CARDIAC TROPONINS AND NATRIURETIC PEPTIDES IN RUNNERS: USEFUL FOR CARDIAC RISK SCREENING?

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Background:
Our aim was to compare cTnT and NT-proBNP levels before and after the stress tests, in sporting subjects. Cardiac troponins (cTn) are considered as the best biomarkers for detection of myocardial cell injury and NT-proBNP as the best for the cardiac insufficiency.

Materials and Methods:
Two populations were compared
• a group of 28 marathon runners (44.1 ± 8.37 years old)
• a group of 33 ultra-trail runners (45.8 ± 8.7 years old)
Three blood tests were drowned
• one just before
• one just after
• the last three hours after the end of the race
Two cardiac biomarkers were measured:
• Highly Sensitive Troponin T
• Natriuretic peptide (NT-proBNP)

Main outcome measurements: cTnT concentrations were measured by high sensitive methods (hsTnT, Roche Diagnostics) on heparin plasma. The NT-proBNP was also determined with the kit Roche on heparin plasma. The ultra-trail runners will be subject to an echocardiography and an ECG pre- and post-race.
All statistical analyses were performed using Medcalc version 8.1 for Windows. P-value <.01 was regarded as statistically significant.

Table 1: Results for TnT and NT-proBNP

<table>
<thead>
<tr>
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<th>T0</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
</tr>
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<tbody>
<tr>
<td>M</td>
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<td>0.015</td>
<td>0.033</td>
<td>0.028</td>
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<tr>
<td>U</td>
<td>33</td>
<td>0.005</td>
<td>0.024</td>
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<table>
<thead>
<tr>
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<td>81.9</td>
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<td>U</td>
<td>33</td>
<td>32.0</td>
<td>225.8</td>
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</table>

Fig. 1: Kinetic of the cardiac biomarkers released during the 2 races

Results (Table 1):
A significant difference between hsTnT concentrations at T0 and T1 (P<.001), and between T0 and T3 (P<.001) for NT-proBNP have been observed, but not between T1 and T3 (Figure 1). This observation appeared only after a strenuous exercise. However, up to now this type of exercise is not reproducible easily in a laboratory. Moreover, nobody knows if these observations would have cardiac consequences at long terms.
Medical imaging in ultra-trail runners present cardiac adaptations to endurance training, as left ventricular hypertrophy (LVH) and incomplete right bundle branch block (IRBBB). A decrease of systolic and diastolic volumes of the left ventricle and a decrease of longitudinal strain were observed by echocardiography at the end of the race.

Conclusions:
Measurement of cardiac troponins by high sensitive methods allows detecting significant release of biomarkers from the heart during exercise. The value of NT-proBNP are also significant but less than TnThs. We think that the TnThs could be an interesting tool in the future to help sport medicine to detect risk of developing a cardiac problem in the future or a sudden death.
For the medical imaging, it was observed a myocardial adaptation to training and a transient impairment of ventricular function due to dehydration.

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