

# Time-courses of the Central Frequencies of Low-Frequency Components of RR intervals, Systolic and Diastolic Pressure Variabilities in response to Active Orthostatic Test

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Previously, while studying the effects of static and dynamic exercises on HRV, we provided evidence supporting the adequate performance of the central frequencies of low-frequency components ( $_{CF}LF$ ) of: RR intervals ( $_{CF}LF_{RR}$ ), systolic ( $_{CF}LF_{SP}$ ) and diastolic ( $_{CF}LF_{DP}$ ) pressure variabilities as cardiac and vasomotor sympathetic activity measures. Currently, in 23 healthy subjects we assessed the effects provoked by 1-min stages of supine position, active orthostatic test (AOT) and recovery to supine on the instantaneous time-courses of  $_{CF}LF_{RR}$ ,  $_{CF}LF_{SP}$  and  $_{CF}LF_{DP}$  and of low-frequency powers ( $_{p}LF$ ) of the same variables ( $_{p}LF_{RR}$ ,  $_{p}LF_{SP}$ ,  $_{p}LF_{DP}$ ), estimated by a time-frequency distribution. The response patterns of  $_{p}LF_{RR}$ ,  $_{p}LF_{SP}$  and  $_{p}LF_{DP}$  dynamics to AOT were similar and depicted an initial prominent change (IPC) upwards, followed by their return to baseline (RB) and a final moderate change (FMC) upwards. Mean maximal points in IPC and FMC were greater ( $p < 0.003$ ) than their mean baseline (BL). The response patterns of  $_{CF}LF_{RR}$ ,  $_{CF}LF_{SP}$  and  $_{CF}LF_{DP}$  were similar but in opposite direction to those of  $_{p}LF$ : a prominent decrement in IPC, return to BL in RB and a final moderate reduction in FMC. Mean minimal points in IPC and FMC were less ( $p < 0.001$ ) than their mean BL. Mean correlations of  $_{p}LF_{RR} - _{CF}LF_{RR}$ ,  $_{p}LF_{SP} - _{CF}LF_{SP}$  and  $_{p}LF_{DP} - _{CF}LF_{DP}$  relations ranged from  $-0.88 \pm 0.35$  to  $-0.96 \pm 0.07$  in IPC,  $-0.82 \pm 0.22$  to  $-0.88 \pm 0.10$  in RB and  $-0.21 \pm 0.65$  to  $-0.41 \pm 0.57$  in FMC. The table shows means of  $_{CF}LF_{RR}$  and  $_{CF}LF_{DP}$ . Our findings, initial prominent and final moderate leftward shift of  $_{CF}LF_{RR}$ ,  $_{CF}LF_{SP}$  and  $_{CF}LF_{DP}$  dynamics that were strongly and inversely correlated with  $_{p}LF_{RR}$ ,  $_{p}LF_{SP}$  and  $_{p}LF_{DP}$  and that  $_{CF}LF_{RR}$  is greater than  $_{CF}LF_{DP}$ , support that AOT provokes similar cardiac and vasomotor sympathetic activations, large at the onset and moderate at the ending. Thus,  $_{CF}LF$  are trustable measures of sympathetic activity, possibly branch-specific:  $_{CF}LF_{RR}$  for the cardiac and  $_{CF}LF_{DP}$  for the vasomotor one.

Table. Means  $\pm$  S.D. of  $_{CF}LF_{RR}$  and  $_{CF}LF_{DP}$  in BL, IPC, RB and FMC. N=23.

|                      | BL                   | IPC                   | RB                   | FMC                   |
|----------------------|----------------------|-----------------------|----------------------|-----------------------|
| $_{CF}LF_{RR}$ (mHz) | 101 $\pm$ 4          | 85 $\pm$ 4*           | 100 $\pm$ 5          | 92 $\pm$ 4*           |
| $_{CF}LF_{DP}$ (mHz) | 94 $\pm$ 3 $\dagger$ | 83 $\pm$ 3* $\dagger$ | 98 $\pm$ 6 $\dagger$ | 88 $\pm$ 4* $\dagger$ |

\* $p < 0.001$  vs. BL.  $\dagger p < 0.01$   $_{CF}LF_{RR}$  vs.  $_{CF}LF_{DP}$ .