

Respiratory-Vagal Modulatory Effects of Cold Face Test on the High Frequency Components of Systolic and Diastolic Blood Pressure Variability

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To provide insight into the generating mechanism of the high frequency components (HF) of diastolic (DBP) and systolic (SBP) blood pressure variability (BPV), which has not been sufficiently clarified by the few reported studies addressing it, we assessed and compared, in 23 healthy volunteers, the respiratory and vagal effects evoked by the cold face test (CFT) on the instantaneous 120-s time-courses of HF powers (pHF) and central frequencies ($CFHF$) of RR intervals (pHF_{RR} , $CFHF_{RR}$), respiration (pHF_{RES} , $CFHF_{RES}$), SBP (pHF_{SBP} , $CFHF_{SBP}$) and DBP (pHF_{DBP} , $CFHF_{DBP}$), estimated by a time-frequency distribution, their gains (G_{HF}) in relation to pHF_{RES} ($G_{HF_{RR}}$, $G_{HF_{SBP}}$, $G_{HF_{DBP}}$), computed by alpha index, and their respective coherences ($CO_{HF_{RR}}$, $CO_{HF_{SBP}}$, $CO_{HF_{DBP}}$). Ensemble averages of pHF and G_{HF} dynamics (similar to each other) presented two distinctive response patterns: one of large and progressive increase that reaches a plateau, shown by pHF_{RR} and pHF_{DBP} , and the other of small, sustained increment, depicted by pHF_{SBP} and pHF_{RES} . pHF_{DBP} and $G_{HF_{DBP}}$ means were greater ($p<0.04$) than pHF_{SBP} and $G_{HF_{SBP}}$ means. Mean correlation of pHF_{RR} with pHF_{DBP} was greater than with pHF_{SBP} (Table). Correlation of pHF_{RES} with pHF_{SBP} was greater than with pHF_{DBP} (Table). Correlations between G_{HF} measures behaved similarly to pHF (Table). Response patterns and mean values of $CFHF_{RR}$, $CFHF_{DBP}$ and $CFHF_{SBP}$ were similar to those of $CFHF_{RES}$: relative to control, all decreased ($p<0.02$). Mean $CO_{HF_{SBP}}$ was greater than ($p<0.02$) mean $CO_{HF_{DBP}}$. CFT provokes large increment of vagal activity and slight respiratory changes, increase of pHF_{RES} and reduction of $CFHF_{RES}$, with distinctive effects on HF of BPV: on pHF_{DBP} , a large modulatory effect, better correlated with pHF_{RR} , possibly mediated by this measure of vagal activity, and on pHF_{SBP} , a small modulatory increment, with better correlation and coherence with pHF_{RES} , most likely associated to the mechanical respiratory influence. Moreover, $CFHF_{RES}$ drives $CFHF_{SBP}$, $CFHF_{RR}$ and $CFHF_{DBP}$ changes.

Table. Mean \pm SD of correlations between pHF and G_{HF} indexes ($p<0.02$) in CFT. N=23.

	$HF_{RR}-HF_{DBP}$	$HF_{RR}-HF_{SBP}$	$HF_{RES}-HF_{DBP}$	$HF_{RES}-HF_{SBP}$
pHF	0.85 \pm 0.08*	0.69 \pm 0.17	0.58 \pm 0.20†	0.66 \pm 0.19
G_{HF}	0.78 \pm 0.18††	0.56 \pm 0.24	--	--

* $p<0.001$ vs. $pHF_{RR}-pHF_{SBP}$ correlation. † $p<0.02$ vs. $pHF_{RES}-pHF_{SBP}$ correlation. †† $p<0.001$ vs. $G_{HF_{RR}}-G_{HF_{SBP}}$ correlation.