

Preview of the Medifocus Guidebook on: Meniere's Disease

Updated January 3, 2025



This document is only a SHORT PREVIEW of the **Medifocus Guidebook on Meniere's Disease**. It is intended primarily to give you a general overview of the **format and structure** of the Guidebook as well as select pages from each major Guidebook section listed in the Table of Contents.

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1 - Background Information

Introduction

Chronic or life-threatening illnesses can have a devastating impact on both the patient and the family. In today's new world of medicine, many consumers have come to realize that they are the ones who are primarily responsible for their own health care as well as for the health care of their loved ones.

When facing a chronic or life-threatening illness, you need to become an educated consumer in order to make an informed health care decision. Essentially that means finding out everything about the illness - the treatment options, the doctors, and the hospitals - so that you can become an educated health care consumer and make the tough decisions. In the past, consumers would go to a library and read everything available about a particular illness or medical condition. In today's world, many turn to the Internet for their medical information needs.

The first sites visited are usually the well known health "portals" or disease organizations and support groups which contain a general overview of the condition for the layperson. That's a good start but soon all of the basic information is exhausted and the need for more advanced information still exists. What are the latest "cutting-edge" treatment options? What are the results of the most up-to-date clinical trials? Who are the most notable experts? Where are the top-ranked medical institutions and hospitals?

The best source for authoritative medical information in the United States is the National Library of Medicine's medical database called PubMed®, that indexes citations and abstracts (brief summaries) of over 7 million articles from more than 3,800 medical journals published worldwide. PubMed® was developed for medical professionals and is the primary source utilized by health care providers for keeping up with the latest advances in clinical medicine.

A typical PubMed® search for a specific disease or condition, however, usually retrieves hundreds or even thousands of "hits" of journal article citations. That's an avalanche of information that needs to be evaluated and transformed into truly useful knowledge. What are the most relevant journal articles? Which ones apply to your specific situation? Which articles are considered to be the most authoritative - the ones your physician would rely on in making clinical decisions? This is where *Medifocus.com* provides an effective solution.

Medifocus.com has developed an extensive library of *MediFocus Guidebooks* covering a wide spectrum of chronic and life threatening diseases. Each *MediFocus Guidebook* is a

high quality, up- to-date digest of "professional-level" medical information consisting of the most relevant citations and abstracts of journal articles published in authoritative, trustworthy medical journals. This information represents the latest advances known to modern medicine for the treatment and management of the condition, including published results from clinical trials. Each *Guidebook* also includes a valuable index of leading authors and medical institutions as well as a directory of disease organizations and support groups. *MediFocus Guidebooks* are reviewed, revised and updated every 4-months to ensure that you receive the latest and most up-to-date information about the specific condition.

About Your MediFocus Guidebook

Introduction

Your *MediFocus Guidebook* is a valuable resource that represents a comprehensive synthesis of the most up-to-date, advanced medical information published about the condition in well-respected, trustworthy medical journals. It is the same type of professional-level information used by physicians and other health-care professionals to keep abreast of the latest developments in biomedical research and clinical medicine. The *Guidebook* is intended for patients who have a need for more advanced, in-depth medical information than is generally available to consumers from a variety of other resources. The primary goal of a *MediFocus Guidebook* is to educate patients and their families about their treatment options so that they can make informed health-care decisions and become active participants in the medical decision making process.

The *Guidebook* production process involves a team of experienced medical research professionals with vast experience in researching the published medical literature. This team approach to the development and production of the *MediFocus Guidebooks* is designed to ensure the accuracy, completeness, and clinical relevance of the information. The *Guidebook* is intended to serve as a basis for a more meaningful discussion between patients and their health-care providers in a joint effort to seek the most appropriate course of treatment for the disease.

Guidebook Organization and Content

Section 1 - Background Information

This section provides detailed information about the organization and content of the *Guidebook* including tips and suggestions for conducting additional research about the condition.

Section 2 - The Intelligent Patient Overview

This section of your *MediFocus Guidebook* represents a detailed overview of the disease or condition specifically written from the patient's perspective. It is designed to satisfy the basic informational needs of consumers and their families who are confronted with the illness and are facing difficult choices. Important aspects which are addressed in "The Intelligent Patient" section include:

- The etiology or cause of the disease
- Signs and symptoms
- How the condition is diagnosed
- The current standard of care for the disease
- Treatment options

- New developments
- Important questions to ask your health care provider

Section 3 - Guide to the Medical Literature

This is a roadmap to important and up-to-date medical literature published about the condition from authoritative, trustworthy medical journals. This is the same information that is used by physicians and researchers to keep up with the latest developments and breakthroughs in clinical medicine and biomedical research. A broad spectrum of articles is included in each *MediFocus Guidebook* to provide information about standard treatments, treatment options, new clinical developments, and advances in research. To facilitate your review and analysis of this information, the articles are grouped by specific categories. A typical *MediFocus Guidebook* usually contains one or more of the following article groupings:

- *Review Articles*: Articles included in this category are broad in scope and are intended to provide the reader with a detailed overview of the condition including such important aspects as its cause, diagnosis, treatment, and new advances.
- *General Interest Articles*: These articles are broad in scope and contain supplementary information about the condition that may be of interest to select groups of patients.
- *Drug Therapy*: Articles that provide information about the effectiveness of specific drugs or other biological agents for the treatment of the condition.
- *Surgical Therapy*: Articles that provide information about specific surgical treatments for the condition.
- *Clinical Trials*: Articles in this category summarize studies which compare the safety and efficacy of a new, experimental treatment modality to currently available standard treatments for the condition. In many cases, clinical trials represent the latest advances in the field and may be considered as being on the "cutting edge" of medicine. Some of these experimental treatments may have already been incorporated into clinical practice.

The following information is provided for each of the articles referenced in this section of your *MediFocus Guidebook*:

- Article title
- Author Name(s)
- Institution where the study was done
- Journal reference (Volume, page numbers, year of publication)

- Link to Abstract (brief summary of the actual article)

Linking to Abstracts: Most of the medical journal articles referenced in this section of your *MediFocus Guidebook* include an abstract (brief summary of the actual article) that can be accessed online via the National Library of Medicine's PubMed® database. You can easily access the individual abstracts online via PubMed® from the "electronic" format of your *MediFocus Guidebook* by clicking on the corresponding URL address that is provided for each cited article. If you purchased a printed copy of a *MediFocus Guidebook*, you can still access the article abstracts online by entering the individual URL address for a particular article into your web browser.

Section 4 - Centers of Research

We've compiled a unique directory of doctors, researchers, medical centers, and research institutions with specialized research interest, and in many cases, clinical expertise in the management of the specific medical condition. The "Centers of Research" directory is a valuable resource for quickly identifying and locating leading medical authorities and medical institutions within the United States and other countries that are considered to be at the forefront in clinical research and treatment of the condition.

Inclusion of the names of specific doctors, researchers, hospitals, medical centers, or research institutions in this *Guidebook* does not imply endorsement by Medifocus.com, Inc. or any of its affiliates. Consumers are encouraged to conduct additional research to identify health-care professionals, hospitals, and medical institutions with expertise in providing specific medical advice, guidance, and treatment for this condition.

Section 5 - Tips on Finding and Choosing a Doctor

One of the most important decisions confronting patients who have been diagnosed with a serious medical condition is finding and choosing a qualified physician who will deliver high-level, quality medical care in accordance with currently accepted guidelines and standards of care. Finding the "best" doctor to manage your condition, however, can be a frustrating and time-consuming experience unless you know what you are looking for and how to go about finding it. This section of your *Guidebook* offers important tips for how to find physicians as well as suggestions for how to make informed choices about choosing a doctor who is right for you.

Section 6 - Directory of Organizations

This section of your *Guidebook* is a directory of select disease organizations and support groups that are in the business of helping patients and their families by providing access to information, resources, and services. Many of these organizations can answer your questions, enable you to network with other patients, and help you find a doctor in your geographical area who specializes in managing your condition.

2 - The Intelligent Patient Overview

MENIERE'S DISEASE

Introduction to Meniere's Disease

What is Meniere's Disease?

Meniere's disease is a disorder of the inner ear that affects balance and hearing. The most common symptoms include vertigo (dizziness), hearing loss, tinnitus (ringing in the ear), and a feeling of fullness in the ear. In the early stages, Meniere's disease is usually unilateral (occurring on one side). There is no predominance of right or left ear. Meniere's disease is also called *idiopathic endolymphatic hydrops*. The cause of Meniere's disease is unknown. It was first described by a French physician, Dr. Prosper Meniere, in 1861.

Meniere's Disease and the Ear

The human ear is a complex sensory organ that has two functions: hearing and maintaining balance.

The ear consists of three parts, each of which has functional subparts, as described below:

- Outer (external) ear (for hearing)
- Middle ear (for hearing)
- Inner ear (for hearing and balance)

Outer Ear

The outer ear is the external portion of the ear whose function is to "catch" sound waves, identify which direction they are coming from, and channel them into the ear.

The components of the outer ear include the:

- Pinna - The visible part of the ear that is made of cartilage and that enables us the hearer to localize the source of sound.
- Ear canal - The tube that directs sound waves towards the ear's tympanic membrane.
- Tympanic membrane (eardrum) - A thin, cone-shaped membrane that separates the external ear from the middle ear, and protects the middle ear from the outside environment. It is the first organ to respond to sound waves that are conducted through the ear canal.

Middle Ear

The middle ear is an air-filled cavity known as the *tympanic cavity* that is carved out of the temporal bone at the base of the skull. Its main function is to transmit sound waves from the external environment to the inner ear. There are two parts of the middle ear:

- Ossicles - Very small bones that react to vibrations of the tympanic membrane by moving, and thereby transmit the sound waves to the inner ear. The ossicles consist of three small bones: the malleus (hammer), the incus (anvil), and the stapes (stirrup). The stapes is attached to the "oval window", a membrane that separates the middle ear from the inner ear.
- Eustachian tube - A tube that connects the middle ear to the nasopharynx (a segment of the throat behind the mouth and nasal cavity), that acts as a pressure valve to equalize the pressure in the middle ear. (So-called "popping your ears" opens the Eustachian tube.)

Inner Ear

The inner ear is responsible for interpreting incoming sound waves (hearing function), and for maintaining balance (vestibular function).

The inner ear contains the *labyrinth*, which is a system of fluid-filled passages that includes the organs for hearing and balance. The labyrinth is completely encased in bone and is located in the hollowed-out area of the temporal bone at the base of the skull. The labyrinth is the most relevant organ related to Meniere's disease, and accounts for all hearing and vestibular (balance) symptoms. The inner ear consists of three parts:

- Cochlea - An essential organ of hearing that is coiled in the shape of a snail and is located towards the front of the inner ear. It contains the *Organ of Corti* that consists of hair cells that transmit nerve signals to the brain.
- Semicircular canals - Three loops located towards the rear of the inner ear that are organs of balance and movement and that detect the body's rotational movement through space.
- Vestibule - The central part of the inner ear that connects the cochlea and the semicircular canals, and contains two membranous sacs, both of which are important for balance and which detect linear movement in space (as opposed to rotational):
 - utricle - arises from the semicircular canals and is the larger of the two sacs
 - saccule - connected to the cochlear duct and to the utricle and is the smaller of the sacs

Within the cochlea, semicircular canals, and vestibule, there are two complex systems of sacs lined by membranes, ducts, tubes and nerves, one inside the other. The outer system contains fluid found throughout the inner ear called *perilymph*. Inside the system containing perilymph is another complex system of ducts. The fluid in this system is called *endolymph* and it is chemically different than perilymph. The membrane that separates the endolymph-filled cochlear duct from the surrounding perilymph is called *Reissner's membrane*.

The nerve supply (innervation) for organs of the inner ear comes from the *vestibulocochlear nerve*, also called the eighth cranial nerve. As the name implies, there are two branches of the vestibulocochlear nerve: the *vestibular* branch, which carries signals from the vestibular organs (semicircular canals and vestibule) to the brain; and the *cochlear* branch, which carries signals from the auditory organ (cochlea) to the brain.

Hearing

When sound enters the ear canal, the sound waves cause the tympanic membrane to vibrate, setting the ossicles into a vibratory motion. Vibrations of the middle ear cause disturbances of the fluid in the inner ear (perilymph) leading to disturbance of the small hairs in the cochlea. In response, the small hairs create nerve impulses that travel to the brain via the auditory portion of the vestibulocochlear nerve. The impulses are translated by the brain into sound.

Balance

The organs of the vestibular system (semicircular canals and vestibule) also contain hair cells which, when disturbed by the moving endolymph, detect either rotation of the head, movement (acceleration and deceleration), or position in space. When a person moves or changes direction, the endolymph moves and disturbs the hair cells in those organs. The direction of movement determines which hair cells are stimulated. The hair cells then generate nerve impulses that travel via the vestibulocochlear nerve to the brain stem, cerebellum, and spinal cord. The body responds by shifting itself to maintain balance.

The vestibular system works together with the visual and skeletal systems in order to help a person maintain balance. If all incoming information from each of these systems is synchronized, then balance is achieved. When the central nervous system detects mismatching or conflicting information, it reacts by trying to *compensate* or *habituate* to the information in order to reconcile the sensations. "Central compensation" takes place unconsciously and reflects the body's capacity to adapt to change. The center for this compensation or "conflict resolution" is in the *vestibular nuclei*. Vertigo is the sensation that occurs when there is no compensation or habituation.

What Happens in Meniere's Disease?

Meniere's disease is a chronic disorder of the inner ear that, while uncomfortable and disruptive to quality of life, is not fatal. All symptoms are related to dysfunction in the organs of the inner ear described above. According to guidelines of the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS), Meniere's disease is characterized by four symptoms that occur with varying degrees of intensity:

- Vertigo - An intense sense of spinning that is usually episodic and can range from mild to severe. The vertigo attacks of Meniere's disease are rotational and the duration of each episode must be at least 20 minutes in order to be classified as Meniere's disease.
- Hearing loss - Fluctuating, low frequency, sensorineural hearing loss that becomes worse during attacks and may permanently deteriorate over time.
- Tinnitus - Ringing or roaring noise in the ears (typically a low tone).
- Aural fullness - A sense of fullness in the ear.

Initial presentation of symptoms for Meniere's disease is variable. Most people experience a fully developed attack of Meniere's disease with all of its symptomatic manifestations that lasts from 20 minutes to 24 hours (the average duration is 1-2 hours). Aural fullness and tinnitus typically precede the vertigo attack. A fluctuating, low frequency, sensorineural hearing loss often occurs during the vertigo attack, but it usually rebounds after the attack ends. However, when individuals experience recurrent attacks, the hearing loss is persistent and hearing starts to deteriorate. Horizontal rotary nystagmus (involuntary quivering of the eye in a rotational direction) is also typically present during the vertigo attack. Other individuals may experience vertigo or other symptoms appearing alone and preceding fully developed Meniere's disease by many months or years.

Causes of Meniere's Disease

There have been many hypotheses regarding the underlying causes of Meniere's disease since its first description in 1861, including:

- Genetic predisposition - Approximately 5-20% of individuals diagnosed with Meniere's disease report that a family member has or had Meniere's disease or similar symptoms. In addition, chromosomal studies appear to be making progress in identifying certain genetic markers in individuals diagnosed with Meniere's disease.
- Ethnicity - Meniere's disease appears to be more common in certain populations. For example, while there is a predominance of the condition among Caucasians in the northern parts of the U.S. and Europe, it is virtually unknown among some populations, such as African-Americans, American Indians, or West Indians.
- Autoimmune response - Many individuals with Meniere's disease have elevated levels of autoantibodies, and have a higher prevalence of autoimmune diseases, such as rheumatoid arthritis, systemic lupus erythematosus, and ankylosing spondylitis. More about Meniere's disease and autoimmune disease can be found at: <http://www.ncbi.nlm.nih.gov/pubmed/22053211>
- Allergies - Individuals with Meniere's disease report higher rates of allergies than people not affected with Meniere's, and some studies have shown higher rates of serum immune markers in individuals with Meniere's disease than those without. In addition, studies have shown that individuals with allergies and Meniere's disease report an improvement in the severity and duration of their Meniere's attacks when treated with immunotherapy and/or dietary adjustments. To read more about the relationship between allergy and Meniere's disease, please click on the following link: <http://www.ncbi.nlm.nih.gov/pubmed/21621052>
- Otosclerosis - Some individuals with otosclerosis (a rare condition of formation of spongy bone around the stapes) have symptoms of Meniere's disease. It is thought that otosclerotic formations may cause malformation in the endolymphatic sac, or may change the chemical properties of the perilymphatic and endolymphatic fluid.

- Migraine headaches - There appears to be an association between Meniere's disease and migraine headaches. Reports in one study indicated that the prevalence of migraine in individuals with Meniere's disease was 56%, compared to 10% among the general population; and that 45% of individuals with Meniere's disease always experienced at least one symptom of migraine headaches (e.g., aura, or an aversion to light) during Meniere's attacks. More information can be found at the following link:
<http://www.ncbi.nlm.nih.gov/pubmed/12473755>
- Viral neuropathy - There is clinical evidence of viral neuropathy in the vestibular ganglion cells found in the endolymph of both affected and unaffected ears, in a subset of individuals with Meniere's disease. An article published by researchers at the University of Massachusetts Medical School reported that 35 Meniere's disease patients suffering vertigo were treated with antiviral medication, and vertigo was controlled in 91% of these cases. To read more about this study, please click on the following link:
<http://www.ncbi.nlm.nih.gov/pubmed/19142031>

Although the underlying cause of Meniere's disease is not clear, it has been associated with an excess of endolymph within the cochlear duct and vestibular system. The excess of endolymph causes distortion of Reissner's membrane in the labyrinth, which results in disturbances of the hearing and vestibular nerve endings, as well as incremental injury to the membrane. Excess endolymph by itself is known as *endolymphatic hydrops* and causes symptoms that include hearing loss and tinnitus. When vertigo is present in addition to endolymphatic hydrops, the condition is known as *Meniere's disease*. A subset of people with Meniere's disease exhibit all of the symptoms, but do not have endolymphatic hydrops.

There are several theories that try to explain the relationship between endolymphatic hydrops and Meniere's disease. One of the first theories was that of noted audiologist Harold F. Schuknecht, put forth in 1975. His theory is that the primary event in the development of endolymphatic hydrops is a viral infection of the inner ear that results in a dysfunction of the control mechanism that balances fluids in the inner ear. The sensory cells of hearing and balance are sensitive to these changes and, subsequently, symptoms of Meniere's develop. This is still a widely accepted theory.

Another theory claims that a dysfunction in the production or absorption of endolymph allows a build-up of fluid in the ducts. When hydrops occurs, the pressure causes small ruptures at any point in the membrane (Reissner's membrane) and allows the endolymph to mix with perilymph. The mixture of these chemically unique fluids bathes the cochlear and vestibular hairs (nerve receptors) and causes them to stop firing, resulting in a temporary loss of function. This sudden change of status causes hearing loss and vestibular imbalance. Other opinions explain that endolymphatic hydrops causes pressure and mechanical displacement of inner ear organs, which then precipitates the attacks.

It is clear, though, that as a result of the increased pressure in the inner ear and the resulting distention, the nerve hairs in the utricle and saccule are irritated, which results in dizziness, imbalance, and disequilibrium. The damage from periodic, intense disturbances to the cochlear duct nerve cells causes hearing loss. Since there is greater pressure at the apex (top) of the cochlea where the nerve cells are sensitive to low-frequency sounds, any disturbance affects that area first.

For this reason, the first symptoms of hearing loss usually involve low-frequency tones. The fluctuation of endolymphatic pressure is the reason for fluctuation of symptoms in Meniere's disease.

While there seems to be a relationship between hydrops and Meniere's disease, it is not clear if hydrops is a result of obstruction of the endolymphatic duct, overproduction of fluid, or faulty resorption of normal amounts of fluid. It is also not clear whether endolymphatic hydrops is the cause or the result of Meniere's disease, since there are known cases of individuals with endolymphatic hydrops who are otherwise asymptomatic for Meniere's disease.

Triggers for Meniere's Disease

Many individuals report that certain situations can trigger individual symptoms of Meniere's disease or precipitate a fully-developed attack, including:

- Otitis media (middle ear infection)
- Allergies
- Upper respiratory infection
- Pregnancy
- Stress
- Fatigue
- Caffeine
- Salty foods
- Alcohol
- Sugar
- Menstruation
- Pregnancy
- Orgasm
- Barometric pressure changes
- Visual stimuli that produce *nystagmus* (involuntary, side-to-side, rapid eye movements)
- Trauma

Otitis media, repeated ear infections, may result in the spread of an infectious agent to the cochlea or the endolymphatic sac. This could cause changes in Reissner's membrane or of the fluids, leading to hydrops. Acoustic or physical trauma may lead to dysfunction of cells that produce or absorb endolymph. Also, if inner ear organs are injured by trauma, the cellular debris may cause chemical changes that effect the production or absorption of endolymph.

Incidence of Meniere's Disease

While Meniere's disease is the second most common cause of vertigo in the U.S., it is listed in the National Organization of Rare Diseases (NORD) database as a rare disease. Information regarding the precise incidence and prevalence of Meniere's disease is scarce, but some estimates range from 15 to 150 cases per 100,000 people. Some reasons for this wide range of incidence include:

- Inconsistent criteria for diagnosis of Meniere's disease among primary care physicians and

within the diagnostic guidelines of the AAO-HNS

- Misdiagnosis by primary care physicians (e.g., treating dizziness as a virus or labyrinthitis, instead of seeing it as part of a broader syndrome)
- Episodic occurrence with long periods of remission and atypical manifestations that make Meniere's disease difficult to recognize

Additional information about the incidence of Meniere's disease:

- Meniere's disease most often affects adults between the ages of 40 and 60. Isolated symptoms can appear between the ages of 20 and 40. It is uncommon for people older than 60 to develop Meniere's disease.
- Approximately 40,000 new cases of Meniere's disease are diagnosed annually in the U.S.
- Approximately 3% of patients diagnosed with Meniere's disease are children.
- Male-to-female ratio ranges from equal to a slight preponderance of females over males. Some women report improvement of symptoms following pregnancy.
- Although most cases of Meniere's disease are usually unilateral (occurring on one side), up to 10% of individuals have bilateral Meniere's disease at the time of diagnosis. Over the course of time, approximately 50% of individuals also develop symptoms in the opposite ear.

Who Treats Meniere's Disease?

A number of physicians with different specialties may be involved in the diagnosis and treatment of Meniere's disease, including a:

- Primary care physician
- Otorhinolaryngologist / ENT (Ear, Nose, and Throat specialist)
- Otologist (specialist in disorders of the ear)
- Neurologist (specialist in disorders of the nervous system)
- Neurotologist (specialist in disorders of the ear and the vestibulocochlear nerve)

The **Intelligent Patient Overview** in the complete **Medifocus Guidebook on Meniere's Disease** also includes the following additional sections:

- **Diagnosis of Meniere's Disease**
- **Treatment of Meniere's Disease**
- **Quality of Life in Meniere's Disease**
- **The Role of Alternative Medicine in Meniere's Disease**
- **New Developments in Meniere's Disease**
- **Questions to Ask Your Health Care Provider About Meniere's Disease**

To Order the Complete **Guidebook on Meniere's Disease** [Click Here](#)
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3 - Guide to the Medical Literature

Introduction

This section of your *MediFocus Guidebook* is a comprehensive bibliography of important recent medical literature published about the condition from authoritative, trustworthy medical journals. This is the same information that is used by physicians and researchers to keep up with the latest advances in clinical medicine and biomedical research. A broad spectrum of articles is included in each *MediFocus Guidebook* to provide information about standard treatments, treatment options, new developments, and advances in research.

To facilitate your review and analysis of this information, the articles in this *MediFocus Guidebook* are grouped in the following categories:

- Review Articles - 44 Articles
- General Interest Articles - 53 Articles
- Drug Therapy Articles - 13 Articles
- Surgical Therapy Articles - 13 Articles
- Clinical Trials Articles - 7 Articles

The following information is provided for each of the articles referenced in this section of your *MediFocus Guidebook*:

- Title of the article
- Name of the authors
- Institution where the study was done
- Journal reference (Volume, page numbers, year of publication)
- Link to Abstract (brief summary of the actual article)

Linking to Abstracts: Most of the medical journal articles referenced in this section of your *MediFocus Guidebook* include an abstract (brief summary of the actual article) that can be accessed online via the National Library of Medicine's PubMed® database. You can easily access the individual abstracts online via PubMed® from the "electronic" format of your *MediFocus Guidebook* by clicking on the URI that is provided for each cited article. If you purchased a printed copy of the *MediFocus Guidebook*, you can still access the abstracts online by entering the individual URI for a particular abstract into your computer's web browser.

4 - Centers of Research

This section of your *MediFocus Guidebook* is a unique directory of doctors, researchers, medical centers, and research institutions with specialized research interest, and in many cases, clinical expertise in the management of this specific medical condition. The *Centers of Research* directory is a valuable resource for quickly identifying and locating leading medical authorities and medical institutions within the United States and other countries that are considered to be at the forefront in clinical research and treatment of this disorder.

Use the *Centers of Research* directory to contact, consult, or network with leading experts in the field and to locate a hospital or medical center that can help you.

The following information is provided in the *Centers of Research* directory:

- **Geographic Location**

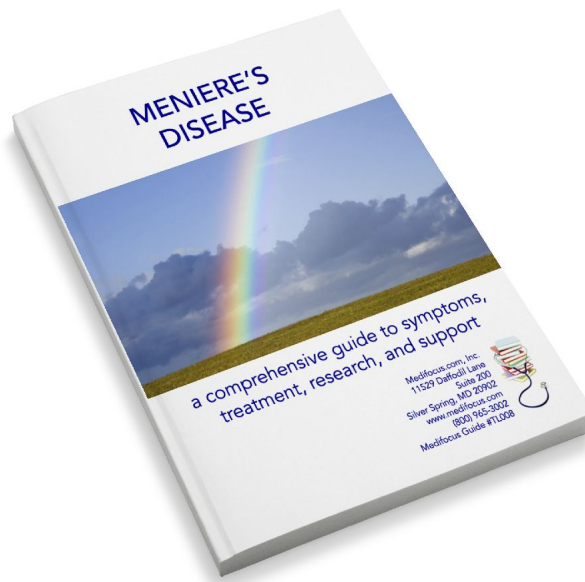
- United States: the information is divided by individual states listed in alphabetical order. Not all states may be included.
- Other Countries: information is presented for select countries worldwide listed in alphabetical order. Not all countries may be included.

- **Names of Authors**

- Select names of individual authors (doctors, researchers, or other health-care professionals) with specialized research interest, and in many cases, clinical expertise in the management of this specific medical condition, who have recently published articles in leading medical journals about the condition.
- E-mail addresses for individual authors, if listed on their specific publications, is also provided.

- **Institutional Affiliations**

- Next to each individual author's name is their **institutional affiliation** (hospital, medical center, or research institution) where the study was conducted as listed in their publication(s).
- In many cases, information about the specific **department** within the medical institution where the individual author was located at the time the study was conducted is also provided.



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