Diagnoptics

Measurement of skin autofluorescence with the AGE Reader

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Many of our therapeutic decisions are based on the personal cardiovascular risk of our patients, which is often calculated by means of established risk scores (e.g. UKPDS, PROCAM, SCORE or Arriba) using parameters such as cholesterol, blood pressure or HbA1c. However, these parameters are subject to large fluctuations over time, which limits the accuracy of the risk calculation. It would therefore be good to have a value that takes into account metabolic fluctuations over several years. Data from the UKPDS/EDIC study (Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications) have shown that, especially at the beginning of the disease, the quality of metabolic control in type 1 diabetes mellitus influences microvascular and macrovascular endpoints for up to 30 years, even if metabolic control changes later (1).

So there must be a so-called metabolic memory that lasts for a very long time. The substrate could be the so-called AGEs (Advanced Glycation Endproducts). These are mainly formed by non-enzymatic glycation of amino acids, lipids or nucleic acids, increasingly in hyperglycaemia and increased oxidative stress. They are very long-lived and accumulate in various organs such as the skin. Due to the autofluorescence property of some AGEs, their concentration in the skin can be measured non-invasively using light, e.g. with the AGE Reader.

In patients with diabetes, autofluorescence of the skin (AFH) correlates better with mean values of HbA_{1c} over approx. 15-16 years than with the last HbA_{1c} value alone. Thus, AFH reflects metabolic control over several years and thus extends the temporal significance of the HbA_{1c} value.
The AGE Reader has been validated against skin biopsies. Numerous studies on well over 10,000 individuals have shown that the measurement of skin autofluorescence with the AGE Reader can be used for:

1. diabetes screening (sensitivity comparable to the OGTT),
2. develop screening for diabetes complications in known diabetes mellitus and for calculating the risk of diabetes complications,
3. the more accurate calculation of cardiovascular risk together with the UKPDS risk score, as well as
4. as a good predictor of mortality in high-risk patients, e . g. with renal insufficiency or diabetes mellitus .

Literature

1. Gubitosi-Klug et al, Diabetes Care 2016.
2. Stirban, Heinemann, Diabetes Metabolism and Heart 2013.