Psychosomatic aspects

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Pupillometry – a promising tool to assess central autonomic reactivity in mental stress

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Question: Pupillometry represents a noninvasive measurement of pupil diameter providing important information about dynamic sympathovagal balance reflecting mainly central autonomic control. Despite the fact that mental activity significantly influences pupil diameter, the knowledge related to pupillary light reflex in response to mental stress is absent. Thus, we aimed to study potential changes in pupillary light reflex (PLR) in response to cognitive stress (arithmetic test) under physiological conditions.

Methods: Thirty eight undergraduate students (24 women, age: 22.9+-0.1 yr.) were examined during protocol consisting of three phases: at the initiation (T1 - basal period) – after mental stress (T2 – stress period) – at the end of measurement (T3 – recovery period). The time for each period was 2 minutes. The PLR parameters were following: INIT (initial value of the pupil diameter before the light stimulus), END (final value of the pupil diameter after illumination at the peak of the constriction) and DELTA (pupil reactivity during PLR). PLR was examined separately for both eyes using the Pupillometer PLR-2000 (NeurOptics, USA).

Results: The PLR parameters (INIT, END) were significantly lower immediately after mental stress compared to basal period (T2 vs. T1, $p<0.05$). Moreover, these significant differences remained in recovery period compared to rest for both eyes (T3 vs. T1, $p<0.05$). Index DELTA was without significant changes and no significant differences were found in PLR parameters between the left and the right eye.

Conclusion: Our study firstly revealed decreased constriction-phase related PLR parameters indicating parasympathetic activation after cognitive stress in young healthy probands. We assume that pupillometry could provide important information about pathomechanisms linked central autonomic activity and psychological states in clinical practice.

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