

Research Article

# Reflections of an Otorhinolaryngologist Based on Genetics Concepts

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## Abstract

Otorhinolaryngology is rich in a large number of hypothetical approaches related to anatomical and functional concepts as well as in theories concerning the etiopathogenesis and physiopathology of various diseases. The function of the paranasal sinuses, the pneumatization of the temporal bone and the factors that predispose to the appearance and evolution of otitis media, mainly. Following the path of the nonconformists and with the aim of presenting new concepts based on the principle that Genetics as the universal science capable of explaining everything related to life in the animal and plant kingdoms, we present our concepts. This paper is composed of a compendium of 3 articles created by the author with the aim of presenting a new theory of the etiopathogenesis and physiopathology of otitis media, taking as its main element the genetic factors as the only elements capable of explaining its appearance, development and evolution, mainly its transition to chronicity. In addition, the current paper includes reflections related to the “Auditory System” and the elements that influence individual constitutional characteristics that could help to understand the enormous variety in auditory quality, including gifted ears. Criteria related to the controversial, mysterious and still unresolved “Havana neurosensory syndrome” are also included with the intention of contributing to solving a health problem.

## Keywords

Craniofacial Pneumatization, Genetics and Diseases, Havana Syndrome, Genetic Factor, Venturi Effect, Otitis Media

## 1. Introduction

Scientific development in humanity has experienced exponential growth since the end of the 19th century. The most significant examples are the automobile industry, aviation, television, telephony, computing, genetics (genomes, genetic maps, etc.). Many of the advances achieved today were once considered science fiction.

Medical sciences cover a wide spectrum that does not escape the great scientific advances. The comprehensive knowledge of healthy man, from conception to physical disappearance, advances in parallel with other sciences. The

same happens with the process of appearance and development of diseases. However, despite the great achievements obtained, scientists are still far from absolute control of numerous natural phenomena and in particular those related to health.

Otorhinolaryngology is no exception to other medical specialties, where there is a great diversity of opinions and hypotheses trying to explain a certain phenomenon from different points of view. It is common to find different criteria related to anatomical and functional aspects of the elements

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that make up a certain structure and the impact that these may have on the pathophysiological mechanisms that explain the pathogenesis of the diseases that affect it, particularly those of the middle ear.

The advances achieved in the field of otorhinolaryngology have allowed us to deepen our knowledge of the anatomy and physiology of the structures that comprise it essential and necessary elements to fundamentally understand the evolutionary course of diseases, however, there are still questions to be answered.

The physiology of hearing, from the capture of sound, its transmission, conduction and interpretation at the level of the auditory area in the temporal cortex, is the subject of new theories trying to give a definitive explanation to such a complex phenomenon. The same happens with the enormous number of hypotheses stated in relation to the existence of the paranasal sinuses. Most people believe that they were created to fulfil certain functions. The process of pneumatization of the temporal bone is full of theoretical arguments. A large number of scientists support the existence of various elements that disrupt this process, determining the degree of development of the bones.

On the other hand, there are numerous and accepted etiopathogenic and physiopathological considerations related to the appearance and evolution of otitis media.

It has been suggested that various systemic diseases such as tuberculosis, syphilis, rickets, anemia, human immunodeficiency virus (HIV), etc. cause a disability of the immune system that predisposes to otitis media. It is claimed that an immature immune system in early childhood is one of the main causes of acute inflammation of the middle ear at this stage of development.

Regionally, it has been pointed out that deviations of the nasal septum, sinusopathy, chronic nasal catarrh, adenoiditis and adenoid hypertrophy influence the appearance, development and evolution towards chronicity of middle ear conditions.

Locally, and linked to development, it is mentioned that the anatomical characteristics of the Eustachian tube in childhood, described as shorter, narrower and more horizontal, favour middle ear infections, which would lead to poor petro-mastoid pneumatic development. This is supported by the assertion that inflammation of the tube mucosa in the first years of life is a factor that determines the degree of pneumatization of the temporal bone. As a consequence of this poor "secondary" pneumatic development, the evolutionary tendency towards chronicity is explained.

As regards the treatment of the various pathologies affecting the middle ear, from the acute phase to the chronic phase, whether open or not, a huge number of therapeutic variants have been tested. The favourable results obtained do not yet meet all the desired expectations. [1-9]

## 2. Material and Method

The reflections are composed of a compendium of 3 articles created by the author [1-3] to present in a single volume the main aspects and facilitate the understanding of all the elements stated related to a new theory that explains all the aspects that condition the appearance, development and evolution of otitis media, fundamentally its path to chronicity, considering Genetics and the elements that compose it, the genetic system, which are responsible for predisposing the pathological process by interacting with the triggering or etiological elements.

The considerations related to the auditory system and its particularities as well as those related to the mysterious Havana Syndrome are also made based on genetic-constitutional considerations.

## 3. Reflections

Nature is perfect. Genetics and the genetic system, its representatives on planet Earth, are also perfect. This system, made up of nucleotides, DNA, RNA, genomes, millions of genes, mutations, etc., is responsible for directing and controlling everything related to life in the animal and plant kingdoms. Through evolutionary changes, the morphological and functional characteristics of all species necessary to adapt to new existential conditions are determined. This system is so perfect that many of the changes experienced by species are not only unknown but, at times, misinterpreted.

To consider that the function of the pharyngeal orifice of the Eustachian tube is incompetent, allowing various regional factors to transgress it, causing alterations that violate its defensive function, is a serious error in assessment. To affirm that the anatomical characteristics of the tube in childhood are a precondition for a higher rate of middle ear infections is to ignore the role played by the evolution of the species since the emergence of life in the development of the defensive function of the soft palate in coordinated action with the pharyngeal auricle of the auditory tube. To blame the inflammation of the mucosa of the tube and the tympanic cavity in the first years of life for the pneumatic development achieved by the temporal bone, particularly that observed in the petrous bone, represents an undervaluation of the role of genetics in the establishment of codes that define its morphological and functional characteristics. Recognizing the constitutional nature of the development of these cavities is essential to understand the evolutionary course that otitis media can follow. These premises can help to choose an individualized therapeutic approach as early as possible. The dimensions of the eardrum also determine the size of the structures it contains, such as ossicles, muscles, tympanic membrane, nerve vessels, etc (content-container relationship). These are important elements in the transmission of sound waves and in the role played as part of the auditory system in the physiology and quality of hearing individually.

The pneumatic cavities of the bones of the head, present in a large number of animal species, extend beyond the paranasal sinuses and the temporal bone and include, among others, the cristagalli process and the horizontal plate of the ethmoid, the middle and superior turbinates, the zygomatic processes of the temporal and the clinoids of the sphenoid. With the exception of the lateral masses of the ethmoid, the rest of the air spaces present in the skull are contained in the body of short bones that should be occupied by spongy tissue. Nature, as a defense mechanism of the neighboring structures, which would represent a danger to life and the expansion of the species, gets rid of it to prevent its infection (osteomyelitis), which is rebellious and aggressive even today, from spreading to the neighboring structures, representing a danger to the life of the individual and to the conservation of the species. [9].

The ethmoid masses, located on both sides of the head, originate from an ossification nucleus located in the center of all those that give rise to the skeleton of the region. As the development and formation of all these bones begins, the ethmoid masses, consisting of a thin peripheral cortex, cartilaginous at the beginning of their development, adhere and accompany the growth of the bones around them, acquiring the shape and dimensions that the space between them confers. Inside, the masses contain multiple thin bone partitions joined together, located in the 3 planes of space, responsible for providing resistance and stability to that region to avoid its deformity or collapse. Taking into account what has been described above, it can be considered that the ethmoid masses are structures independent of the horizontal cribriform plate of the ethmoid to which it is attached at its end and, of the middle and upper turbinates, whose union is due to the thickening that the cortex undergoes when joining them, becoming compact tissue and forming a solid block to give way to and protect the drainage ducts of the anterior and posterior ethmoid cells towards the middle and upper meatuses, respectively.

The pneumatization of the temporal petrous bone, created in the thickness of a compact pyramid-shaped bone, was designed with the aim of safely housing structures of the hearing and balance systems that intervene in functions very important to guarantee survival. The dimensions of these morphologically defined cavities are proportional to the dimensions of the petrous bone, and the size of the structures contained corresponds to the volume of the container. This aspect is important to explain the individual variations in the functions of the hearing and balance systems. [1]

The pharyngo-laryngeal region is made up of a large number of muscles that have a complex and well-coordinated physiological activity directed by the action of several cranial pairs that control the mechanisms of swallowing, breathing and phonation, the main functions of this region. The soft palate is part of this muscle conglomerate.

In addition to the functions indicated above, the soft palate in coordinated action with the pharyngeal concha actively and efficiently participates in the protection of the Eustachian tube and in the physiology of the middle ear (auditory and protec-

tive functions).

The velum, in coordination with the pharyngeal auricle of the auditory tube, is responsible for providing absolute protection to the middle ear by creating a system of 2 gates that alternately keep the access to the fallopian canal permanently isolated from the influence of external elements. This orifice, which is closed at rest (1st gate), opens when the velum rises and occludes the pharyngeal concha of the auditory canal (2nd gate). The drainage of secretions from the box is carried out by ciliary movement, an "active and natural" mechanism that works optimally regardless of the anatomical characteristics in relation to the age of the individual.

In order to carry out the functions of the soft palate, the internal peristaphyline muscle participate, which provides the fibers that constitute the levator veli and muscle bundles that are inserted into the postero-internal membranous part of the tubal auricle, the external peristaphyline muscle or tensor veli, with its fibers that are inserted into the antero-external membranous portion of the tubal auricle and, the glosso-staphyline muscle (posterior pillar) with one of its bundles that is also inserted into the membranous portion of the pharyngeal shell. During swallowing, the velum rises in front of the orifice of the tube, attaches to it and closes it (first gate). When the orifice is sealed, a small amount of air is trapped in the tubal infundibulum. Immediately, almost in unison, the tensor velum contracts, the collapse of which acts as a piston to propel the air into the canal when its entrance opens (second gate) due to the displacement of the membranous portions due to the contraction of the muscle fibers of both peristaphyline and the posterior pillar, the orifice opens. The air propelled by the tensor increases its speed and decreases its pressure progressively as the space reduces its caliber, reaching its greatest speed and lowest pressure when it passes the isthmus ("Venturi effect") where the negative intratympanic pressure due to the rarefaction of the air provides it with sufficient force to easily pass through on its way to the tympanic cavity. [12, 13].

As can be understood, this efficient middle ear ventilation mechanism, ingeniously created by nature, is carried out with a minimum expenditure of additional energy since the main motor, the soft palate, performs the other functions in unison together with another group of muscles that act in coordination in the first phase of swallowing.

It is necessary to point out that the mechanism exerted by the Eustachian tube has been established and perfected over millions of years by the evolutionary process experienced by the species with the objective of achieving the safe protection of the structures contained in the petrous bone and preventing any regional factor (pathological or not) or foreign substance, under normal and physiological conditions, from penetrating or interfering with its functioning. The anatomical architecture of the pharyngeal orifice is designed in the same way to prevent secretions or foreign bodies from the nasal cavities from projecting directly into the entrance of the tube. It should also be noted that its anterior and upper edges are projected towards the midline of the nasopharynx, forming a wall in

front of the choana that serves as a retaining wall and a corridor for nasal secretions towards the oropharynx, an action facilitated by the impulse given to these by the soft palate and the tongue. [2, 10, 11].

The individual genetic arsenal contains the codes of the diseases that could develop during the period of his life. Each individual is a carrier of a limited number of the total of existing diseases. Those that correspond to each individual differ in quantity and quality from the rest of his peers.

Each disease corresponds to a genetic code that identifies it and contains the information of the parameters that characterize it in the way it manifests itself individually.

When. It is the moment that the code is activated to develop or cause the disease to develop.

Where. It determines the primary place where the process appears and the secondary place or places where it will spread.

Who. That the triggering agent present is the one contemplated to start the process.

How. It determines the characteristics of the clinical manifestations from the time the antigen-antibody reaction occurs that gives rise to the disease known as the Immune System.

Two factors are involved in the process of appearance and development of diseases: the predisposing factor and the triggering factor. The first is represented by the genetic code that identifies the entity and by certain anatomical and functional characteristics of the affected region, which sometimes induces the evolutionary course of the disease. The triggering factors include elements that, when interacting with the code of a disease, provoke the antigen-antibody reaction that initiates the pathological process. These agents can be: physical, chemical and biological.

For a disease to be triggered, it is essential that its code is activated at the time of its encounter with the etiological agent. Once the pathological process is established, the parameters that define it with its own characteristics begin to be determined, as well as the other elements that characterize it indicated above. Marked individual differences can be observed in: the histological or humoral characteristics that are related to the entity (tumor or inflammatory); variations in the activation period of each disease; diversity in the sites of appearance, whether initial or secondary, as well as the diversity and nuance in the way they manifest clinically.

The activation of each disease is programmed circadianly on an individual basis.

The capacity of the Immune System (IS), designed to defend the organism from the moment the antigen-antibody reaction occurs, determines the way the disease manifests itself. The course to be followed by the process in its natural evolution depends on the efficiency of the "IS". It may be controlled immediately or continue to go through multiple stages until it is controlled or, conclude with death as the end of the life cycle, a stage contemplated in the genetic calendar of the individual.

The immune system is not immature in children, it is in

development. The function of this system is to fight diseases, not to prevent them. Its activity begins with the process. Its defensive capacity is specific to each individual and may decrease secondarily if this system becomes ill or, as a consequence of the aging process inherent to natural evolution. Its exhaustion triggers the mechanisms that cause death as the culmination of the biological cycle.

There are many physical agents capable of triggering a disease on our planet, others come from outer space. Temperature, humidity, pressure changes, radiation, electromagnetic and sound waves, among others, are the most well-known.

The chemical elements that can cause a pathological process are found in numerous natural sources.

Among the great diversity of existing biological agents, viruses and bacteria stand out. The oldest, most widespread and those that produce the greatest number of diseases are viruses. They cause well-known endemic epidemics such as measles, poliomyelitis, chickenpox, etc. etc. fortunately controlled by science. Many of these agents are found in hosts considered healthy carriers but can become pathogens and invade other species due to the influence of certain physical or chemical factors, capable of inducing mutations in some of their amino acid chains. An example is the current SARS-CoV-2, which is reported to have originated from some mutations experienced by a coronavirus residing in a healthy host.

Some of the conditions or eventualities that may explain why a disease does not develop, despite the individual being exposed to any of the triggering agents, may be:

The genetic arsenal of the individual does not present the code for the disease or the transmitting agent (e.g. measles, mumps, coronavirus variant, etc.).

The disease code is not activated at the time of exposure to the triggering agent.

The agent is present but is not the one considered to trigger the disease (e.g. healthy carrier of Lancefield Group A Beta Hemolytic Streptococcus).

Two examples that illustrate the above can be seen in the epidemics of the mid-twentieth century (viral mumps, chickenpox, measles, rubella, etc.) and in the current COVID-19 pandemic.

During the course of the former, considered endemic, in each episode a limited number of exposed individuals were affected, mostly children, often crowded and without complying with epidemiological mitigation measures. In subsequent outbreaks, some who had not previously suffered from the disease were infected, other individuals could become ill at later stages, even at advanced ages of life and part of the population would never develop them.

This same epidemiological dynamic has been observed at the beginning of the current SARS-CoV-2 pandemic. Some of those who were exposed to the virus did not develop the disease at that time, but at later stages. Today, a large number of people who have apparently been exposed have not become ill.

Otitis media, in general, follows the same course as all diseases. The only difference that can be pointed out is in its form of appearance. It can appear as a secondary location in the course of an upper respiratory tract infection, generally of viral etiology, initially affecting the tubal canal. It can be considered a primary disease, genetically contemplated, when it is initially located in the tympanic cavity. The secondary sites that this entity can affect most frequently are: the mastoid process) and the endocranium, which respond to the individual genetic program.

The evolutionary course of inflammations of the middle ear is determined by the anatomical characteristics of the structures that constitute it. The degree of pneumatic development of the tympanic cavity and the diameter of the isthmus are directly related to the evolution of acute otitis media towards chronicity. The thickness, mobility and extension of the tympanic membrane, particularly the flaccid part, define the type of chronic otitis media, with or without cholesteatoma, that occurs in the course of serous otitis media. Simple chronic otitis media is the evolutionary consequence of acute purulent otitis media in a petrous bone with poorly developed pneumatic cavities.

To help us better understand the pathophysiology of the process towards chronicity of serous otitis media, we can use the formula  $PV=kT$  ( $P$  means pressure,  $V$  volume,  $k$  is a constant that depends on the measurement units, proportional to the number of gas molecules present and  $T$  is temperature), created to evaluate the pressure variations experienced by a gas in a closed, rigid container. By analyzing the behavior of these parameters, applied to each particular case, we can understand the influences on the dynamics of changes experienced in the tympanic cavity when the isthmus is occluded and converted into a closed receptacle, despite not being a completely rigid cavity. The smaller the volume, the greater the pressure necessary to compensate for the equality in the formula (negative), which, motivated by the collapse of the tympanic membrane, the thickening of the mucosa and the accumulation of transudate, causes the volume of the cavity to continue to progressively reduce in the form of a vicious circle that acts on the isthmus, folding it and closing it more and more, an action aggravated by the fibrosis of the accumulated liquid. The evolution towards a chronic adhesive process or towards chronic cholesteatomatous otitis media is determined by the thickness and extension of the epitympanum, allowing its degree of invagination to favor the formation of a cholesteatoma.

The pathophysiology of chronic simple otitis media is also marked by the pneumatic development of the box and the diameter of the isthmus. Partial or total, temporary or permanent occlusion of the latter prevents spontaneous or surgical healing of tympanic perforations.

Despite the favourable results reported in surgical repairs in patients suffering from serous otitis media and in the surgical closure of tympanic perforations of various causes, there is still a significant number of patients who have not benefited. Various factors have been invoked as possible causes of therapeutic

failures and many recommendations have been made to ensure that the results are completely satisfactory.

Life arises and develops from genetic transformations that evolutionarily defined the morphological and functional characteristics that gave rise to each of the species. The perfection in achieving its objectives is unquestionable. Absolute knowledge of the anatomical (macro and microscopic) and physiological characteristics of each species in general and each individual in particular is essential to understand the etiopathogenesis and physiopathology of the diseases that affect them.

Otorhinolaryngology, despite the great scientific and technical advances achieved, is notable for the large number of different criteria relating to the anatomy and physiology of some of its structures. The inconsistency and irregularity of the treatment chosen and the results obtained in some pathologies, observed in different publications, denote that certain aspects related to the appearance and development of the disease have not been taken into account.

The poor pneumatic development of the tympanic cavity, accompanied by a decrease in the diameter of its isthmus and the additus at antrum, are basic elements in the evolution towards the different stages of acute otitis media in its course towards chronicity. It is advisable to develop a technology that allows a study to be carried out on every patient who presents this entity with the objective of knowing the characteristics of the tympanic cavity, isthmus and additus at antrum. According to the results obtained, the ideal therapeutic variant will be determined in each case, which will be in accordance with the clinical stage at the time of diagnosis. Patency of the tube as early as possible is essential to ensure the success of any procedure to be used, whether medical or surgical. [3, 14-21].

The dimensions of the temporal petrous bone have individual characteristics. The volume of its cavities is determined by its size and its relationship with the structures contained within it is directly proportional to its volume (content-container ratio). [Figure 1].



Source: Department of Anatomy FCM Pinar del Rio, Cuba. 1989

**Figure 1.** Images of rocks with obvious differences in their dimensions.

In the physiology of hearing, the anatomical characteristics

of each of the components of the auditory system responsible for capturing, channelling, transporting and interpreting sound waves to convert them into sound determine individual hearing quality, from the most common aspects to the most subtle manifestations. The function of the auricles is to capture sound waves, define their origin, reinforce them and channel them towards the external auditory canal (EAC). The quality and efficiency of their functions vary individually and are conditioned by the size and the marked differences in the reliefs and depressions present in them. The extension, tortuosity and diameter of the EAC influence the flow of the waves as they pass through it. In the narrowest and most tortuous ones, the creation of vortices can modify the organisation of the waves that, when they hit the tympanic membrane (TM), are captured and cause oscillations that the type of sound wave imprints on it. The fidelity of the transmission of the waves is guaranteed by the anatomical characteristics of the TM, whose length, thickness and mobility were planned by nature in relation to the structures that precede it, allowing it to vibrate according to the quality of the waves it receives, which in turn transmit them to the chain of ossicles that move in correspondence to the same. The dimensions of these tiny bone structures vary in relation to the degree of pneumatic development of the tympanic cavity (content-container ratio) and, in the same way as the structures that precede it, its morphology is designed to receive and transport the sound waves in progress without distortion. The muscles of the malleus and the stapes are responsible for fixing the chain of ossicles in order to provide protection from exposure to intense noise. Their dimensions vary for the same reasons as the ossicles. In cases where the muscles have a smaller volume, their weak contractile force can explain a lower threshold for the appearance of *algiaacusis* related to the progressive increase in noise intensity than in those where these muscles are larger and therefore more vigorous.

The diameter of the stapes plate and the oval window is the reference for knowing the dimensions of the membranous labyrinth and therefore the volume of its main content, the cochleovestibular receptors. The morphological characteristics of the cochlear organ and other elements as a whole determine the speed and extension of the sound wave, the capture and transformation into electrical energy according to its frequency and intensity, a phenomenon originated by biochemical reactions that define the acoustic, global and particular parameters. These structures include the organ of Corti, spiral ganglion, conductive neurons, bulbar nuclei and the auditory area of the temporal cortex. The latter is responsible for processing and converting the received electrical stimulus into sound. Its extension varies according to the quality of the information received, and this in turn is determined by the characteristics of the structures that precede it. Through nuclear magnetic resonance, its greater extension has been proven in individuals with so-called absolute hearing. The auditory system also determines certain particular features that explain the perception of sound, such as comfortable and

uncomfortable levels, dynamic hearing range, auditory fatigue, pain, auditory floor and ceiling, degree of discrimination, absolute pitch (cognition?), etc. The morphological differences of the components of the auditory system observed between both sides also influence the quality of individual hearing. All these anatomical characteristics, in association with the cognitive particularities of the individual, both genetically constituted, combine to enable certain people to become exceptional musicians and singers: Mozart, Steve Wonder, Michael Jackson, etc.

It is well known that certain individuals are predisposed to hearing disorders when exposed to any of the triggering factors already mentioned. Acoustic trauma caused by loud or prolonged noise; ototoxicity due to exposure to or use of chemical substances (medications, fertilizers, insecticides, etc.) and hearing loss secondary to various infections (meningitis) are some examples.

In order to reach a positive diagnosis of any condition affecting hearing, it is necessary to identify the predisposing factors, specific to the individual and the triggering factors (external).

Determining individual morphological and functional characteristics using anatomical, physiological and genetic studies is essential in order to determine the predisposition to becoming ill.

Investigating and discovering the triggering factor is important. Sometimes it is easy to solve it, but this is not always the case, especially with some physical and chemical elements due to their wide distribution and the overlapping way in which they act.

An example can be found in the mysterious Havana syndrome, also known as "Havana Sonic Attacks." Leading institutions and eminent scientists are engaged in discovering the cause of the health problems reported by diplomatic officials, initially located in the city of Havana. Several hypotheses have been published but the cause is still unknown. Discarding the sources generating the physical and chemical agents stated as factors causing the problem requires a more precise and objective analysis in light of current knowledge of the etiopathogenesis and physiopathology of the mechanisms by which these agents act. To consider that elements originating in nature (crickets) were responsible for causing this condition is to deny the action exerted by the evolution of the species in the creation of protective defense mechanisms against sounds coming from natural sources. The noises perceived by some of these patients, attributed to the impact of the sound or electromagnetic wave, could be tinnitus or tinnitus originating as a consequence of lesions in the inner ear, pathways, nuclei or auditory cortex. On the other hand, the relationships between the elements contained in the ear and other neuro-sensory structures, among which there are some cranial pairs, the neurovegetative system and the central nervous system, are widely known. These could explain the signs and symptoms located in other parts of the body reflected by the symptoms reported in these patients. In addition, the role played by personal psychological character-

istics should be included. The variety and intensity of these manifestations are determined by genetic factors specific to each individual.

Physical and chemical agents as triggers of this neuro-sensory syndrome are impossible to rule out. Identifying and studying substances or other elements used by certain equipment to which these officials are exposed in their specific work would be of interest and a possible solution to the question. The affection of people related to these officials (relatives) is explained by their occasional exposure to the toxic source. The fact that diplomats exposed to the same activity have not become ill may be due to the fact that these individuals are genetically resistant or immune to developing this condition.

A very accurate criterion has been issued by the group of experts of the Cuban Academy of Sciences when they affirm that "We must find simpler and less esoteric explanations to get closer to the truth."

The development achieved in the field of cybernetics has achieved new and sophisticated technologies capable of avoiding the identification of aerial and submarine targets (radars and sonars). Perhaps new technological ways are being developed to neutralize hacking or interference of information systems (e.g. Wikileaks) that use some type of toxic substances that explain the reported clinical manifestations.

Tinnitus and discrimination disorders present in patients who do not suffer from hearing loss may be manifestations of a hidden auditory disorder. Tinnitus measurement is a procedure that could be of great value for the topo-diagnosis of tinnitus.

The individual morphological characteristics of the elements that make up the vestibular system, in the same way as in the auditory system, determine the varied functional manifestations observed in each individual. The threshold of onset of vertigo, the sense of balance and spatial orientation are some of the elements that mark individual differences. In the selection and, subsequent preparation and training, of dancers and aviation pilots, these premises are of great importance and must be taken into account. [1, 3, 22, 23].

## 4. Conclusions

-Genetics through the elements that compose it (Genetic System):

-Identify and codify each disease.

-Determine the diseases that can potentially develop in each individual.

-Determine the active period that the disease is ready to develop.

-Determine the exact place of appearance and the secondary sites where the disease will be located.

-Determine the way each disease manifests itself through the defense mechanism assigned to the immune system.

-Select the triggering agent (physical, chemical or biological) that will develop the disease.

-The biological agents have to be activated and will be the one selected by the genetic system.

-Otitis media follow the same rules as other diseases.

-Acute otitis media can be primary and secondary:.

-Primary otitis media, located from the beginning in the middle ear,

-Secondary otitis media, when they accompany processes in the upper respiratory tract,

-Chronic otitis media appears due to the constitutionally established poor pneumatic development of the middle ear, mainly of the tubal isthmus.

-Chronic otitis media with or without cholesteatoma occur in the evolutionary course of serous otitis media.

-Simple chronic otitis media are an evolutionary product of acute purulent suppurative otitis media.

-Absolute hearing is defined by the anatomical characteristics of the auditory system in association with individual cognitive peculiarities. They are genetically defined.

-The Neurosensory Syndrome of Havana must respond to the direct and personal exposure of those affected to a neurotoxic, chemical or physical agent.

## Abbreviations

EAC	External Auditory Canal
TM	Tympanic Membrane
IS	Immune System
RNA	Ribonucleic Acid
DNA	Deoxyribonucleic Acid

## Author Contributions

Candido Adalberto Benitez-Lorenzo is the sole author. The author read and approved the final manuscript.

## Conflicts of Interest

The author declares no conflicts of interest.

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## Research Fields

**Cándido Adalberto Ben fez-Lorenzo:** Pneumatization of the bones of the head, Soft palate, Protective role of the middle ear, Genetics and Otitis media. Their relationship, Reflections of an otorhinolaryngologist.