Dry eye:

Dry eye is a serious problem that limits good vision in many millions of sufferers and only very recently has medical research begun to find ways to treat the underlying problem as opposed to a “band-aid” approach. To develop a sense as to what it means to have dry eyes, imagine the events that you will read about in the next paragraph, as they actually occur every day in millions of people with slight differences (1). It is characterized by a loss of an adequate amount of tear fluid that is available on the surface of the eye. The tears are a complex fluid, critical for the health of the surface of the eye and for good vision. Tears are made in a specialized gland, which undergoes changes with age and hormonal status so that it loses functionality. Adding to that is an oily layer over the tears that helps to lessen the evaporation of this very thin layer which is only about a third of the thickness of a hair. The oily layer is from a different set of glands located in the eye lids, and in Asia there is a great deal of inflammation of these glands, bringing an additional complication to treating dry eye disease.

You are about 45 years of age, female and in good health. On a morning after awakening you find that you are noticing your eyes, probably for about the first time in your life, and that there is an unpleasant, uncomfortable feeling coming from somewhere on the front of your eye. This is dry eye. It is unsettling as throughout most of your life you have not thought about how your eyes have felt, except for perhaps a brief encounter with something in your
Dry eye will likely progress, but to different ends in people—women being affected more, but men are certainly included. Additional symptoms are blurring of vision, and blinking may help excess tears in the early stages; later it may be more of a burning sensation, and for a few, it is very debilitating, sight threatening.

**Does this really affect our lives?**

The medical term is lacrimal keratoconjunctivitis; however, even eye doctors tend to call it dry eye. Quality of life issues are important in our aging population: We all would like to be as functional as possible for as long as possible. In a recent publication, my colleagues and I discuss many issues regarding dry eye that relate to the impact on quality of life. (1) Dry eye does impact the quality of life and patients have said that it is similar to chronic low back pain. However, there are some medical issues such as an increased number of eye infections, and ulcers of the front of the eye that can make this much more serious. Of course, dry eye has different levels of the disease, with severe dry eye leading to more serious eye problems. Sjogren’s syndrome, an autoimmune-based inflammation that is associated with extreme dryness of the eye and mouth and other mucous membranes.

**How big is the problem?**

In the US with a prevalence estimated at 6%, there are more than 7 million people with dry eye. However, this is chronic and the duration of the problem will be from 10–30 years. Both age and sex affect the occurrence of dry eye. However, surprisingly in Asia dry eye may be a greater problem than in the US. Studies in India and Indonesia suggest that 18% to more than 20% of respondents, respectively, had symptoms of dry eye. (2-6) From Taiwan, a study in more than 2000 people over 65 years of age found that the incidence was over 33%. (2)

**New Therapies:**

Recently we have begun to understand more about the problems associated with dry eye, and we know that it has an inflammatory basis. (7,8) Associated changes occur to ocular surface cells, particularly of the cornea, the clear tissue through which light passes for imaging on the retina. For many years a tear substitute was the only answer available. These are made by many companies such as Bausch and Lomb, Allergan, Santen and Alcon and are commonly available in pharmacies without prescription. These companies have worked for years to understand the tear fluid complexities to try and duplicate the ingredients for use in dry eye patients. However, this has not been satisfactory as some of the underlying problems such as inflammation have not been remedied by tear substitutes.
and for most patients their dry eye problems are only partly relieved. There are problems in carrying out clinical testing of new drugs in this area as there are few good objective ways of measuring the severity of the disease. At the Singapore Eye Research Institute as part of our proteomics research, we are discovering new biomarkers for dry eye and other ocular surface inflammatory diseases so that more accurate new drug evaluation can be carried out.

New therapeutics directed against what is known of the underlying biological problems include, cyclosporine A, a drug that suppresses the inflammatory aspects of dry eye and thereby improving the health of the ocular surface and hyaluronate drops that may help to improve the condition of the cells on the surface of the eye.

Allergan has developed cyclosporine at a concentration of 0.05% that is available by prescription for use for moderate to severe dry eye. However, as Allergan points out it requires some time of application of these drops usually several weeks before there is a patient benefit, and some type of additional therapy may be of benefit. This new US Food and Drug Administration (FDA) approved drug, Restasis, does appear to lessen the inflammatory nature of dry eye and lead to increased tear production. The Santen method of packaging sodium hyaluronate, a naturally occurring material made by the body and found in joint fluid where it acts as a lubricant and shock absorber. Santen makes this at a concentration of 0.1% for drop application onto the front of the eye. It may be useful for making the cells healthier and relieving some of the discomfort associated with dry eye. However, the ophthalmologist may also prescribe other types of medications which can help to lower the inflammatory nature of dry eye. These medications are best taken for short periods of time. More unusual therapies have been used with some success such as extracting the serum of the patient and using that as a drop. It is known from other studies that serum from blood has special properties but it has been difficult to find out how these properties are developed.

**Even better therapies ahead:**

As stated at the beginning of this article, the fundamental problem with dry eye is a decrease in the ability of the primary gland, which makes tears, to keep up the necessary amount of tear secretion. These new therapies do help to protect the surface of the eye, decrease the discomfort and optimize what tear producing ability that remains, but they are not able to change the secreting gland back to the original condition. So there are challenges ahead that medical research is continuing to work toward, and ultimately making the gland function as a normal gland would be optimal. Other approaches that are under examination seek to improve limit the evaporation rate of the tears as well as other means to decrease the inflammation. Certainly, Asia with the high levels of dry eye and associated diseases will become a more active clinical trial setting for new dry eye therapies and more active in research in this area.
References


McDonald CC, Kaye SB, Figueiredo FC, Macintosh G, Lockett C. (2002) A randomised, crossover, multicentre study to compare the performance of 0.1% (w/v) sodium hyaluronate with 1.4% (w/v) polyvinyl alcohol in the alleviation of symptoms associated with dry eye syndrome. Eye 16(5): 601-7.