

Abstract

Prospective study of fatigue and metabolic parameters in patients with early breast cancer (EBC) receiving concomitant radiotherapy and anthracycline-based adjuvant chemotherapy

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Background: Fatigue affects the quality of life of cancer patients. Treatment and disease related factors contribute to the symptom. The metabolic factors involved have not been studied adequately in humans. We have initiated a clinical-metabolic study of the effect of adjuvant chemotherapy on fatigue, excluding confounding disease-related factors. The hypothesis was that chemotherapy affects mitochondrial energy production. **Methods:** Patients were treated with 6 cycles of adjuvant CEF, concurrent with locoregional radiotherapy. Consenting patients were prospectively followed with the FACT-F subscale; an standardized aerobic forearm exercise test with measurement of blood levels of lactate, pyruvate, pH, free carnitine and acylcarnitines, pO₂, pCO₂, urinary organic acids and arterial flow. All measurements were performed at baseline, after 3 and 6 cycles of chemotherapy, and 3 and 6 months of follow-up. The variables were determined at rest, during exercise and in the recovery phase. **Results:** Seventeen patients were included, 12 patients are currently evaluable after 3 cycles of chemotherapy. Mean age was 53 years (39–65 years). At baseline the FACT-F subscale was less than 32 in two patients whom were considered severely fatigued. At test 2, two more felt severe fatigue. The mean fatigue subscale score at baseline was 37(4–49), whereas after 3 cycles of chemotherapy the score decreased at 33 (6–46). This is a clinically important difference. Tissue extraction of O₂ and arterial blood flow were not affected. Mean free carnitine levels were supernormal at baseline and decreased by 33%; acylcarnitines decreased by 22% after cycle 3. **Conclusions:** This is the first prospective study to demonstrate a clinically significant decline in the fatigue subscale under adjuvant anthracycline-based chemotherapy in early breast cancer. The results suggest that oxidative phosphorylation is not significantly affected but that a chemotherapy-induced decrease in carnitine levels might be responsible for the fatigue symptoms.