BIOMEDICINE

From our reporter at the spring meeting of the Association for Research in Vision and Opthalmology in Sarasota, Fla.

Porphyrins and a cancerous retina

Porphyrins are compounds that, in the presence of light, can kill cells. They also selectively locate in cancer cells. So Theodore W. Sery and Rosemary McFall of Wills Eye Research Institute in Philadelphia exposed cancerous cells of the retina—the part of the eye that provides sight—to a particular porphyrin—hematoporphyrin—in the presence of light. The cells died. When they exposed control retinal cell culture to hematoporphyrin without light, the cells remained living and healthy. So hematoporphyrin appeared to be a drug which could kill cancerous retinal cells but leave healthy ones untouched.

Then they gave the chemical to rabbits with cancerous retina and report tentatively that it can inhibit the tumor. They will soon be ready to try the compound in clinical trials. They believe that it may also be effective against melanoma of the eye.

Rapid detection of eye infection

Endophthalmitis, inflammation of the eye leading to destruction of the eye, unless quickly treated, is one of the devastating complications of eye surgery. Gram-negative *E. coli* bacteria are often responsible. In the past, it has taken 24 hours to diagnose this condition. Now an assay that can diagnose it in one hour or less is reported by Cameron Parrett and his coworkers at the University of California at Los Angeles. It is called the Limulus lysate assay. Gram-negative *E. coli* were injected into the vitreous cavity of rabbits' eyes. Fluid from the vitreous and aqueous humor of the eyes were then withdrawn and submitted to the assay. The assay detected protein endotoxin made by the *E. coli* with 100 percent accuracy.

The researchers will now test the assay in clinical trials and will also try to see whether it might detect endophthalmitis caused by some other kinds of gram-negative bacteria.

Earliest vertebrate vision

Two hundred million years ago, there was a widely distributed order of fish called the holosteans. Today only two genera of this order have survived—the bowfin and the gar.

For the first time, holostean vision has been investigated by Dwight A. Burkhardt of the University of Minnesota. He reports that the holosteans are the earliest vertebrates in which color vision has yet been discovered.

Burkhardt studied the retinas of a gar and a bowfin and found that both contained light-sensitive pigment cells that are excited by both red and green. The fish also contained ganglion cells sensitive to these colors. Ganglion cells provide a link between excitation of retinal pigment cells and the optic nerve, which in turn sends a signal into the brain that provides a visual image. Ganglion cells in modern vertebrates do not play a direct role in color vision.

Insulin in the eye

Diabetics suffer from insulin deficiency. They are also susceptible to diabetic retinopathy (damage to the retina of the eye) and to cataracts (damage to the lens of the eye). Some vision researchers are anxious to learn more about the possible involvement of insulin in the eye in these two eye diseases.

Stephen Feman and his colleagues at Albany Medical College analyzed the insulin level in the fluids that bathe the retinas of the eyes in six nondiabetic patients with retinal detachments and in four diabetic patients with retinal detachments who had been receiving insulin therapy. He reports that there was no detectable insulin level in the fluid of the six nondiabetics nor in three of the diabetics' fluid. The fifth diabetic had some insulin in his fluid, but even that was a low level. Thus insulin does not appear to play a major role in diabetic retinopathy.

However, altered availability of insulin to the lens of the eye might well play a role in diabetic cataracts, if preliminary animal studies are any indication. For the first time, insulin has been accurately measured in the aqueous humor of the eye (which makes insulin available to the lens) by John B. Coulter and Robin L. Knebel of Scott and White Memorial Hospital in Temple, Tex. They found that in healthy rabbits insulin in the bloodstream reaches the aqueous humor, at least in small amounts. They will now try to determine whether, in diabetic rabbits, there is altered availability of insulin to the lens.

Muscle transplant corrects eyes

Squint eye (strasbismus) consists of the inability of one eye to see properly because of the imbalance of muscles of the eyeball. When surgeons operate on a squint eye so that it can achieve full range of motion, they often use artificial materials to lengthen the muscle to the eye. Now a possibly superior alternative has been found—eye-muscle transplant.

Muscles have been successfully transplanted in areas of the body other than the eye. Roger L. Hiatt of the University of Tennessee in Memphis attempted to see whether a muscle transplant to the eye might work in dogs. He fused a muscle from another part of the body to a muscle in the eye. As a result, movement of the eye became reasonably full. Twenty-eight days after surgery, microscopic examinations showed that wound healing was complete and that there was no rejection of muscle or its extrusion.

The procedure was then performed on three human patients and successfully corrected their eyes.

T cells and eye disease

Thousands of Americans inhale a fungus called *Histoplasma capsulatum*. It can harm different parts of the body, including the eyes. Most of the victims have positive skin reactions to histoplasmin, an antigen made by the fungus, which indicates a cellular immunity to the disease. Antibodies to the fungus have seldom been found in the bloodstream, indicating that humoral immunity is not involved.

To further underscore the role of cellular immunity (white cells known as T cells) in ocular histoplasmosis, Walter M. Jay and his colleagues at the University of Chicago cultured T cells from patients with the condition and also from some healthy subjects. None of the healthy persons' T cells were stimulated by histoplasmin antigen. However, T cells from three of the seven patients were, and these were the patients with the most severe eye disease. So T cells are definitely involved in ocular histoplasmosis.

T cells, the researchers speculate, may actually help the disease rather than fight it by overreacting, that is, providing hypersensitivity to the histoplasmin antigen.

When butterflies see red

Few insects have light-sensitive pigment cells in their retinas that detect the color red. But some butterflies do, reports Gary D. Bernard of Yale University. Butterflies were already known to see blue and green. It makes sense that they can see three colors, Bernard believes, since they are attracted to brightly colored flowers.