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Sex differences in the change of amino acid and cortisol concentration after marathon race

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Objective As we all know, marathon exercise can induce dramatic changes in amino acid and hormone concentration in the plasma. However, little attention has been given to the role of sex in metabolic changes.

Methods We compared the changing rates of amino acid and hormone after marathon running in male and female runners. Twenty-seven female (mean age: 41±15 years) and 66 male (mean age: 40±16 years) non-professional runners performed a marathon race. Amino acid and cortisol levels were assessed before and at 1h after race.

Results At pre-race and post-race, cortisol concentrations in female runners were lower than in males. Cortisol increased in all subjects at post-race but the rising rate was substantially higher ($P < 0.05$) in females [median (range): 3.5 (21~ -0.25)] than in males [median (range): 2.09 (14.3~-0.43)]. Post-race, the glycogenic amino acid concentrations of Arg, Asn, Gly, Ile, Met, Ser and Thr were significantly decreased in females and males. But females have higher decreased rate ($P < 0.02$) [median (range): Arg -45% (12%~ -69%), Asn -42% (25%~ -72%), Gly -45% (5%~ -73%), Ile -35% (16%~ -64%), Met -28% (48%~ -62%), Ser -34% (17%~ -58%), Thr -33% (32%~ -52%)] than males [median (range): Arg -35% (65%~ -64%), Asn -29% (46%~ -59%), Gly -33% (13%~ -64%), Ile -23% (37%~ -57%), Met -14% (92%~ -52%), Ser -23% (21%~ -56%), Thr -17% (84%~ -58%)]. This is because, during exercise, cortisol has the function of inducing gluconeogenesis to maintain plasma glucose supply.

Conclusions There is significant sex differences in the change of cortisol and some glycogenic amino acid concentration before and after marathon race, which has potential value for training and nutrition supplement in marathon running.