

## GUEST EDITORIAL

# The Changing Times in Dry Eye Research

The last 2 years in dry eye research have been memorable; in fact, they have been a culmination of over a decade of effort by a growing group of passionate and steadfast individuals in the clinical and research dry eye community. Some of the fruits of these efforts are reflected in this special dry eye issue of *Optometry and Vision Science* (OVS), and represent several of the initiatives and recommendations found in the recently published report(s) of the International Dry Eye Work Shop (DEWS).<sup>1-6</sup> The recent growth of our knowledge in the field of dry eye can be assessed by comparing the DEWS reports to what is arguably the most read and cited article in the field of dry eye research, the 1995 NEI/ Industry report on clinical trials in dry eye.<sup>7</sup> The NEI/Industry report is 12 pages in length, including references. At the time it was published, it represented the significant effort put forth by researchers in defining the disease, classifying the condition, and defining future research directions. The current DEWS report (an entire journal issue, 125 pages in length) demonstrates the significant advances in the field over time, and like its predecessor, provides a dry eye research road map for the next generation of tear film and ocular surface clinicians and researchers.

## Who has Dry Eye and How is it Defined?

It is exciting to see that many of the articles contained in this OVS issue seek to address cutting-edge areas mentioned within the DEWS report, as well as to provide new information, which will continue to fill gaps in our knowledge of the condition. In 1995, there was minimal knowledge of the prevalence, incidence or risk factors associated with the disease.<sup>7</sup> In this OVS issue, the 10-year incidence of dry eye in an older population is presented. This is a group of patients likely to be seen in clinical practice, and as this study demonstrates, one which will continue to grow over in the upcoming decades.

Although we have greatly increased our knowledge of the patient characteristics in dry eye, our understanding of the natural history of the condition is limited. In some regards this challenges researchers to define dry eye patients consistently in clinical trials, as well as creates an environment of cat-and-mouse in drug development for new therapeutics for the condition. Dry eye is often discussed as a symptom-based disease, yet, there is some disagreement as to what symptom instrument should be accepted to classify dry eye, as well as to track changes over time or with treatment. In this OVS issue, symptoms are used in the diagnosis paradigm for classification in several studies, and several dry eye surveys are discussed. Several of the available surveys can be utilized in the diagnosis, or possibly management of the condition. Of particular interest, related to symptomatology, is the impact on quality of life.

Compelling data on the impact of dry eye on every day life symptom survey is presented here, which attempts to emphasize the impact of the condition on a patient's daily quality of life. The impact of the dry eye condition on the day to day activities in a patient's life will continue to garner clinical and research interest, as we struggle to define appropriate endpoints for clinical trials.

## Core Mechanisms

The DEWS definition and classification report highlights four "core mechanisms" in the etiology of this multifactorial condition: tear instability, tear hyperosmolarity, association with inflammatory pathways, and ocular surface damage. It is unclear how the core mechanisms result in the symptoms reported by patients, but a better understanding of the inter-relation of these mechanisms is needed. For example, the role of inflammation in dry eye is a very hotly debated topic at the forefront of the field. Unfortunately, research in this area has been limited in the past, and several researchers are making significant contributions in this area. In this OVS issue, two articles highlight the evaluation of biochemical tear components, including inflammatory mediators such as cytokines, and predominant tear proteins lipocalin and lysozyme. This type of research is a challenge in that tear samples, especially those collected in dry eye patients, may be insufficient in volume for many of the commonly utilized techniques for protein analysis, thereby requiring sensitive, not widely-available instrumentation. We expect more cutting edge research like this over the next few years as these techniques become more widely accepted and available.

## Contact Lens Dry Eye

Four articles in this OVS issue discuss contact lens related dry eye, and while it can be debated as to whether contact lens dry eye is a separate entity, readership of this journal is well aware of the frequent symptoms and clinical characteristics of this patient group for whom which we care. Of specific interest in the contact lens research community is the impact of materials and care solutions on dryness symptoms, tear component changes, and ocular surface damage, as well as improvement in the condition with changes in any of the previously mentioned parameters. In the evaluation of factors associated with contact lens discontinuation, patient-reported dryness drives contact lens discontinuation<sup>8</sup>; therefore, a better understanding of the role of these factors in lens-related dry eye is a step in preventing contact lens drop-out.

## Meibomian Gland Disease

Recently, an international task force used the Delphi technique to delineate diagnosis and treatment algorithms for dry eye.<sup>9</sup> Of notable interest, lid disease (anterior and posterior blepharitis) was considered separate from dry eye, but still under the umbrella of “dysfunctional tear syndrome.” In contrast, the DEWS report includes “meibomian oil deficiency” as a subcategory of evaporative dry eye, and the recommended management of this condition is part of the overall DEWS dry eye management scheme. Several articles presented in this OVS issue discuss treatment of meibomian gland disease, and it is our expectation that this area (classification, diagnosis, etiology, and management of meibomian gland-related conditions) will be the new “dry eye.” It is possible that the vast majority of mild dry eye patients may have low-grade lid disease, warranting future clinical, and basic science research in this area.

## The Future is Bright

We realize that there is a vast array of topical information covered in this *Optometry and Vision Science* issue, which we feel reflects the complex, multifactorial nature of dry eye disease. As dry eye clinicians and researchers, we are proud of the content of this issue and of the recent advances in our field. As Albert Einstein once said, “We can’t solve problems by using the same kind of thinking we used when we created them.” With a wave of new clinicians and researchers interested in dry eye and new technology to support these efforts, it is clear that the field of dry eye is moving forward with innovation and creativity. With luck and effort, a new way of thinking is within reach.

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