EXTENDED ABSTRACT

Importance of selenium status in patients with chronic heart failure☆

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Abstract
Overactivity of the immune system may be a worthwhile therapeutic target for implementing prognostic improvements. Therefore the impact of lipopolysaccharide (LPS) desensitization on survival may help in the development of novel therapies. An understanding of the pathophysiology of the trace element selenium may complement such approaches, as recent data suggest that inflammatory responses are selenium-dependent.

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The impact of LPS desensitization on survival may help in the development of novel therapies (Gutsmann et al., 2010; Horan et al., 1991; Kojika et al., 2006). An understanding of the pathophysiology of the trace element selenium may

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complement such approaches, as recent data suggest that inflammatory responses are selenium-dependent (Curran et al., 2005; Stoedter et al., 2010). We hypothesized that lower LPS reactivity would be associated with worse survival as compared to normal or higher LPS reactivity in patients with chronic HF. In addition, we sought to elucidate the role of the selenium status in this context.

LPS responsiveness was studied in 122 patients with chronic HF (mean±SD: age 67.3±10.3 years, 24 female, New York Heart Association class [NYHA] class: 2.5±0.8, left ventricular ejection fraction [LVEF]: 33.5±12.5%) and 27 control subjects of similar age (63.7±7.7 years, p>0.05). Reference LPS was added at increasing doses to ex vivo whole blood samples and tumour necrosis factor-α (TNFα) was measured. Patients were subgrouped into good- and poor-responder status according to their potential to react to increasing doses of LPS (delta TNFα secretion). The optimal cut-off value was calculated by receiver-operator characteristic curve (ROC) analysis.

Serum selenium ranged from 51 to 318 µg/L in both groups with significantly lower levels in patients with chronic HF than in controls (p<0.05). A total of 56 patients with chronic HF died from any cause during follow-up. At 12, 24, 36, and 48 months, cumulative mortality was 10.7% (95% CI 10.4–11.0%), 16.4% (95% CI 16.0–16.7%), 25.4 (95% CI 21.5–25.8%), and 32.0% (95% CI 31.6–32.4%), respectively. At 24 months, the delta TNFα value representing the optimal cut-off for the prediction of mortality was 1522 pg/mL, and it was associated with a sensitivity of 49.3% (95% CI 37.6–61.4%) and a specificity of 81.5% (95% CI 61.9–93.6%). According to this cut-off value, 51 patients (45%) were defined as good-, and 62 (55%) as poor-responders. In patients with HF, serum selenium was significantly higher in good-responders compared to poor-responders (p<0.05). LPS responder status remained an independent predictor of death after multivariable adjustment (hazard ratio 0.09 for good- vs. poor-responders, 95% CI 0.01–0.67, p<0.05).

We have shown that the responsiveness towards LPS as assessed by TNFα secretion is an independent predictor of death. Additionally, serum selenium appears to play an important role in immune function and HF-dependent survival. These findings are in line with other studies (Alexanian et al., 2014; de Lorgeril and Salen, 2000; Lymbury et al., 2010) highlighting the physiological importance of the selenium status for the immune system and HF-related mortality risk.

Conflict of interest

The authors declare that there is no conflict of interest.

References


