What is age-related macular degeneration? The retina is the light-sensitive membrane in the back of the eye. Age-related macular degeneration (AMD), the macula, which is the part of the retina responsible for fine vision, becomes unhealthy. The decline in central vision, found most commonly in those over the age of 60, can result in the inability to read, recognize faces, or even drive. There are two types of AMD—dry and wet. In the dry form, the macula loses its sensitivity to light gradually and may take years before fine vision is lost. The wet form results from the growth of abnormal blood vessels under the retina, which may leak fluid and blood. This can cause permanent damage to light-sensing cells in the retina, giving rise to blind spots in the central vision and distortion, for example, straight lines may look wavy.

What is the treatment for age-related macular degeneration? There is no known treatment that can prevent AMD at present. The progression of dry AMD may be slowed through diet changes to include more fruits and vegetables, choosing healthy unsaturated fats, eating whole grains and adding fish high in omega-3 fatty acids. Wet AMD can be treated with laser surgery, photodynamic therapy, and injections into the eye. None of these treatments are a permanent cure for wet AMD and the disease and loss of vision may continue to progress. New research is being conducted by USC Roski Eye Institute researchers on stem cell-based transplantation with phase I clinical trials underway. Researchers with the Age-Related Eye Disease Study (AREDS) at the National Eye Institute are studying nutritional supplement formulations—called AREDS and AREDS2—to see if they can reduce the risk of developing advanced AMD.

What is retinitis pigmentation and is there treatment to cure it? Retinitis pigmentosa (RP) is a hereditary eye disease whose symptoms appear between the ages of 10 and 14. With RP, degenerating photoreceptors in the eye cause the loss of night vision and peripheral vision first, then central, detailed, color vision. Gene therapy and stem cell transplantation are being studied as treatment methods. The only U.S. Food and Drug Administration-approved treatment is the Argus II retinal prosthesis—first implanted in patients at USC Roski Eye Institute—which restores the sense of sight. The retinal implant system consists of an eyeglass-mounted camera and an implanted electrode retinal stimulator. The stimulator, implanted on the eye, relays signals from the external camera to the retina via small electrical impulses, which triggers signals in the retina that are passed to the brain via the optic nerve. The brain is then able to process the signals into a visual picture.

What is retinal detachment and its risk to people who are nearsighted? Retinal detachment is a separation of the retina from underlying layers of tissue at the back of the eye. There are a variety of causes for a detachment. Retinal tears may occur because of aging. The vitreous gel inside the eye may shrink and pull on the retina causing a tear or hole. Near sightedness, previous intraocular surgery, previous retinal detachment in the other eye and family history of retinal detachment all increase the risk. People who are nearsighted may have thin retinas, which increases the risk of retinal detachment. Regardless of whether you are nearsighted or not, if you see floaters, flashes of lights or part of your vision is blocked as if by a curtain, you should see an ophthalmologist immediately and receive a detailed examination.

How is vision affected by diabetes? Diabetes usually affects vision by causing retinal swelling, bleeding inside the eye or retinal detachment. The best way to prevent vision loss is to control blood sugar and blood pressure and quit smoking. An important way of preventing vision loss is with early detection of diabetic changes in the back of the eye. By having regular appointments with an ophthalmologist, appropriate treatments can begin before vision is affected.

The patient asks, “If I need a medicine injected in my eye for macular degeneration, is it going to hurt?” This is usually quickly followed by “Where exactly are you going to stick that needle?” Patients can be set at ease by knowing that the eye will be anesthetized beforehand with numbing medication for several minutes prior to the actual injection. Patients may still feel a mild and quick pinch as the needle penetrates the wall of the eye. The small needle is passed through the white of the eye and aimed toward the middle cavity of the back of the eye, avoiding all the important structures that contribute to vision. We also use sterilizing medication to cleanse the surface prior to the injection, which can be moderately irritating (sensation that something is still on your eye) and may have lingering effects several hours after. What irritates patients the most is the variable recovery later that day due to the effects of the anesthetic agent, which is necessary in order to avoid the low risk of blinding eye infections.

The patient asks, “How are you going to fix my macular pucker/scleral membrane?” The macular pucker is a very thin layer of abnormal tissue found on the surface of the retina. In vision, light passes through the cornea and lens of the eye and comes into focus on the central retina in the macular region. The abnormal macular tissue distorts the retina, such that patients see images in a garbled fashion. Straight lines on a cross-word puzzle may appear wavy, blurry, or like you are “looking through a glass of water.” The goal with vitrectomy and membrane peeling surgery is to remove this abnormal tissue from the surface of the retina. A microscope is used throughout the surgery to achieve the type of magnification required to safely remove the thin macular pucker tissue without damaging the underlying normal retina tissue. This surgery is performed typically with the patient awake and in 40 minutes or less. One nice side-effect of this surgery is that any “floaters” the patient had before the surgery are largely eliminated.

Speaking of floaters, what are they? Can anyone have chronic floaters removed? Can Laser, eye drops, medications, or vitamins work to safely remove floaters? Floaters are rod-shaped condensations in the otherwise clear vitreous jelly that fills the entire back portion of the eyeball. As one ages, the gel starts to degenerate, lipozyme, and begins to slowly pull away from the wall of the eye creating opaquie areas. As light passes through the eye, it hits these opacities before illuminating the retina, thereby casting shadows on the retina. Patients perceive these as physical objects, often described by patients as mosquitoes, insects, or spider webs in their vision. The floaters (mobules) are mobile and can move, with physical activity, eye movements, or changes in body position. There are no eye drops, medications, or vitamins available that can safely eliminate the annoying floaters. Fortunately, the floaters are not dangerous to one’s vision. Laser is one method of trying to eliminate floaters, but is an unpopular approach and is discouraged. Typically, the laser simply pushes the floaters around instead of eliminating them altogether. The laser is associated with the risk of retinal tear, retinal detachment, and bleeding inside the eye. Vitrectomy is an effective way to remove floaters, but is seldom recommended because there are rare complications that can occur and, for most patients, these risks are not justifiable. We will occasionally perform the surgery for patients whose livelihood is dependent upon crystal clear vision (think: gemologists, astronomers, etc.) and who acknowledge the risks of the procedure. If floaters persist suddenly, especially associated with the sensation of flashes of light in the peripheral vision and/or a curtain of darkness being pulled over one’s vision, then the patient should immediately be examined for the possibility that a retinal tear or retinal detachment is present.