Biological Age Markers as Predictors of Health & Disease

Sağlık ve Hastalığın Habercileri Olarak Biyolojik Yaş Belirteçleri

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The identification of biomarkers of human ageing is one of the top goals of aging research today. The reason for that includes the necessity to identify individuals with high risk of developing age-associated diseases. This allows the close follow-up examination and perhaps prophylactic treatment by medication, nutritional intervention or others. The assessment of the efficacy of such interventions is also one rational for the using of efficient biomarkers.

A vast amount of biomarkers of human ageing have been published, but unfortunately the usage of these is strongly limited by methodological difficulties or inter-individual variations. So no single ready-to-use biomarker of aging is available today. This presentation will review the available biomarkers and highlight their potential. The presentation will focus on the changes in oxidative stress parameters. However, several different classes of potential biomarkers of aging will be reviewed on the background of the multi-causal nature of the ageing process.

Oxidative stress induced damage can be quantified by specific biomarkers which might contribute to the clarification of the impact of oxidative stress reactions in the aetiology of diseases. Many diseases like arteriosclerosis, cancer, Morbus Alzheimer, Morbus Parkinson, age related macular degeneration and radiation damage are associated with oxidative stress and related cellular damage. Thereby, oxidative stress is not the causing event but rather an accompanying pathophysiological factor. Interestingly, no unique definition exists of oxidative stress, of how it contributes to the clinical worsening and most importantly, no common strategy exists about its measurement. Despite these problems, limiting the intensity of oxidative stress has become a popular therapeutic target.

A major problem results from the multitude of methods measuring oxidative damage and changes in antioxidative defence. Many methods of measuring oxidative stress have proven unreliable and no single method exists enabling objective determination and characterization of oxidative stress in clinical settings whether in critical illness or in chronic disease. Some methods, like determination of malondialdehyde, F2-isoprostanes, or 8-hydroxy-desoxyguanosine, are widely used to determine oxidative stress. Other methods – such as the determination of vitamins or micronutrients – are able to determine components of the antioxidant defence. Many methods for the determination of oxidative stress are characterized by major differences in specifity, accuracy, reproducibility, as well as feasibility under in vivo conditions. Additionally, there is a great individual variation in basal oxidative damage as well as antioxidative defence, making the establishment of reference values impossible. No single method, however, is yet alone able to characterize oxidative stress under clinical conditions.

Today, strategies to measure oxidative stress are limited in clinical settings. The most reliable available marker remains malondialdehyde or F2-isoprostanes, in combination with circulating levels of micronutrients.

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