Biomedicine

Kathy A. Fackelmann reports from Universal City, Calif., at the Science Writers Seminar in Ophthalmology

Nocturnal risks for the eyes

For people with certain eye disorders who are also hypertensive, taking high blood pressure medication shortly before bedtime may cause a sudden loss of eyesight or accelerate a more gradual process of vision loss, reports ophthalmologist Sohan Singh Hayreh of the University of Iowa in Iowa City.

For three years, Hayreh has kept track of blood pressure in patients with "stroke" of the optic nerve or glaucoma, including "normal-pressure" glaucoma. (People with normal-pressure glaucoma have normal fluid pressure in the eye.) All types of glaucoma can gradually reduce eyesight; stroke of the optic nerve can cause an abrupt loss of vision.

Scientists know that healthy people experience a drop in blood pressure during sleep, generally without ill effect. However, Hayreh discovered that on average, people with these eye disorders experienced much steeper declines in nocturnal blood pressure.

Indeed, nighttime blood pressure measurements proved lower in study participants who suffered progressive visual deterioration than in those who did not experience progressive vision loss. Patients taking hypertension medication in the evening appear to be at particular risk of declining vision, Hayreh says.

A drastic drop in nocturnal blood pressure may be the final insult that pushes such individuals toward the brink of blindness, Hayreh suggests. He speculates that very low blood pressure may deprive the optic nerve of nourishing blood. Without adequate blood flow, parts of the optic nerve die, causing fading vision and eventual blindness. In both glaucoma and stroke of the optic nerve, scientists believe that loss of vision is due to optic nerve damage, Hayreh adds.

Hayreh says many cardiologists tell their patients to take hypertension drugs shortly before they go to sleep, a practice that prevents side effects during the day. But for people with glaucoma or a history of an optic nerve stroke, this may be unwise, he says. If such people already show an abnormal drop in blood pressure during sleep, taking drugs to lower the pressure even more might further reduce blood flow to the optic nerve.

Hayreh suggests that people with eye disorders consider asking their doctors to recheck any diagnosis of hypertension. Some people are erroneously labeled as hypertensive simply because their blood pressure rises out of nervousness when they visit the doctor's office, he notes.

Herpes gets in your eye

Herpes simplex type I, the virus that causes cold sores around the lips, can prove nasty if it gets into the eyes.

While cold sores are common, only a small proportion of those who get them ever develop the eye infection. Sequestered in nerve cells, the virus activates periodically. When the infection repeatedly flares up in the eye, it can scar the cornea.

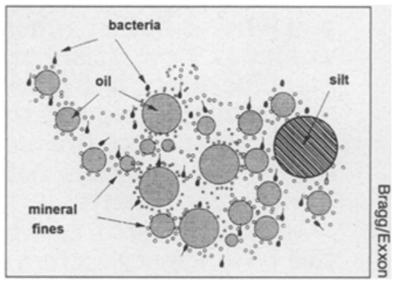
Right now, the only way to treat herpes infections is with expensive antiviral medication. Even with treatment, scarring can progress and lead to a loss of vision, says Anthony B. Nesburn of the University of California, Los Angeles. Nesburn thinks a therapeutic vaccine may help, and he is testing one in rabbits. Rather than preventing herpes infection, such vaccines would keep the virus under control.

Nesburn began by infecting the eyes of rabbits with a strain of herpes simplex I. Like humans infected with the virus, rabbits can develop recurrent eye disease. Nesburn next gave each animal an injection of the experimental vaccine. He found that the vaccine reduced the incidence of active infection by 50 percent.

The results may pave the way for trials of a similar herpes vaccine in humans, Nesburn says.

Environment

Beached *Valdez* oil fled in a floc



Structure of oil-clay floc.

Shortly after the 1989 *Exxon Valdez* accident dumped 10.8 million gallons of North Slope crude into Alaska's Prince William Sound, storms, tides, and work crews began washing the beached petroleum into the sea (SN: 2/13/93, p.102). When little of this oil showed up in tidal or sea sediments — even near beaches that had been heavily polluted — spill-assessment teams began puzzling over its fate. Several studies now suggest that an emulsified mixture containing oil, clay, and sometimes silt was probably flushed far out to sea in the form of buoyant microscopic particles.

Exxon scientists discovered hints of this while assaying natural rates of *Valdez*-oil breakdown by Alaskan microbes (SN: 4/17/93, p.253). James R. Bragg of Exxon's research unit in Houston reported findings from follow-up studies last week in Atlanta at a meeting of the American Society for Testing and Materials.

In one study designed to simulate the effects of waves and tides, contact with seawater gave the black, sticky oil "the fluffy appearance of a flocculated emulsion" that no longer strongly adheres well to sediment, Bragg reports. Seawater made up about 80 percent of these cloud-like aggregates. The rest consisted largely of mineral grains stably bound to oil droplets 1 to 10 microns in diameter.

The concept of oil-sediment flocculation is not new. However, Bragg says, some geochemists expected the process to affect oil at sea — and especially to foster its sinking. Quite to the contrary, his new research suggests that in Alaska the process not only affects mainly beached oil but also virtually guarantees that such oil will float to the surface or remain suspended in the water. And the older (more weathered) the oil, the more likely it will emulsify, the studies indicate.

The new studies also have many important implications for understanding the disposition of the spilled *Valdez* oil.

For instance, the Exxon scientists found that flocculation can increase the area of the oil-water interface — sometimes by up to 1,000 times. This increases the likelihood that the more toxic, water-soluble aromatic chemicals will leach from the oil, Bragg says. Moreover, it expands the area available for hydrocarbon-hungry bacteria to latch on to, thereby facilitating the oil's breakdown. Indeed, water taken from oiled beach sediment revealed that active bacteria usually make up part of any naturally produced oil-clay floc.

Flocculation also helps explain another formerly puzzling observation: the relatively rapid disappearance of oil from even quiet, sheltered bays. Most researchers expected oil to persist in these areas, where abrading waves and sediment movement seldom occur, even during storms. But experiments by Bragg and his co-workers showed that waves too weak to move sediment sands could still drive the flocculation-fostered removal of oil, initially at rates of 3 percent per hour. Bragg says it now appears that every ebb tide may remove some oil — even after heavy weathering has rendered oil tarry and very insoluble in water.

The unusually high levels of "mineral fines" — clay "flours" produced by local glaciers — along the southern Alaskan shoreline contributed to the unusually efficient emulsification of beached *Valdez* oil, the Exxon studies indicate. They also suggest that adding such flours to shores with low clay contents might augment the natural cleanup of oil spills in the future.