Early detection of skeletal muscle atrophy using a multiple plasma-free amino acid index in the advanced aged patients with advanced pancreatic cancer


Background: Loss of skeletal muscle mass (SMM) is related to aging, pancreatic cancer (PCa) and the deterioration of symptoms and quality of life (QOL). This study aimed to identify the factors associated with SMM atrophy in PCa patients during first-line chemotherapy. At the end of our study, the biomarker of early detection of SMM atrophy was established using a multivariate index composed of plasma free amino acid (PFAA) levels.

Methods: Patients with treatment-naïve advanced PCa were enrolled. The whole body skeletal muscle index (wSMI) and symptoms were measured at baseline and one month later using bioelectrical impedance analysis and the MD Anderson Symptom Inventory, respectively. Each patient was assigned to an atrophy or a non-atrophy group based on the change in wSMI after one month. The concentrations of 19 PFAAs were measured using liquid chromatography–mass spectrometry. An index consisting of the PFAAs at baseline was evaluated for its ability to discriminate atrophy one month later.

Results: The advanced aged group (≥ 70 years, N = 52) showed a decrease of wSMI (∼−0.35 kg/m² in mean) to be compared to younger group (< 60 years, N = 34, 0.35 kg/m², P = 0.09). The change of wSMI in the middle aged group (≥ 60 and < 70 years, N = 75) was 0.03 kg/m² in mean. Atrophy was observed in 60% of the advanced aged group. The worsened activity, fatigue and appetite loss became more severe after one month in the advanced aged group with atrophy. The areas under the curves (AUCs) based on a receiver operating characteristic (ROC) curve analysis of the PFAA index for discriminating atrophy from non-atrophy were calculated using single or multiple PFAAs. The best AUC for the multiple PFAA indices was 0.83 in the advanced aged group.

Conclusions: SMM atrophy was related to aging, the deteriorated activity, fatigue and appetite loss in patients with advanced PCa during first-line chemotherapy. A multiple PFAA index is a promising biomarker for the early detection of atrophy.