

Cyclosporine brings tears to dry eyes

A form of "dry eye" that causes constant pain and gradual loss of sight, apparently due to an autoimmune response, may be treatable with minute quantities of the immune-suppressing drug cyclosporine applied directly to the eye, medical researchers reported this week.

While many cases of dry eye are caused by vitamin A deficiency or facial nerve damage, evidence indicates the disorder also can stem from destruction of the tear glands by the body's own immune cells. The immune reaction can occur suddenly or progress slowly, leading to corneal inflammation, infection and ulcers. Often associated with rheumatoid arthritis, this type of dry eye afflicts an estimated 3.2 million people in the United States, according to the researchers, and many more have a mild form of it. Until now there has been no treatment for the cause of the disorder, called keratoconjunctivitis sicca, although its symptoms can be controlled, according to Renee Kaswan of the University of Georgia in Athens.

"It was thought that eye disease caused by autoimmunity would require immunosuppression of the entire body," Kaswan says. But cyclosporine's toxicity to the kidneys when given orally caused most researchers to dismiss it as a treatment for dry eye. However, when Kaswan and her colleagues tested cyclosporine eye drops in dogs, they found the drug substantially restored tearing, reduced corneal scar tissue and speeded the healing of corneal ulcers. In addition, they say, it may prevent further tear-gland destruction in all but in the most advanced cases.

Even in dogs whose tear production did not improve, the researchers observed a "marked reduction" in corneal scarring. They have successfully treated dogs for up to two years without adverse effects, and when they stop the drug, the dogs' tears dry up within a day or two, they say. By applying the drug directly to the damaged area, the researchers were able to reduce dosage to 1 percent of the oral dose. Kaswan reported the group's findings at a seminar in Arlington, Va., sponsored by Research to Prevent Blindness.

In a pilot study nearing completion at the University of Glasgow in Scotland, a cyclosporine ointment used to treat 12 people with dry eye has produced encouraging improvement, Kaswan says. A larger clinical trial at four U.S. medical centers is scheduled to begin early next year.

"It works in dogs. If equivalently effective in people, it will be a breakthrough," Kaswan told SCIENCE NEWS. — C. Eron

Slip-sliding away the rough edges

Because the geologic clock moves so slowly, scientists studying faults such as the San Andreas can only witness a moment or two in the life of the fault. It's something like an ornithologist taking snapshots to glean truths about the growth of owls: One snapshot tells little, but a whole photo album featuring owls of all ages can reveal some trends. Using the geological equivalent of such a technique, a fault researcher reports evidence that certain types of faults actually evolve with time, becoming smoother—and possibly more destructive—as they mature.

In a study of seven quake-generating faults in California and Turkey, Steven G. Wesnousky from Memphis (Tenn.) State University focused on so-called strike-slip faults. Motion on these faults resembles two trains passing in opposite directions. The two sides of the fault slip past each other with little vertical motion. The offset of such faults is the total distance one side has moved in relation to the other during the lifetime of the fault. The classic strike-slip San Andreas runs about 1,000 kilometers long and has built an offset of about 250 km over the last 5 million years.

Wesnousky found that all seven faults in his study fit the same growth pattern, he reports in the Sept. 22 NATURE. The ones with the greatest offsets were the smoothest; the faults ran hundreds of kilometers without an appreciable break. Conversely, those with the smallest offsets were disjointed and broken into short segments. A fault segment

might continue for 20 km, then stop and start again a few kilometers to the right or left.

This trend suggests that as strike-slip faults move, they smooth out the steps along their course. Laboratory models have suggested this intuitively logical relationship, and the concept has long circulated among geologists. Yet before now, no one had tested to see if real faults actually fit the theory.

"Steve has made some very simple observations that should have been made a long time ago," says Richard H. Sibson of the University of California at Santa Barbara. He adds that not all researchers will agree with Wesnousky's suggestions. Some believe faults can create steps as they evolve.

Steps on strike-slip faults play an important role in limiting the size of earthquakes. Quakes occur when a patch of the fault breaks and the rupture runs along the fault. These ruptures usually stop when they reach a sufficiently large step through which they cannot continue.

The relationship between smoothness and offset seems to suggest that as faults develop, they can sustain larger earthquakes. However, Wesnousky cautions that "not all earthquakes are going to stop at steps, so [the relationship] is not a panacea for predicting the strength of earthquakes." Other factors, such as the local subsurface stress and the amount of groundwater lubricating the fault, help determine how far a rupture will spread. — R. Monastersky

New view of fatty foods in diabetics' diets

Patients with non-insulin-dependent diabetes mellitus (NIDDM) traditionally take dietary advice with a grain of salt. For years, they've heard researchers present conflicting conclusions about the ideal balance of dietary carbohydrates and fats. Research released this week contradicts anew some current recommendations of the American Diabetes Association. While the study is deemed "preliminary" by its authors, their findings suggest the need for a much larger clinical trial to settle the issue.

Weight loss and dietary modification are the cornerstones of therapy for patients with NIDDM, who have abnormalities in both glucose and lipid metabolism and are at increased risk of heart disease. The American Diabetes Association recommends a diet low in cholesterol and saturated fats to lower blood levels of low-density lipoproteins, a major risk factor for coronary heart disease. In part to make up for the loss of calories from such a diet, it also recommends a high

intake of complex carbohydrates, including beans and grains. But new research suggests these patients might be better off replacing saturated fats not with carbohydrates but with monounsaturated fats such as olive oil.

Abhimanyu Garg and his colleagues at the University of Texas Southwestern Medical Center at Dallas compared various measures of diabetic health—including blood sugar levels, insulin requirements and levels of "good" and "bad" cholesterol subtypes—in 10 NIDDM patients whose diets were strictly controlled over a 10-week period in a metabolic-monitoring hospital ward. Compared with the low-fat, high-carbohydrate diet currently recommended, a diet low in carbohydrates and high in monounsaturated fat produced significantly better control of blood sugar levels and a superior balance of cholesterol subtypes, they report. The research appears in the Sept. 29 NEW ENGLAND JOURNAL OF MEDICINE. — R. Weiss