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Editorial

Special Issue on "Potential Biomarkers in Tears"

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Tear biomarkers play an increasingly important role in the field of predictive, preventive, and personalized medicine. Several molecules have been suggested as promising biomarkers in ocular diseases, particularly in dry eye disease. However, tear molecules have also been studied in systemic diseases, with or without apparent ocular involvement. This Special Issue of *Applied Sciences* on "Potential Biomarkers in Tears", aims to present an overview of the current knowledge in this field by bringing together studies about potential biomarkers in tears and their applications.

A total of five papers (four articles and one communication) about potential biomarkers in tears are presented in this Special Issue, including two studies in normal, healthy subjects, one study in ocular chronic graft versus host disease (cGVHD) patients, a comparative study between tears and blood, and finally, a study describing the use of a technology for the assessment of tear lactoferrin. Byambajav et al. [1] showed that active ghrelin and gastric inhibitory polypeptide molecules are detectable in tears from healthy subjects. Additionally, their results show a strong intra-class reproducibility for tear leptin levels, suggesting that leptin can be used as a tear fluid biomarker and, possibly, for determining the effects of metabolic disorders on the ocular surface. In the study by Fernández et al. [2], age- and sex-adjusted reference intervals for eight tear cytokine levels in healthy subjects were established. The use of such intervals could be an important tool to extend the utility of tear cytokine levels as biomarkers of ocular inflammatory diseases providing a quantitative diagnostic rule to classify a given cytokine tear value as potentially pathologic. Ciavarella et al. [3] presented a communication about tear protein changes correlation with ocular cGVHD development in allogeneic patients who underwent hematopoietic stem cell transplants. Based on their results, total protein content, lactoferrin, transferrin, and Zinc-alpha-2-glycoprotein pre and post changes are proposed as potentially significant predictors of ocular cGVHD development. Ravishankar and Daily [4] performed a preliminary analysis comparing proteins and microRNA profiles between tears and blood and found that 118 of the proteins analyzed were present in both fluids, whereas 34 were only found in tear samples. They also found that 250 microRNAs were expressed both in tears and blood. Their results, considering the simplicity of collection and processing, encourage an investigation into the use of tears as an alternative biofluid to blood. Finally, Dogru et al. [5] investigated the applicability of a strip meniscometry tube for the evaluation of tear protein levels. Specifically, they tested its usefulness in the assessment of tear lactoferrin in non-obese diabetic (NOD) mice. They found that a strip meniscometry tube may serve as a useful tool for tear lactoferrin assessment as the tears collected with this technique harbored sufficient lactoferrin, detectable by ELISA testing in NOD and wild type mice.

In summary, all of these papers provide new and relevant information in the field of potential tear biomarkers. More in-depth research in this field is warranted, which will hopefully increase the knowledge on molecular mechanisms underlying diseases and could be used by clinicians to make more accurate diagnoses and identify those patients with a predictable response or susceptibility to a given condition. This is essential in order to further develop personalized medicine.

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