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Menière Disease – Is it a special sort of Migraine?

Our experience.

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Abstract

In order to confirm that Menière Syndrome or disease meets all parameters of a regular form of migraine in line with International Headache Society, we have carried out a comparative study with E-Loreta among 120 patients who have consulted on diagnosis of Menière Syndrome but accompanied with migraines or some background of them and 85 patients who have consulted exclusively on the typical Menière trilogy, without migraines and no family background of them.
Our investigations lead us to conclude that Menière 's disease meets all the conditions of migraines .
In Menière 's disease cerebral haemodynamic variations were observed like migraines in 95% of patients.
Brain electrical depolarization and cortical irritative focus are common to both groups of patients.
The only significant difference is an important hyperactivity in the limbic lobe in Meniere Syndrome

Keywords: Menière Syndrome, Migraine, Vestibular Migraine, Brain Electric Thomography, Loreta, Haemodynamic pathology, Connectivity

Introduction

In the international literature the diagnosis and treatment of Menière 's disease is very different according to the various approaches from the clinical or surgical schools.

Since 1981 this variety of treatments leads us to the reflection on which is the most effective treatment in our patients, based fundamentally in the pathogenesis of Meniere's disease.

Our experience through 35 years in the exclusive practice of Neurootology and Neuroophthalmology specialty, has shown in our data bank that 5087 patients, have consulted on the diagnosis of Menière 's disease or Menière 's Syndrome.
This value corresponds to 51% of our patients.

Material and Method

We have performed a review of our Data Bank on these 5087 patients, from 1981 up to date.

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The average age of this group, is 49.91 ÷/- 15.94 years old.

The 36.11% are males and 63.91% females.

At the time of the consultation the symptoms begin, in 17.39% of patients during less than one year, in 30.43% between 1-5 years and in 52.17% in more than 5 years.

Over 50% of this group has been previously treated, without satisfactory results, provoking recurrence in symptoms that motivated the consultation.

The Neurootological History in this group shows, that 54% have or have had personal or family background of migraines and / or headaches.

The 35% shows neurovegetative symptoms: nausea, vomiting, cold sweats, etc., during the vertiginous attacks.

The provoking conditions were in 55.8% of cases postural changes and in 31.1% motion sickness.

Reported unilateral or bilateral hearing loss 39.13% and tinnitus 64.91% of the patients.

26.8% of patients reported ocular symptoms like double vision, photopsia and oscilopsias.

The 62.3% presented cardiovascular background: hypotension 30.6%, hypertension 25.2% and 6.5% other cardiovascular diseases.

24.6% reported a history of whiplash injury with or without loss of consciousness.

The remaining 13.1% relates metabolic, toxic, infectious and neurological background.

The MRI in 43.47% of patients shows signs of cerebral microbleeds, leukoaraiosis or vascular malformations

In all patients routine neurootological tests were performed - Craneocorpography, Caloric Test, Rotatory Test, etc.

From these tests we obtain:
30.44% presents central vestibular pathology with special brainstem engagement
28.44% presents central vestibular pathology with special brainstem and cortical projection pathways engagement
11.80% peripheral and central vestibular combined pathology
16.78% central vestibular pathology with special engagement of cortical projection pathways

and only 12.98% shows a peripheral vestibular pathology

At the beginning of our practice, we observed from our own Data Banks the high incidence of cardiovascular affections and migraine situations in Neurootological History, exceeding this pathology more than 60% of the cases.
This was the reason why, we tried to find out, some method by which we could be able to objectify and quantify the cerebral haemodynamics variations.

Prosper Menière, in his thesis published in 1861, described vascular changes in some cases associated vertigo attacks with migraine.

To this end, in 1982 we started practising Ophthalmodynamometry, which measures by means of a dynamometer the systolic and diastolic pressure of the central artery of the retina, terminal branch of the internal carotid.
This simple and non expensive method was of great help for us, to improve treatments on our patients and to evaluate its evolution.

In 1983 we published our first paper,„*Über die Vaskuläre Migräne unter dem Enrcheinungbild eine Menière Syndrome"(About the vascular Migraine simulating a Meniere Syndrom)*.

In 1984, the first vascular Eco Doppler equipments of continuous bi-directional type were developed, capable of measuring extracraneal arteries.
We have incorporated our first equipment in 1985.

In 1990 we have incorporated a Transcranial Eco Doppler equipment.
Through our 25 years experiencing with Doppler, we have reached a position capable of showing that, in neurootological diagnoses, it is a must the cerebral haemodynamic examination during the first consultation of the patient, previous to performing neurotometric tests.

The result of cerebral haemodynamic studies, in 51% of our patients consulting on the diagnosis of Meniere's disease or Menière Syndrome indicates that 92% of them have objectified haemodynamic pathology

But we were not able to objectify cortical brain dysfunction to confirm that it was a form of migraine and the cortical areas which were involved to prevent recurrence of symptoms.

Through our paper published in 1998 ***Vertigo and Migraine*** using as a study method the Brain Electrical Activity Mapping, we have concluded:

In Brain Electrical Activity Mapping, we observe a disorder of the electrical activity in paracentral areas C3 and C4 in patients with vertigo-migraine but not in the vertigo group of patients.

But through the brain electrical activity mapping it was only possible to observe some superficial variations in cerebral electrical activity.

Advances in basic research in neurosciences and the introduction of new non-invasive techniques, that make possible the detection of weak signals of the brain, have revolutionized diagnosis and treatment.

In 2000 we introduced in our laboratory the use of a specialized software (LORETA) which makes possible obtaining functional imaging of the brain in 2D and 3D.

In 2004 we published:

Menière Syndrome and Vestibular Migraine: Cortical Brain Projections

And in 2006 we published:

Ménière Syndrome: Cortical Brain Projections studied by Brain Electric Tomography (LORETA)

We conclude:

The Menière Syndromes together with migraine are typical signs of vestibular headaches, affecting the temporo-parietal junction and the prefrontal areas.

The regular Menière Syndrome (vertigo-hypoacusis-tinnitus) has an important cortical representation in frontal areas Brodmann 25, Limbic Lobe and the Parahippocampal Gyrus.

The frontalization present in all these patients and the involvement of the limbic lobe and prefrontal lobe was, extensively demonstrated in Menière Syndrome or Disease

The last software version of Brain Electric Tomography – ELORETA – in November 2008, allows evaluation of the correct localization of human brain function with 0 localization error.

In Brain Electric Tomography we analyze the FFT statistical summary between 0,5 and 30 Hz divided in 8 Time Frames comprising the different frequencies of EEG.

The evaluated Time Frames are:

TF1	Delta	1.5 – 6	Hz
TF2	Theta	6.5 – 8	Hz

TF3	Alpha 1	8.5 – 10	Hz
TF4	Alpha 2	10.5 – 12	Hz
TF5	ßeta 1	12.5 – 18	Hz
TF6	ßeta 2	18.5 – 21	Hz
TF7	ßeta 3	21.5 – 30	Hz
TF8	Omega	1.5 – 30	Hz

Results

During the present year and in order to confirm that Menière Syndrome or disease meets all parameters of a regular form of migraine in line with International Headache Society, i.e.

1.- Cerebral haemodynamic disorders and

2.- Areas of depolarization and cortical irritation

we have carried out a comparative study with E-Loreta among 120 patients who have consulted on diagnosis of Menière Syndrome but accompanied with migraines or some background of them and 85 patients who have consulted exclusively on the typical Menière trilogy, without migraines and no family background of them.

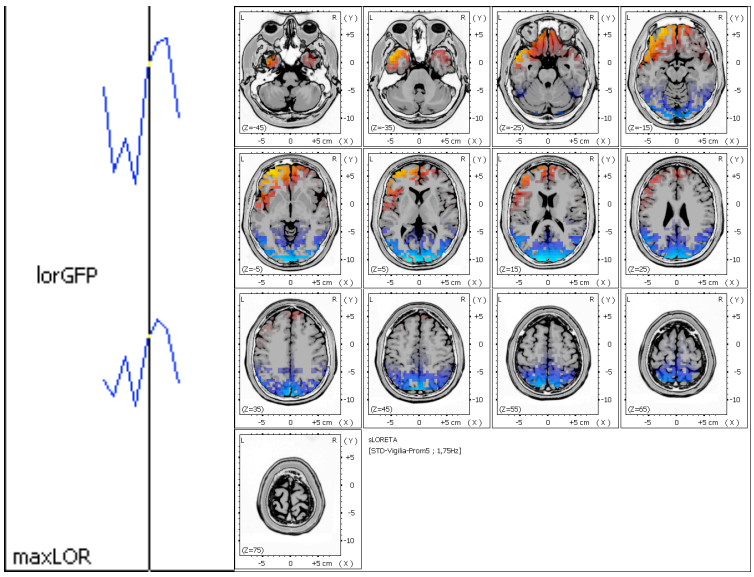

Fig. 1: FFT statistical summary .The color indicates significance in Z-Score
Red = more activity (*p < 0,05 red)(p < 0,001 yellow)*
Blue = minor activity (*p < 0,05 violet)(p < 0,001 blue)*

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In Menière Diseases with Migraine in default mode, we observed in the E-Loreta in Time Frame 2 – Theta Band - a focus on the Middle Gyrus and precentral frontal lobe similar to that observed in the group of patients with Meniere's Disease without migraine – Fig. 2 - 3

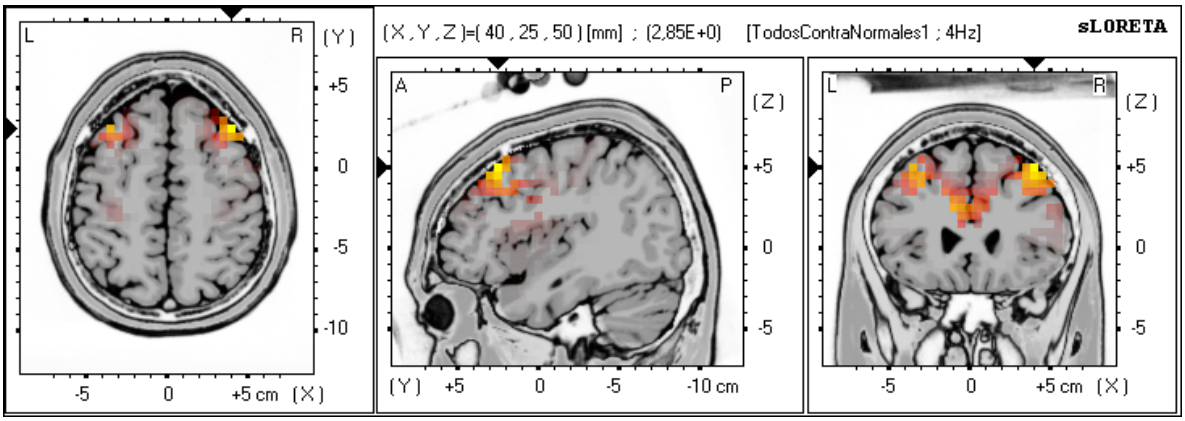

Fig. 2.- Time Frame 2: Menière Disease with migraine

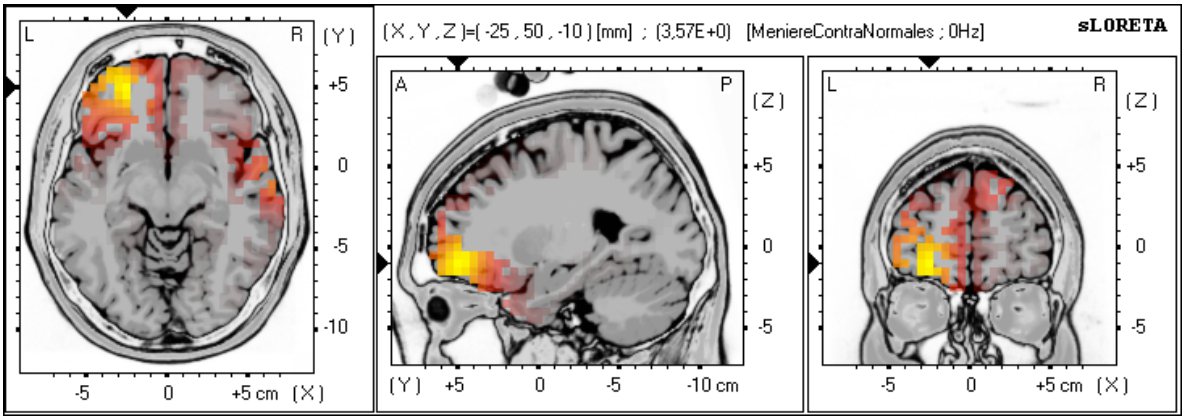

Fig. 3.- Time Frame 2: Menière Disease without migraine

In the Time Frame 5 – Beta Band- shows high frequency waves in the middle and inferior temporal gyrus in both groups of patients.. Fig. 4 - 5.

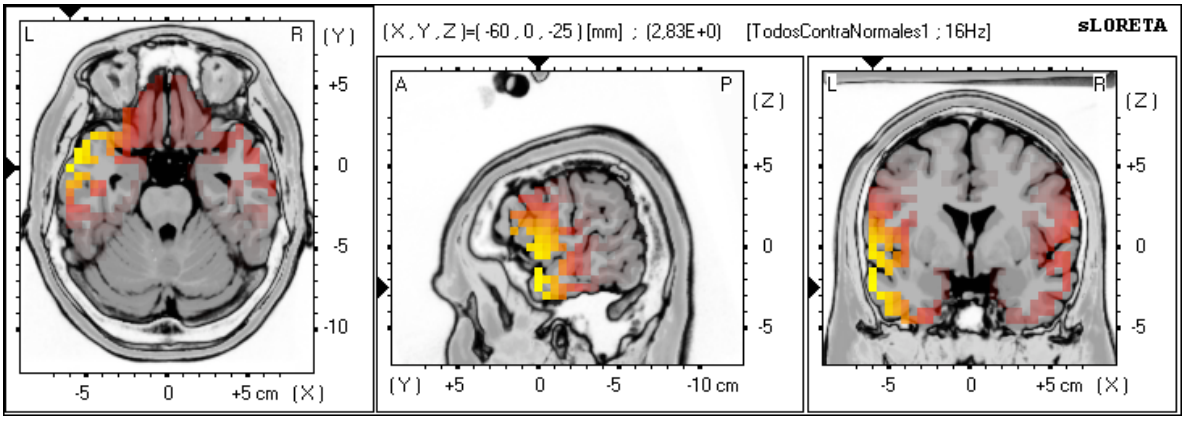

Fig. 4.- Time Frame 5: Menière Disease with migraine

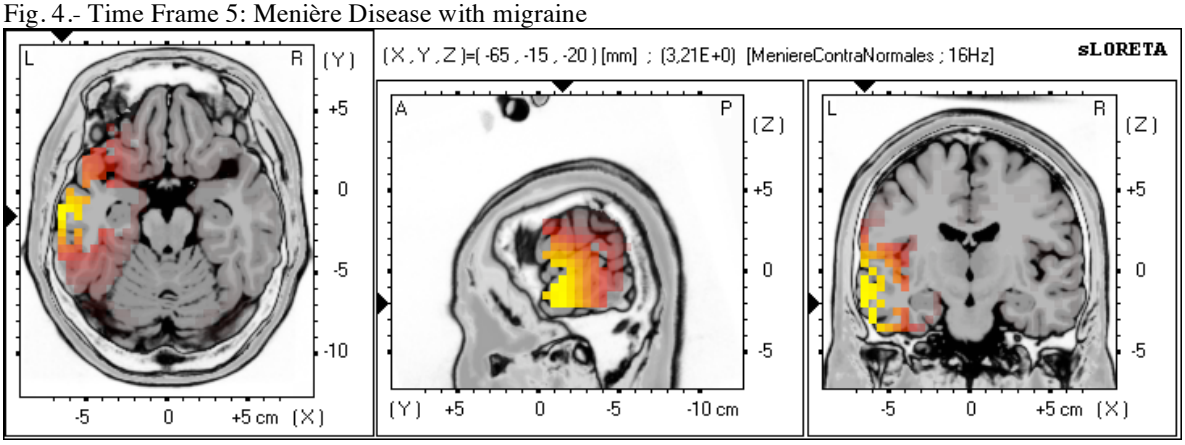

Fig. 5.- Time Frame 5: Menière Disease without migraine

The evaluation of Time Frame 8 - Omega, shows a hyperactivity in both temporal lobes in the group with Migraine, Fig. 6, while in the group Menière Disease is observed a focus of hyperactivity in the limbic lobe anterior cingulate. Fig. 7

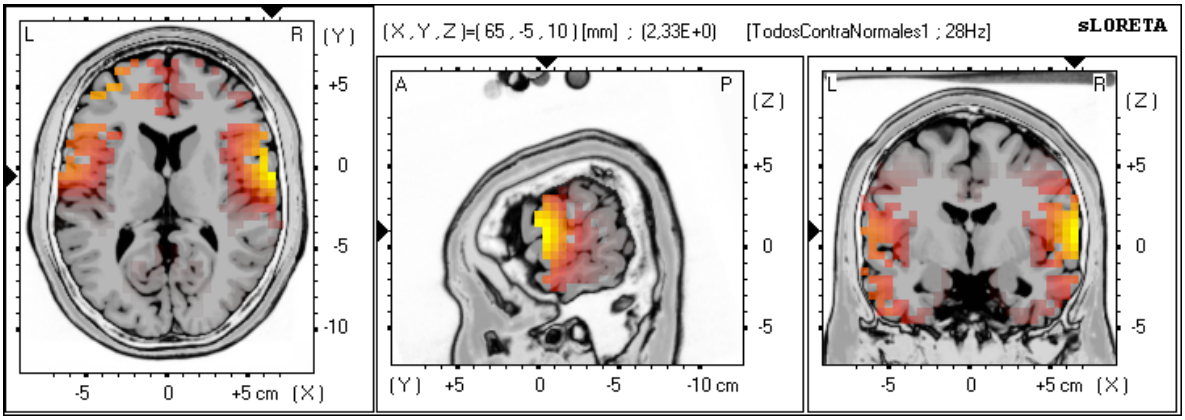

Fig. 6.- Time Frame 8: Menière Disease with migraine

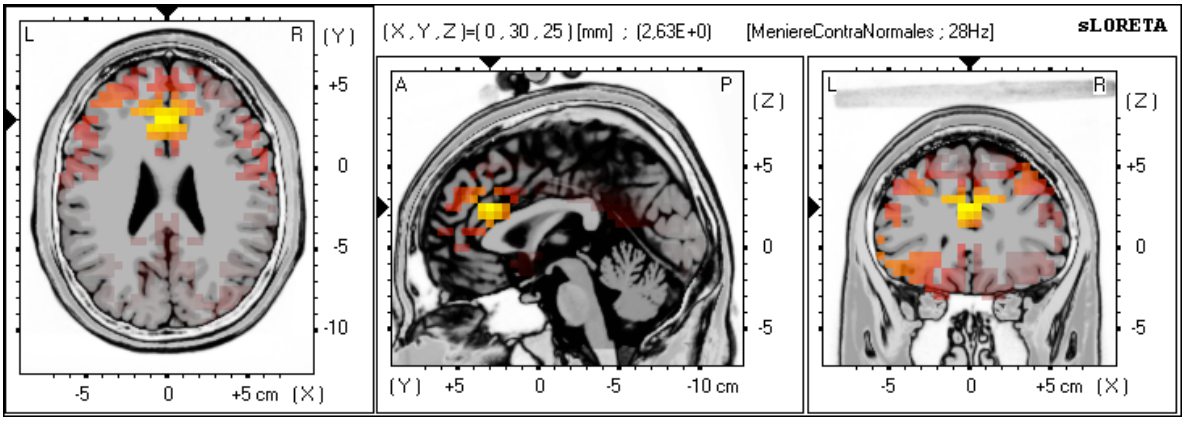

Fig. 7.- Time Frame 8: Menière Disease without migraine

Under auditory stimulation, we do not observed significant differences in the evaluation of the different bands,
We obtained a low frequency focus, in Time Frame 2 – Theta Band comprising middle frontal areas. Fig. 8 - 9

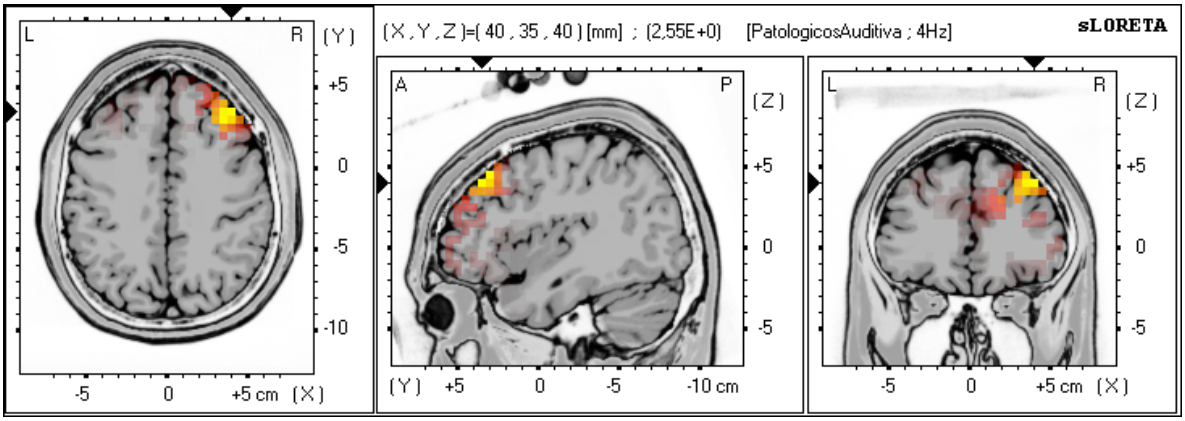

Fig. 8.- Time Frame 2: Menière Disease with migraine

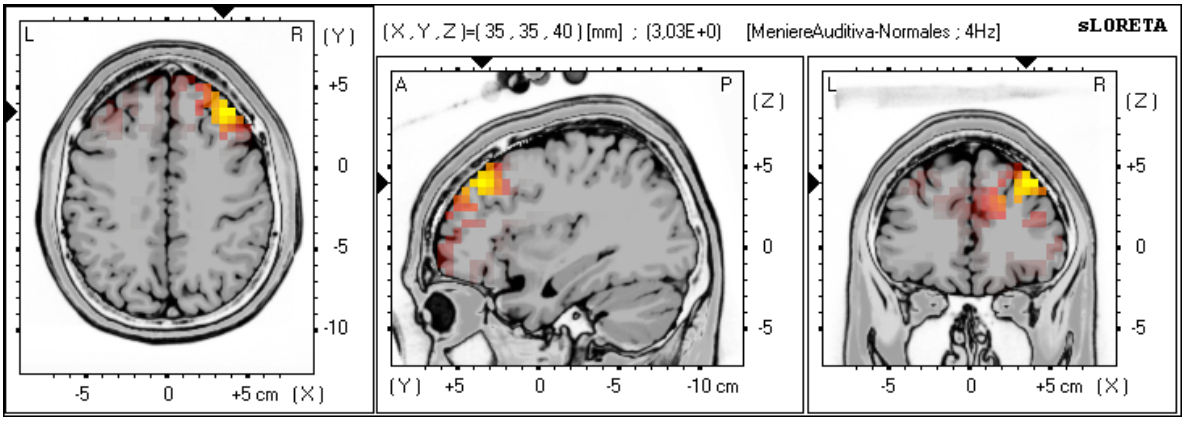

Fig. 9.- Time Frame 2: Menière Disease without migraine

In Time Frame 5 – Beta Band - we obtain a focus of high frequency in temporal lobes in both groups of patients. Fig. 10 - 11

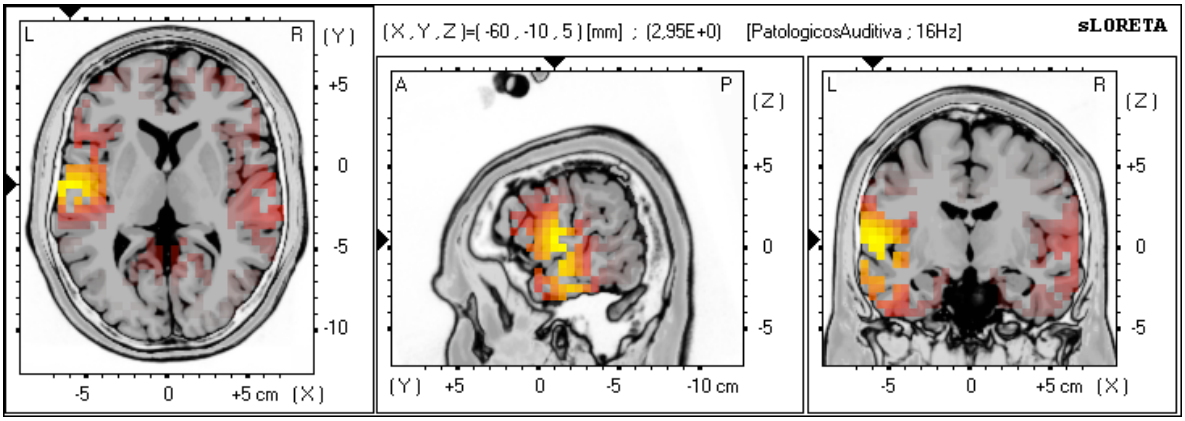

Fig. 10.- Time Frame 5: Menière Disease with migraine

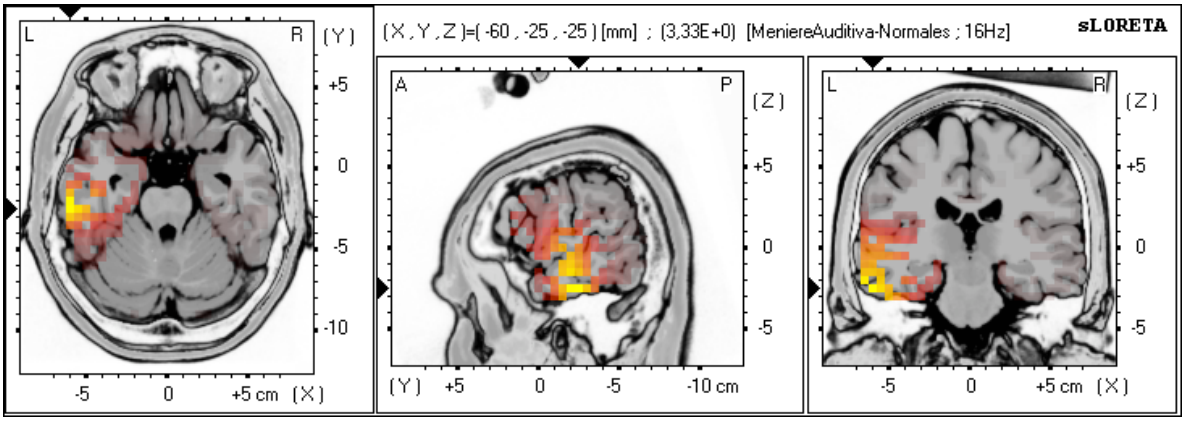

Fig. 11.- Time Frame 5: Menière Disease without migraine

The Time Frame 8 - Omega, shows a hyperactivity focus in both groups of patients in the frontal lobe and cingulate limbic lobe. Fig. 12 – 13

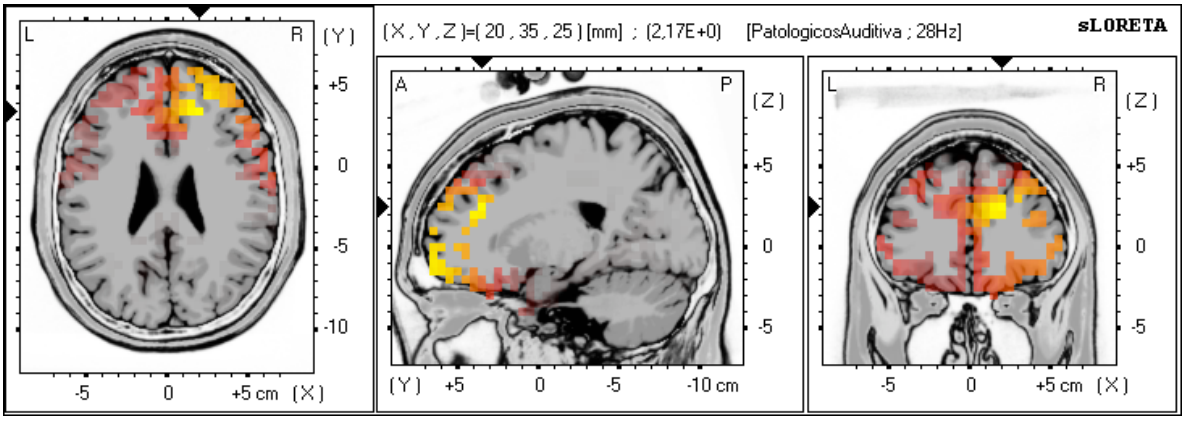

Fig. 12.- Time Frame 8: Menière Disease with migraine

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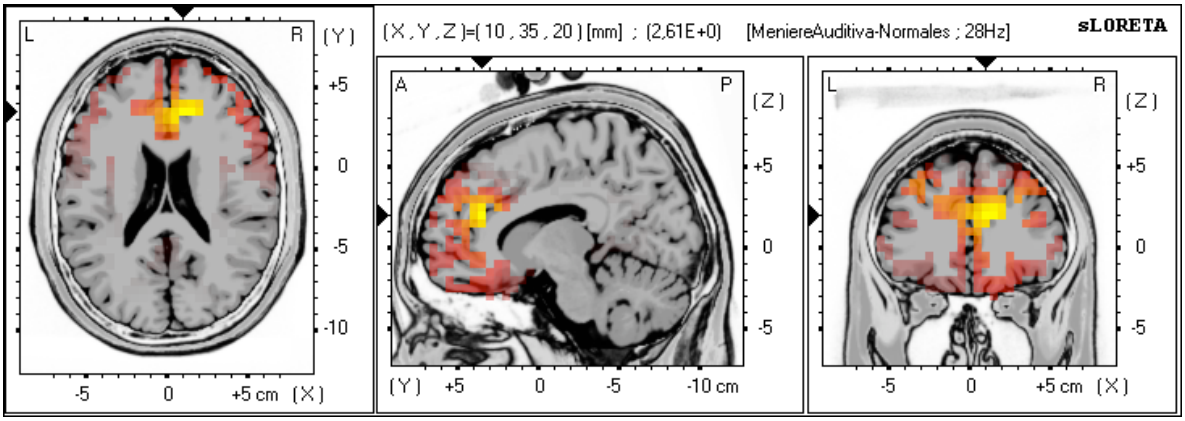

Fig. 13.- Time Frame 8: Menière Disease without migraine

Connectivity is a new method which permits showing the pathway interconnecting different areas of the brain.

Neural dynamics involves the generation of electrical currents by populations of synchronously active neurons within local regions of the brain which are coupled through axonal connections to other populations of neurons. Fig. 14

Anatomical analysis of the cerebral white matter have shown that there are three general categories of cortico - cortical connections:

1- Intra-cortical unmyelinated connections within the gray matter on the order of 1 mm to approximately 3 mm
2- Short-distance 'U' shaped fibers in the cerebral white matter located beneath the gray matter (10 mm to approx. 30 mm)
3- Long distance fasciculi located in the deep white matter below the 'U' shaped fibers with distances from 30 mm to approx. 170 mm.

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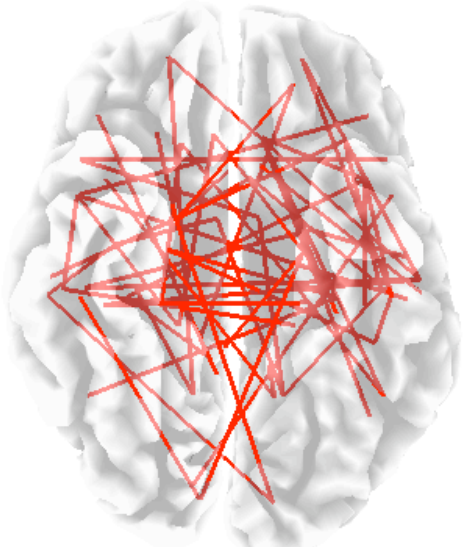

Fig. 14.- Pathway interconnecting different areas of the brain.

Measures of EEG coherence and phase delays from the scalp surface commonly detect the presence of two compartments with an approximate correspondence with the short distance and long distance fiber systems.

We analyze the connectivity in both groups of patients.
We observed in the Alpha Band, in default mode in both groups a decreased pattern in pathways that control the frontal areas.

And in Menière Disease a marked increased connectivity between temporal lobe and limbic areas. Fig. 15

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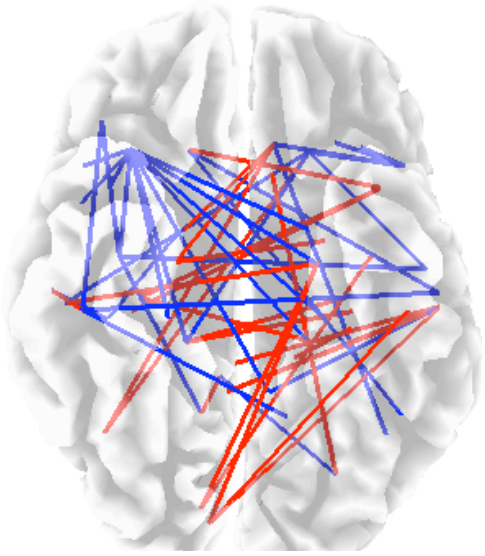

Fig. 15.- Pathways Connectivity in Menière Disease

Conclusions

Our investigations lead us to conclude that Menière 's disease meets all the conditions of migraines .
In Menière 's disease cerebral haemodynamic variations were observed like migraines in 95% of patients.
Brain electrical depolarization and cortical irritative focus are common to both groups of patients.
The only significant difference is an important hyperactivity in the limbic lobe in Menière Syndrome

We observed a decrease in cortical connectivity to frontal areas in both groups of patients, but an increase connectivity between temporal and limbic areas in Menière Syndrome.

Finally, it should be avoided any confusion in diagnosis and therapy, i.e. treating every patient presenting the very well known Menière trilogy as a simple lesion of the inner ear, without taking into account that the equilibrium system is something more complicated than a semicircular canal, where it does not only exist an ear and an auditive nerve, disregarding organs, the vestibular vias in brainstem and the very important cortical projections.

Our experience in the treatment of classic Menière 's disease, to achieve a total compensation of it and prevent recurrences, is to medicate the Meniere's disease as a simple migraine or vestibular migraine.

Directing our treatment to 4 ways
1. –Permanent treatment of cerebral vascular conditions.

2. - Treatment of the peripheral organ and / or of the vestibular and auditory dysfunction.
3. - Treatment of cortical depolarization areas typical of migraine
4. – Treatment of prefrontal cerebral dysfunctions and limbic lobe , with psyquiatric drugs, to prevent the attack recurrence in these patients

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