

HEME OXYGENASE-1 (HO-1) IS CONSTITUTIVELY UP-REGULATED IN TOP ALPINISTS

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Alpinists who challenge Mt. Everest need adaptation to hypoxia before the attack of Mt. Everest. Although this adaptation is important for the success of climbing Mt. Everest, the molecular mechanism on the adaptation to hypoxia is not well understood. In order to clarify this mechanism, we investigated hypoxia-induced gene expressions specific for top alpinists using microarray analyses. We report here that heme oxygenase-1 (HO-1) is significantly higher in the blood of top alpinist compared with non-alpinists. Although HO-1 expression of non-alpinists is also up-regulated in response to hypoxia, HO-1 level of the top alpinists are constitutively higher than that of non-alpinists. Serial examinations of HO-1 in one top alpinist revealed that the higher expression of HO-1 is maintained in high-level several months after the attack of top mountains. Taken together with the biochemical function of HO-1 that catalyzes heme into CO and bilirubin, HO-1 expression may improve the circulation and compensate with oxidative tissue damages induced by hypoxia. These data also suggest that peripheral blood has the memory on hypoxia independent of antigens by maintaining the high-level of HO-1 expression in top alpinists, which merits the rapid adaptation to hypoxia for 8000m climbing.