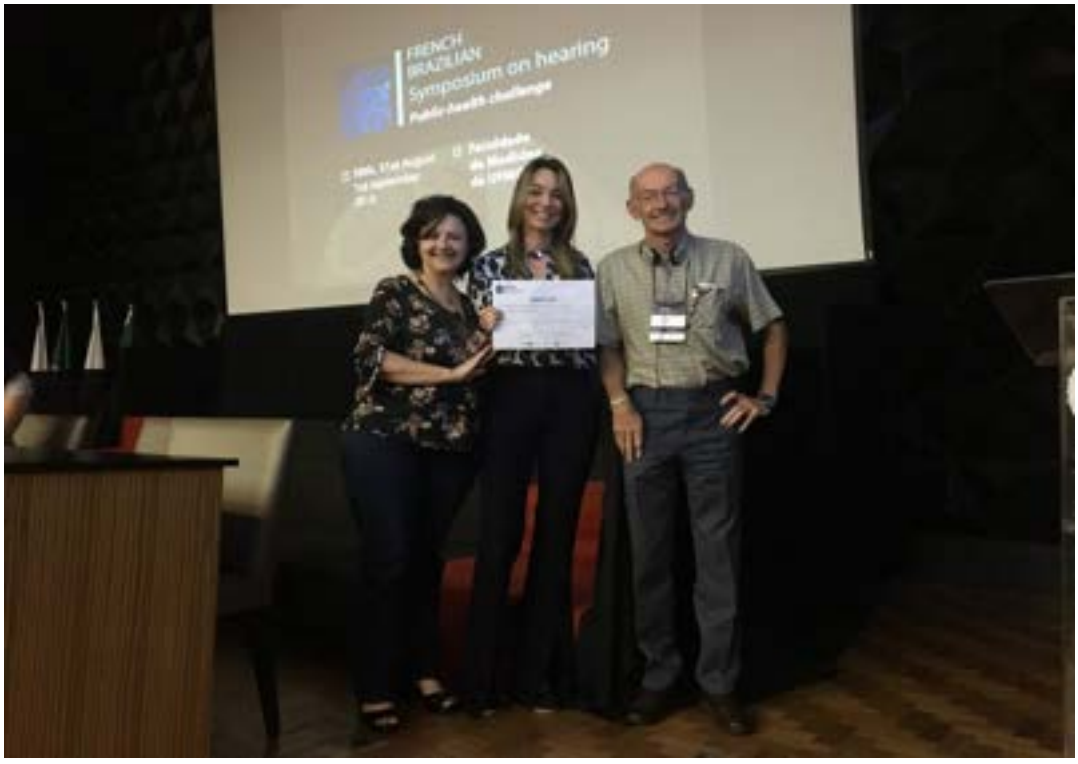

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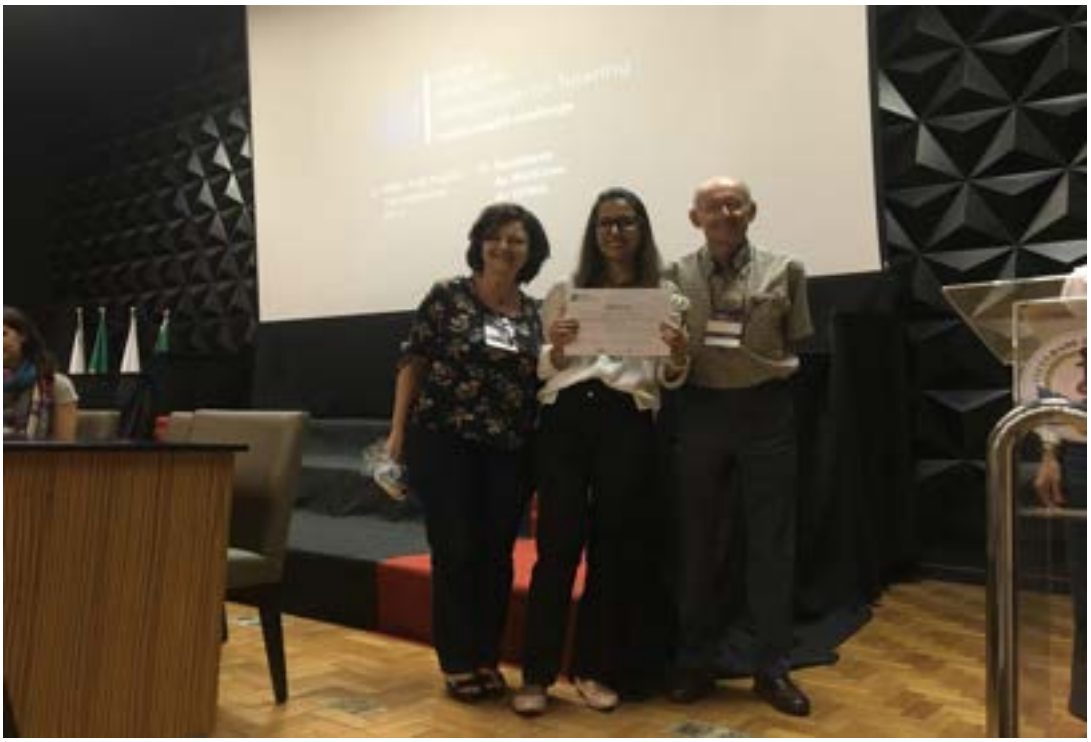

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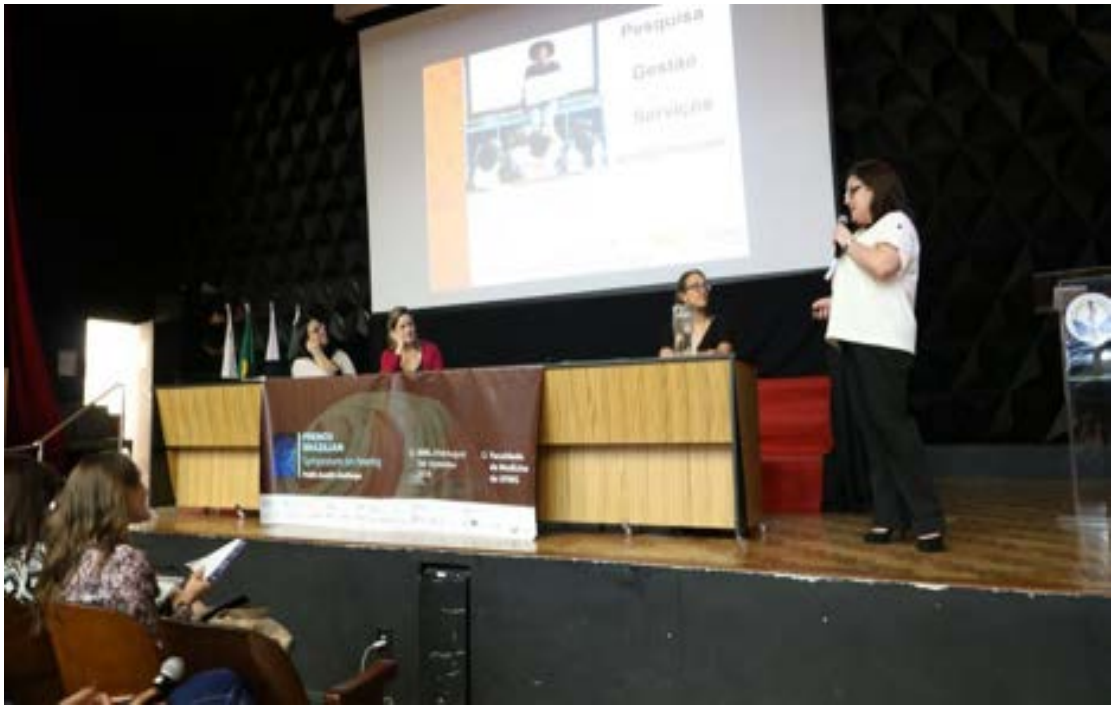

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Thank you!

Obrigado!

Merci beaucoup!