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A Metabonomic Study on the Urine of Rowing Athletes

Yanyan Kang[1],Chengyi Liu[2]
1.Guangdong Provincial Institute of Sports Science
2.College of Physical Education and Sports Science， South China Normal University

Objective To extract information that affect sport performance, the technique of urine metabolism and quantitative difference（QD）analysis were combined in search of the characteristic metabolites of the rowing athletes.
Methods Morning urine were collected in three consecutive weeks, main peaks of the ^{1}H NMR spectrum which have significant difference between the medalists and non-medalists were selected from thousands of one dimensional NMR hydrogen spectrum of urine. Pattern recognition method based on metabonomics combined with QD so that the metabolites which could reflect the competitive level of the elite athletes could be selected from the main components.
Results 1.The optimal principal component of rowing athletes were principal component 1 and 5（PC1&PC5）. 2. Results of 7-fold cross validation showed that the PLS-DA model were stable, reliable and has good prediction ability. Results of the repeatability experiment showed that sample test accuracy were above 85%. 3. N-methylnicotinamide was obtained by multi-criteria assessment methods as the characteristic metabolite. 4. Substance concentration related to aerobic and anaerobic metabolism were different in urine of the rowing athletes.
Conclusions The athletes' urine contains the information of sport performance. Metabonomics combined with QD analysis could be widely applied in the evaluation of rowing athletes' competitive ability. The role of nicotinic acid in regulating energy metabolism and protecting human body might be a necessary condition with which athletes could tolerance high strength training and competition.