

【国際セッション6】

MODEL-BASED TIME SERIES ANALYSIS OF ADAPTIVE RESPONSES TO AEROBIC TRAINING AND DETRAINING

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Time course of training-induced adaptive responses of human body has not been fully elucidated, especially for detraining. Our previous reports found that the time series analysis based on the model proposed by Morton et al. (1990) was useful in explaining inter-individual responses in endurance capacity to aerobic training. However, few studies were investigated the adaptive responses including detraining period and the effect of frequency of training, which would influence both positively and negatively to the body, on the parameters calculated from the model analysis was unknown.

The purpose of this study was 1) to investigate the time course of adaptive responses in physical work capacity at 75% of predicted maximal heart rate (PWC75%HRmax) to aerobic training and detraining and 2) to evaluate the effect of the frequency of training on the parameters calculated from the model.

Fifteen healthy female university students were participated in this study. For all subjects,

PWC75%HRmax during incremental exercise was measured 3-5 days a week for both the entire 4 weeks training and 4 weeks detraining. Five students (EX1) performed a 60 min cycle ergometer exercise 5 days a week at a workload corresponding to pre-determined 70%HRmax. Six students (EX2) performed a 100 min exercise three days a week at the same work load as the EX1. Rest of them served as controls.

PWC75% of four EX1 and that of two EX2 subjects increased linearly with training days ($P < 0.01$), while that of one EX1 subject and that of one EX2 subjects increased linearly with detraining days ($P < 0.05$). For all control subjects, there was no significant change in PWC75% with training days.

From model analysis, time constant of both positive (τ_1) and negative (τ_2) effect by exercise was varied among EX subjects. The significant correlations were observed between the measured and the model-predicted PWC75% in four EX1 and four EX2 subjects. τ_2 for EX2 was significantly larger than that for EX1, while there is no significant difference in other calculated parameters from the model. These results indicated that 1) model-based analysis in this study was useful in evaluating the individual characteristics in adaptive responses to both training and detraining, which showed different time-characteristics to the same training, and 2) frequency of training was one of the factors which affect the time component of the negative effect by exercise.

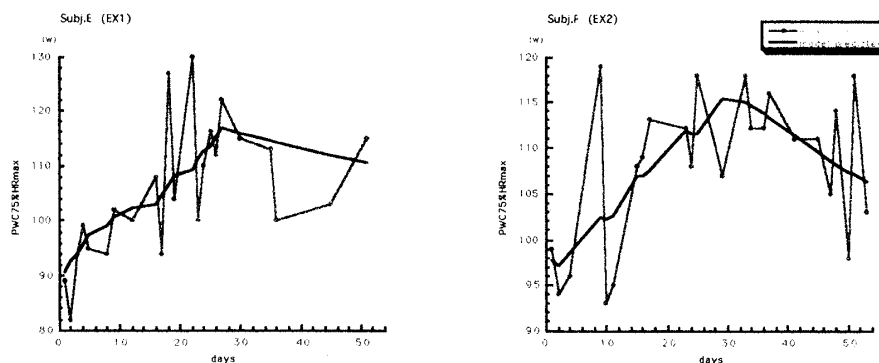


Figure. Time course of both measured(line with dots) and model-predicted(line only) responses to training and detraining in PWC75%HRmax for EX1(Right) and EX2(Left) subject