Changes in nutritional status by recovery phase interventions would be a powerful determinant of cardiovascular prognosis in heart failure patients

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Background: Adequate nutrition has been proposed for better cardiovascular prognosis as well as fitness, although the impact of the "changes" in nutrition and fitness at recovery phase on the future prognosis has been unclear.
Purpose: We aimed to examine whether the change in nutritional level as a result of dietary intervention combined with exercise would determine patients' cardiovascular prognosis.
Methods: This study involved 398 consecutive patients who participated in phase II comprehensive cardiac rehabilitation (CCR) for at least three months. All patients underwent cardiopulmonary exercise test (CPX) at the initial and completion periods of CCR. Individual dietary guidance was periodically performed with exercise. Peak oxygen uptake (PVO2) was measured through CPX to evaluate the fitness level, whereas nutritional status was evaluated using the geriatric nutritional risk index (GNRI). Patients were divided in two groups according to the baseline GNRI and the change in GNRI (ΔGNRI) by the median, respectively, to compare their prognosis between groups. Then they were classified into four categories according to the median values of the changes in GNRI (ΔGNRI) and PVO2 (ΔPVO2) during CCR: "Both improved", "Only GNRI improved", "Only PVO2 improved" and "Both NOT improved", to compare MACCE-free rate between categories.
Results: The rate of MACCE showed significant difference between categories (14%, 18%, 19% and 36%, $p<0.001$), which was approximately 2 times higher in "Both NOT improved" than the others. Kaplan-Meier analysis showed that according to the level of ΔGNRI, "higher ΔGNRI group" showed significantly higher in MACCE-free survival rate than "lower ΔGNRI group" (log rank p=0.010), whereas there was no significant difference according to the baseline GNRI (see figure). According to the categories divided by ΔGNRI and ΔPVO2, MACCE-free rate was significantly lower in "Both NOT improved" (log rank $p<0.001$) compared to the other categories. Cox proportional hazard regression analysis revealed that "both NOT improved" was an independent predictor of MACCE (hazard ratio, 2.1, 95% confident interval, 1.344–3.175, $p<0.001$).
Conclusion: Changes in nutritional level would determine patients' cardiovascular prognosis rather than the baseline nutritional level. Non-responders who showed no improvement in nutritional or fitness by interventions may result in a poor cardiovascular outcome.