UNIT 6 - NERVOUS SYSTEM / SPECIAL SENSES

Diseases and Disorders of the Nervous System

A. **Amyotrophic Lateral Sclerosis (ALS)**
Amyotrophic Lateral Sclerosis, or Lou Gehrig's Disease is the most common motor neuron disease of muscular atrophy. Onset typically occurs between the ages of 40 and 70. The causes of this disease include autoimmune disorders, disturbance in motor neuron enzyme metabolism, difficulty producing nucleic acids, severe stress, trauma, and physical exhaustion. The symptoms of ALS include muscle weakness, muscle atrophy, dysphasia, dysphagia, and dyspnea. The person usually becomes physically incapacitated. Mental deterioration usually does not occur, but depression is a common response to the disease process. Death usually occurs within 2 to 5 years after diagnosis as there is no effective treatment available.

B. **Alzheimer's Disease**
Alzheimer's Disease includes progressive changes in the neurons of the brain due to a lack of neurotransmitters in the brain, trauma, and genetics. The neurons will degenerate until they can no longer carry an impulse. The causes of Alzheimer's includes genetics, unspecified environmental factors (possibly aluminum), and other unknown causes. The onset of Alzheimer's is slow. In the beginning, the patient will have very mild changes such as memory loss, forgetfulness, and difficulty learning new information, deterioration in personal hygiene and appearance, and an inability to concentrate. As the disorder progresses, personality changes may be seen. Physical disability progresses and death usually results from infection. Stem cell research may be promising. Former President Ronal Reagan was afflicted with this disorder and passed away in 2004.

C. **Bacterial Meningitis**
In bacterial meningitis, the covering(s) of the brain and spinal cord (usually the pia mater) become inflamed, usually the result of bacterial infection. Treatment includes early recognition and antibiotic therapy. Symptoms of meningitis include a sore neck when the patient is lying down and the practitioner pulls the head forward and the patient flexes his hips and knees in response, as well as fever, chills, malaise, anorexia, and changes in the cerebrospinal fluid

D. **Cerebral Palsy (CP)**
Cerebral Palsy is the most common cause of crippling in children results from prenatal or postnatal CNS damage due to fetal anoxia. Motor impairment may be minimal or severely disabling. Associated defects, such as seizures, speech impairment, and mental retardation are common. This disorder cannot be cured but proper treatment can help the child reach his/her full potential.

E. **Epilepsy**
Epilepsy is a condition of the brain marked by susceptibility to recurrent seizures that are associated with abnormal electrical discharges in the neurons of the brain. The causes are unknown, but may include birth trauma, infection, anoxia, and brain tumors. Treatment includes medication such as dilantin, phenobarbital, and tegretol to control seizures. Experimental surgeries may also help to control seizures by removing the affected parts the brain.

F. **Multiple Sclerosis**
Multiple Sclerosis (MS) is characterized by a loss of myelin from the axons of the peripheral nerves. Hard, plaque-like structures replace the destroyed myelin and the affected areas are invaded by inflammatory cells. As the myelin is lost, nerve conduction is affected causing weakness, un-coordination, visual impairment, and speech problems. It is most common in women between the ages for 20 and 40. The cause of multiple sclerosis is an autoimmune disorder in which the body turns its immune response on itself. The disease is chronic, but has periods of exacerbations and remissions. There is no known cure, but medications can help slow the progression of the disease.

G. **Parkinson's Disease**
Parkinson's Disease is sometimes referred to as the shaking palsy as involuntary tremors are one of the cardinal signs. It is one of the most crippling diseases in the United States, striking 1 in every 100 people. There is a dopamine (neurotransmitter) deficiency, which prevents brain cells from performing their normal inhibition or stopping nerve impulses within the CNS. Muscle rigidity may occur. The exact cause of Parkinson's is unknown. Death usually occurs within10 years after the disease is diagnosed. There is no cure for this disease. The primary goal of treatment is to relieve symptoms and keep the patient functional for as long as possible with the use of drugs and physical therapy. Stem cell research may be a promising venue for future medical care and cure. Michael J. Fox, Janet Reno, Pope John Paul II (died in April 2005) and Mohammed Ali both are all afflicted with this disorder.

Diseases and Disorders Associated with Special Senses

A. **Presbyopia**
Presbyopia is the normal loss of accommodation power of the eye which occurs as a consequence of aging. It occurs because the lens becomes sclerotic and less flexible and less able to bulge or accommodate for near vision. The major symptom shows when the near point of vision has increased beyond 9 inches. It can be corrected by the use of “reading glasses” worn only for close work and are removed when someone wants to see distance. Some people prefer the use of bifocals, which use two different lenses in the top and bottom of the glasses.

B. **Myopia**
Myopia is the ability to see close objects but not distant ones and results from a defect in which the eye's focusing systems, the cornea and the lens, are optically too powerful or the eyeball is too long. As a result, the focal point is too near the lens and the image is not focused on the retina. It is corrected by a concave lens that reduces the refractive power of the eye by spreading out the light rays.

C. **Hyperopia**
Hyperopia is the ability to see distant objects but not near ones and results from a defect in which the eye's focusing systems, the cornea and the lens, are optically too weak or the eyeball is too short. As a result, the focal point is off and the image is projected posterior to the retina. It is corrected by convex lenses that cause light rays to converge as they approach the eye.

D. **Cataracts**
A cataract is the clouding of the lens resulting from the buildup of proteins and epithelial cells. The lens relies on the aqueous humor for its nutrition. Any loss of the nutrient source will lead to degeneration of the lens and ultimately opacity of the lens. Cataracts make vision in dim light difficult because weaker beams of light cannot pass through the cloudy spots making dim light vision or night vision difficult. Cataracts may occur with advancing age, infection, exposure to sunlight and trauma. The lens may be surgically removed and a transplant completed.

E. **Conjunctivitis**
Conjunctivitis, commonly called pinkeye, is the inflammation of the conjunctiva, or the lining of the eyelids and the anterior sclera. It is generally caused by a bacterial infection and is highly contagious. It is characterized by redness of the eye and extreme redness of the conjunctiva resulting in itchy, watery eyes, with a noticeable increase in the mucous discharge. It is treated with antibiotics.

F. **Deafness**
1. **Conductive Deafness**
Conductive deafness is a loss of hearing related to the impairment of the conduction of sound waves through the external and middle ear. The major cause of conduction impairment is wax build-up. Foreign objects, tumors, and other matter can block sound waves through the external or middle ear. Once the blockage is removed, the hearing problem generally improves. A hearing aid may also help conductive deafness by boosting the sound volume reaching the inner ear.

2. **Sensorineural Deafness**
Sensorineural deafness or nerve impairment deafness results from damage to the nerves or to the Organ of Corti. Hearing loss, or presbycusis, is a progressive hearing loss associated with degeneration of nerve tissue in the ear and the vestibulocochlear nerve. A similar type of hearing loss can occur after chronic exposure to loud noises which damage the receptors in the Organ of Corti. Cochlear implants may help improve hearing. Cochlear implants are made from a receiver and an antenna and are implanted under the skin near the auricle and a small lead is fed through the external auditory meatus, tympanic membrane, middle ear, and into the cochlea where the cochlear nerve can be directly stimulated by electrical impulses from the receiver.

G. **Glaucoma**
Glaucoma is the build-up of excessive aqueous humor in the anterior cavity of the eye. The fluid causes excess pressure against the retina which reduces the amount of blood reaching the retina. The reduced blood flow causes the degeneration of the retina resulting in vision loss. Some of the symptoms may include a gradual loss of peripheral vision or tunnel vision. Blurred vision and headaches may also occur. There may be halos seen around lights. If untreated, glaucoma can eventually can lead to blindness. It is treated with medications that help to dilate the vessels to improve the drainage of the aqueous humor.

H. **Macular Degeneration**
Macular degeneration is the progressive degeneration of the central part of the retina or the macula which is necessary for good vision. The exact cause is not known, but risk factors include age, cigarette smoking, and genetics. There is no cure.

I. **Middle Ear Infection**
Middle ear infection or otitis media is an infection of the middle ear usually the result of a bacterial infection spread from the mucous membrane of the pharynx through the auditory tube to the mucous lining of the middle ear. The symptoms include fever, lethargy, irritability, and in younger infants, pulling on the affected ear. The tympanic membrane is red and swollen. The infection may cause a temporary decrease or loss of hearing because the fluid build-up has dampened the tympanic membrane or ossicles. Bacterial infections are treated with antibiotics.

J. **Strabismus**
Strabismus or cross-eyed occurs when the eye cannot be coordinated. Strabismus is caused by paralysis, weakness, or other abnormality affecting the external muscles of the eye. The cause is generally unknown. It may cause diplopia (double vision) or other visual disturbances. Treatment may include patching the eye or corrective lenses

K. **Tinnitus**
Tinnitus is the ringing or clicking in the ears. These noises may occur as a result of other ear disorders in the middle or inner ear or along the central neuron pathways.

L. **Vertigo**
`Vertigo is dizziness or the sensation of spinning.