Transient Ischemic Attack (TIA)

A TIA is a fleeting episode of blockage in brain blood flow, producing brief and temporary symptoms such as slurred speech or visual disturbance. The TIA clears, sometimes in a matter of minutes, with the functions returning fully.

That is what distinguishes a TIA from a regular stroke: with a regular stroke, the blockage affects a larger part of the brain, with longer lasting symptoms, and sometimes permanent disability.

Even if a TIA does not cause permanent disability, it is an important warning of a major ischemic attack in the future. A Doppler ultrasound gauges the rate of blood flow in the carotids, vessels on either side of the head which serve the brain. Major blockages (70% of more) in either or both carotids would warrant immediate surgery to clear away the fatty plaque deposits. For lesser blockages, control through diet, exercise, and the use of aspirin therapy or ticlopidine is the treatment modality.
Meningitis

Meningitis, an infection of the meninges (the membranes surrounding the brain and spinal cord), is caused by three different bacteria. Hemophilus influenzae was the most common cause of meningitis especially in young children until it was virtually wiped out by a vaccine approved in 1986. The bacterium Streptococcus pneumoniae or pneumococcus, which also causes pneumonia and infections of the inner ear, once killed about 30% of the children it infected no matter how intensively they were treated. In 1991, a new treatment was begun, based on research by Dr. Elaine Tuomanen and colleagues at Rockefeller University in New York, and the mortality rate was reduced to 5-10%. The third bacterium, Neisseria meningitidis, or meningococcus, remains the most virulent for individuals older than 5. This bacterium is usually responsible for community outbreaks.

Of the three strains of Neisseria that lead to meningococcal meningitis, one is felt to be under control. Serotype A was once responsible for major outbreaks, but there have been none since 1945 in North America. In the past 8 years, one-third of cases have been caused by Group B and two-thirds by C, the serotype that has health officials most worried because for the first time it is showing up in clusters of teen-agers.

To further complicate matters, the cause of the disease seems to rotate between B and C every 8 years. Diagnosing the disease can be a problem: viruses, fungi, parasites, and even allergic reactions to chemicals like ibuprofen, the active ingredient in some pain relievers, on rare occasions cause symptoms similar to those of meningitis. Regardless of which bacterium causes an infection, the early flu-like symptoms are similar: headache, fever, and vomiting. These may lead rapidly to high fever, drowsiness, stiff neck and body rash. The brain becomes inflamed, causing seizures, coma and death. The mere suspicion of meningitis signals a medical emergency. Infusion of high doses of antibiotics should begin within an hour or two of the patient showing up at the hospital. Even so, some patients will not live, regardless of the aggressiveness of the treatment, and others will experience brain damage or deafness.

In meningitis, all three causative bacteria cross the blood-brain barrier. Only glucose and a few other substances can seep from the blood through the blood-brain barrier and into the cerebrospinal fluid surrounding the brain. The meningitis bacteria are also shut out, but they contain molecules on their surface that mimic normal sugar molecules, therefore, they fool the blood-brain barrier, pass through into the cerebrospinal fluid and begin their virulent work on the brain. Massive amounts of antibiotics are prescribed with the hope that at least some will leak through the blood-brain barrier and kill the bacteria. Unfortunately, the cure begins to create its own havoc and the patient gets worse – possibly dies – as a result of the treatment.

Antibiotics, like penicillin, cause bacteria to destroy their own walls and burst, littering their environment with debris. The body, thinking that a high concentration of adult bacteria are present, sends out a last-ditch distress call for white blood cells to attack the invaders. Rushing to the brain side of the barrier, they force it to let in the white blood cells, causing further inflammation of the barrier and swelling of the brain. The antibiotics are more like tanks than stealth missiles. The answer appears to be steroids which shut down the immune system,

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1 The Globe and Mail, Science and Medicine, Saturday, June 25, 1994
combined with antibiotics. In the U.S. this treatment has become routine for children under 18 with meningitis.

PARKINSON'S DISEASE²

An estimated 500,000 to 1 million Americans have Parkinson's disease which robs people of control over their movements. It causes tremors, shuffling gait, and muscular rigidity; it can eventually incapacitate people who have it.

First symptoms may include fine tremors of one or both hands. Eventually, there is slowness of gait, dragging of feet, some speech impairment, and difficulty with balance. Stress can exacerbate the symptoms.

³Parkinson's disease causes an unexplained death of dopamine-producing cells in a deep brain structure known as the substantia nigra. Dopamine is one of the key chemicals used to relay messages between cells.

Treatment of Parkinson's has focused on drug therapy specifically L-dopa (levodopamine) and its derivatives. There are downsides to drug therapy, however, and patient tolerance to the drug meant that larger doses had to be taken. As Parkinson's progresses, the drug's efficiency can switch on and off, causing abrupt rigidity, hallucinations, and dyskinesias (arm waving, facial tics, and other involuntary movements).

In 1992, a Swedish neurosurgeon, Lauri Laitinen, published a report on a procedure called a pallidotomy in which a pea-sized hole is burned in the brain. According to Dr. Laitinen's report, 35 of his first 38 operative subjects had "complete or almost complete relief of rigidity", and 30 experienced "excellent or good long-lasting tremor relief". Other neurosurgeons report the surgery seems to be most consistently helpful in reducing dyskinesia and in somewhat easing rigidity. As pallidotomies are more widely performed, it is evident that there is a honeymoon period which generally lasts a few weeks. This postsurgical euphoria may have a very real effect on a disease whose symptoms are greatly influenced by stress. Younger patients (60 and under) tend to approve most; people with dementia seem to worsen after surgery, and patients who never responded to L-dopa don't seem to be helped at all.

Pallidotomies pose dangers beyond the risk of stroke that accompanies any brain surgery. Even a targeting mistake of just three millimeters can render the surgery ineffective, skew vision, or cause paralysis. Neurosurgeons predict that pallidotomies will be better in years to come and there will likely be new treatment options: transplants of cells engineered to replenish lost dopamine stores. But for now, pallidotomies offer a glimmer of hope.

²A.G. Reno Announces she has Parkinson's (newspaper article, 1995).
AMYOTROPHIC LATERAL SCLEROSIS (ALS)  
LOU GEHRIG'S DISEASE

a - prefix meaning not any, without  
myo - root meaning muscle  
troph - trophy meaning nourishment, growth  
ic - process of

amyotrophic - WITHOUT MUSCLE NOURISHMENT

Progressive neurological disorder affecting the spinal cord, brain stem, and large motor neurons of the cerebral cortex. It results in progressive degeneration of motor neurons as well as the progressive weakening and ultimate wasting of muscles.

Symptoms: limping, weakness of muscles, loss of muscle tone. Fibrillation of muscles with severe cramping. Usually affects the hands first, moving up the forearms and shoulders; attacking the lower extremities later.

Disease worsens steadily but slowly; muscles eventually atrophy. As the nerve cells in the brain and spinal cord degenerate, they send irregular impulses to the muscles beginning with the extremities and proceeding inward until patient is completely paralyzed. Progress of the disease is usually 18 months to 7 years.

Intelligence and awareness are not affected.

Chapter 17
SENSE ORGAN: EYE$^4$ and EAR

**Eye:** Combining Forms related to structures and fluid: p. 676-679; Combining Forms related to conditions: p. 679-80

Errors of refraction, p. 680-1.
Pathology p. 682-5.
Clinical procedures and abbreviations, p. 685-9.

**Ear:** Read through the anatomy & physiology p. 689-91 and look at the pathway of sound vibration
Combining forms, p. 693-5
Symptoms and Pathological conditions: 695-6
Clinical Procedures: p. 696-7
Abbreviations, p. 698
(add T&A – Tonsillectomy & Adenoidectomy).

**Chapter 17 – Exercises: E, H, I, K, P, and R**

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$^4$Modern Maturity, Jan-Feb 1996, p. 72.
Glaucoma
A leading cause of blindness in people over 60, glaucoma results from blockage of the passages that let fluid drain from inside the eye. Increased pressure from the excess fluid may damage the optic nerve.

Since most people with glaucoma have no symptoms, regular exams are essential. At risk are those who are African-American, diabetic, suffered a previous eye injury, are very nearsighted, or have a family history of glaucoma.

Laser and microsurgical treatment are used to relieve fluid buildup associated with glaucoma.

Cataract
A cataract is a clouding or darkening of the eye's lens that prevents light from properly reaching the retina. Primarily found in people over 55, cataracts usually develop in both eyes, often at different rates. Symptoms include:

- hazy, blurred, or double vision
- colors that fade or may seem yellowed or brownish
- increased glare problems
- increased need for more light to read clearly
- increased nearsightedness
- poor night vision
- frequent eyeglass prescription changes

There is no proven way to prevent cataracts, but glasses or contacts may initially improve vision. Ultimately, surgery followed by lens implants or special glasses/contacts may be necessary to restore adequate vision. Microsurgery is used to remove lens clouded by cataracts, after which a plastic replacement lens is almost always inserted to restore vision. Some cataract surgeries may require follow-up laser treatment to treat the cloudiness that sometimes develops several months after the initial surgery.
**Diabetic Retinopathy**
Over time, diabetes can cause changes in the small blood vessels that serve the retina, resulting in a gradual loss of vision. In its early stages, diabetic retinopathy may not cause vision symptoms, but as it progresses, cloudy vision, blind spots or floaters may become evident. In its most advanced stages, hemorrhages can occur and the retina may detach. The risk of severe disease increases for those with high blood pressure.

**Macular Degeneration**
Macular degeneration is the leading cause of central-vision loss among people over 60; it affects about one in three people over the age of 65. It results from changes in the macula (the area of the retina in the back of the eye which results, in the early stages, to an inability to see details or vivid colors to distorted vision in which objects appear to be the wrong size or shape and straight lines appear wavy or crooked. It’s a progressive disorder in which the macula is damaged by drusen, plaquelike deposits that grow beneath the macula, and by the growth of abnormal new blood vessels that can leak and leave scar tissue in the macula. Ultimately the disease leads to the complete loss of central vision. Like other disorders associated with the aging process, MD may be caused by a faulty immune system.

What causes this abnormal growth has long been a mystery, but now researchers in Florida think they may have some clues that may eventually lead to a better diagnosis and treatment. The scientists believe that the presence of drusen triggers the immune system to get rid of the unwanted deposits. The body sends out macrophages, cells that do this cleanup job. Investigators found that those who had high active macrophages had more severe disease than those with low macrophage activity. The low active macrophages safely remove the drusen deposits and promote healthy repair of the eye. The high active macrophages may in some way trigger the unwanted vessel growth. It’s not yet clear what promotes this activity, but genetic predisposition or exposure to viral infection may play a role. A previous study found that those who had prior infections caused by a common virus in the herpes family were more likely to develop severe age related macular degeneration. Measuring macrophage activity may lead to new ways to test the progression of ARMD and to the development of macrophage therapies.

Doctors use lasers to seal leaking blood vessels associated with both diabetic retinopathy and macular degeneration. While there is no way to restore central vision, visual aids are available that can enhance remaining peripheral vision. A head mounted, portable video device called the Low-Vision Enhancement System (LVES) provides both distance and close-up enhancement. High-powered spectacle-mounted lens systems, hand-held or stand-mounted magnifiers, and telescopic lenses for distance are examples of low vision aids that are widely available.

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5 Canadian Living, March 2003, p. 43-44
Corrective Surgeries

Refractive errors like myopia (nearsightedness) are usually treated with corrective lens.

**LASIK** (Laser Assisted In Situ Keratomileusis): Works best for moderate myopia or mild astigmatism. Laser reshapes the outer cornea to redirect light. Vision improves within 24 hours.
Success/failure rate: 20/40 vision or better in 95% of patients; 20/20 vision in 65% of patients who had moderate myopia; 10-20% need enhancement surgery.
Possible downside: corneal flap damage; distortion caused by irregular healing; undercorrection, overcorrection or induced astigmatism. Light sensitivity and tearing for first 24 hours. May need glasses for night driving or have may glare/halo effect for a few months.

**PRK photorefractive keratectomy** (PRK). Works best for mild to moderate myopia; mild astigmatism (then it's called PARK: Photo Astigmatism Refractive Keratology). In this procedure, the cornea’s surface layer is reshaped using a laser-delivered ultraviolet light beam.
Success/failure rate: 95% achieve 20/40 vision or better; 66% achieve 20/20.
Potential downside: possibility of severe post-operative pain; foreign body sensation; dryness; itchiness; light sensitivity; halo effect at night.

Researchers at Duke University in Durham, N.C. are investigating the first-ever light activated surgical glue that could replace sutures in eye surgeries. Instead of closing a wound using stitches, the surgeon applies the biological adhesive (biodendrimer glue or bioglue) which hardens a few seconds after being exposed to a gentle laser. Although the glue is being tested only on eyes, it may be useful on other body parts.

There are several advantages to using this glue, which is not yet widely available. For one, it allows the surgeon to better control the rate of wound closure. It takes less time than stitching, and it may be safer because sutures can lead to infection. Finally, bioglue is absorbed by the body so it may lead to more even healing, and possibly less scarring, than stitches.

The new adhesive is also superior to other adhesives that are already being used in wound healing. The current glues harden on contact, can be cumbersome and stiff, and have been associated with complications such as cataract formation.

Bioglue may prove to be particularly useful for repairs to corneal lacerations. These procedures are fairly common eye emergencies that can lead to blindness. It is also being tested for use in other eye wounds.

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7 Canadian Living, March 2003, p. 43
TYMPANOPLASTY/ PE Tube

Every year more than half a million American children have drainage tubes surgically implanted in their ears to combat persistent infections. The procedure, known as tympanoplasty, may not be as common as the tonsillectomy was in the 1940's, but it now ranks as the nation's leading childhood operation. A new study indicates it is being vastly overused.

In reviewing 6,000 scheduled tympanoplasties, a team of experts, led by Harvard pediatrician Lawrence Kleinman, found that fewer than half were clearly justified. Even making "generous assumptions" about the likely benefits, the researchers found that a quarter of the proposed operations were inappropriate, while another third were as likely to be harmful than helpful to the recipients.

Tube placement isn't a risky procedure, but it costs $1000-1500 and sometimes scars the eardrum, causing a partial loss of hearing. Studies show that the benefits outweigh the risks if a child's middle ear has produced sticky fluid for more than four months despite treatment with antibiotics. For less virulent infections, treatment with antibiotics is usually a cheaper, safer alternative. Parents needn't panic about ear tubes already in place since they provide drainage for six months to a year, then come out by themselves.

These new findings could help families make better informed decisions while reducing health care costs.