The autonomic cardiovascular respiratory (ACR) response to hypoglycemia has been reported in a static and fragmentary fashion and with limited use of cardiovascular variability spectral analysis.

To characterize a dynamic and integrative ACR response to hypoglycemia we assessed, in 13 healthy subjects under control, peak hypoglycemia induced by administering 0.2 U/kg of insulin, and recovery conditions, instantaneous 5-min time-courses of: time series of RR intervals (RR), systolic (SP), diastolic (DP) and pulse (PP) pressures, tidal volume (V T) and respiratory frequency (RF) obtained from ECG, arterial pressure (AP) and respiratory (Res) signals; their low-frequency powers (LF RR, LF SP, LF DP, LF PP), their respective central frequencies (CF LF RR, CF LF SP, CF LF DP, CF LF PP), and high-frequency powers (HF RR, HF Res), computed by a time-frequency distribution; baroreflex (BRS) and respiratory sinus arrhythmia (RSAS) sensitivities computed by alpha index and their coherences (cBRS, cRSAS) by a cross-time-frequency distribution. For statistical analysis, 1-min epoch means (EM) of dynamics were obtained.

With respect to control, peak hypoglycemia (48±6 mg/100 ml) provoked 1. decreases (p<0.03) in: five EM of HF RR, LF RR, BRS and RSAS dynamics, three EM of CF LF PP and cBRS, two EM of CF LF RR and CF LF SP; 2. increases (p<0.02) in: five EM of SP, DP, PP, V T and RF, three EM of HF Res, two EM of LF SP and LF DP, one EM of LF PP; 3. no change in CF LF DP, RR and cRSAS.

Hypoglycemia modifies the basal fluctuating time-courses of ACR measures, specifically eliciting: sympathetic measures powers increase (except LF RR) associated with central frequencies reductions; SP, DP and PP increments, indicating stroke volume elevation; BRS and cBRS decreases allowing AP to rise; vagal activity index and RSAS reductions determining greater RR regularity; and increased pulmonary ventilation. These effects integrate a dynamic mechanism of sympathetic, cardiovascular and respiratory activation, whose consequence is increased cardiac output with greater oxygen content to ameliorate the harmful effects of neuroglycopenia.