RESPIRATORY PATTERN IN DIABETES TYPE 2 PATIENTS UNDER NEURAL FATIGUE

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Diabetes mellitus type 2, formerly non-insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes, is a metabolic disorder that is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency. This is in contrast to diabetes mellitus type 1 in which there is an absolute insulin deficiency due to destruction of the Langherans islet cells in the pancreas. The classic symptoms are excess thirst, frequent urination, and a constant hunger. Type 2 diabetes makes up about 90% of cases of diabetes, with the other 10% due primarily to diabetes mellitus type 1 and gestational diabetes. Long-term complications from high blood sugar can include heart disease, strokes, diabetic retinopathy, where eyesight is affected, kidney failure which may require dialysis, poor circulation of limbs leading to amputations, and other severe complications. International diabetes diagnostic criteria are based on blood level of glucose (≥11.1 mmol/l, 200 mg/dL) after two hour of a dose glucose administration; so called fasting glucose (≥7.0 mmol/l, 126 mg/dL); and finally on the percentage of HbA_{1c} (≥6.5%). The major problem in diabetes type 2 is linked to unpredictable diminution of consciousness do to pathological glucose metabolism in these subjects. However, there is no reliable continuous monitoring system of the neural ability at initial stages of the disease in affected subjects affected. In the present study we took advantage of the ancient physicians' knowledge that the smell of human breath could provide a clue to the pathology and that the characteristically sweet and fruity odor of acetone is a sign of diabetes. Therefore, we set out to continuously monitor the breath in healthy and diabetic subjects in a non-invasive manner. All subjects provided written informed consent and the procedures were performed in agreement with the Ethical Standards of the Helsinki Declaration. We measured the exhaled breath content in the control condition and under neural fatigue caused by a cognitive task. The recording system used in this experiments was an iAQ-2000 (AppliedSensor, Warren, NJ) equipped with a metal oxide semiconductor (MOS), which is able to detect a broad range of volatile organic compounds. Preliminary results indicate that the recording system employed was suitable for the continuous monitoring of the breath exhale content in humans. Interestingly, the system was able to detect the neural fatigue in the subjects affected by diabetes mellitus type 2. The results suggest that this system could be suitable for a non-invasive continuous monitoring of neural fatigue in subject affected by diabetes mellitus type 2.