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# Effects of hypoxia preconditioning on acute hypoxic exercise-induced phosphorylation of AMPKα in mice skeletal muscle

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**Objective** AMP-activated protein kinase (AMPK) is a metabolic energy sensor and its activation plays an important role in the regulation of energy homeostasis. Increasing evidence indicates that AMPK activation depend on the phosphorylation sites in AMPKα. $Thr^{172}$ is involved in AMPK activation, whereas $Ser^{485/491}$ are not. Under suitable stress stimulations, the phosphorylation of AMPKα at the $Thr^{172}$ site can increase AMPK activation. However, serious hypoxic exercise or taking antioxidants before exercise can reduce the activation of AMPK by phosphorylating AMPK α1$Ser^{485}$/α2$Ser^{491}$ sites. The aim of this study was to investigate the effects of hypoxia preconditioning on exhaustive exercise under hypoxic condition induced AMPKα $Thr^{172}$ and $Ser^{485/491}$ phosphorylation in mice skeletal muscle.
**Methods** The 40 eight-week-old male C57BL/6J wild type mice were randomly divided into four groups (10 mice /group): non-hypoxia preconditioning control group (NC), hypoxia preconditioning control group (HC), non-hypoxia preconditioning acute hypoxic exercise group (NE), and hypoxia preconditioning acute hypoxic exercise group (HE). Hypoxia preconditioning groups were exposure in hypoxia for 48h, with the oxygen concentration was 11.2%. Meanwhile, non-hypoxia preconditioning was in the normoxic condition for 48h. After hypoxia preconditioning, acute hypoxic exercise groups finished an exhaustive exercise. Tibialis anterior muscles of mice were collected immediately after the exhaustive exercise. The protein expression of the total AMPKα, $Thr^{172}$-AMPKα phosphorylation, and $Ser^{485}$-AMPKα1/$Ser^{491}$-AMPKα2 phosphorylation were measured by Western Blot. $Thr^{172}$-AMPKα phosphorylation to total AMPKα ratio and $Ser^{485}$-AMPKα1/$Ser^{491}$-AMPKα2 phosphorylation to total AMPKα ratio was calculated.
**Results** Compared with NE group, The $Thr^{172}$-AMPKα phosphorylation to total AMPKα ratio was increased significantly, whereas the relative expression of $Ser^{485}$-AMPKα1/$Ser^{491}$-AMPKα2 phosphorylation to total AMPKα ratio seemed to decreased in skeletal muscle of HE group.
**Conclusions** The 48h hypoxia preconditioning could improve the AMPK activation by $Thr^{172}$-AMPKα phosphorylation in mice skeletal muscle following an exhaustive exercise under the hypoxic condition.