

個人の内因性抗酸化能に応じた強度別身体活動量の検討

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Investigation of Individual Endogenous Antioxidant Capacity by Intensity of Physical Activity

by

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ABSTRACT

Endogenous antioxidant enzyme superoxide dismutase 2 (*SOD2*) gene polymorphisms were measured in stored DNA specimens from 6,410 men and women. Physical activity data were collected from these subjects over a 10-day period using an accelerometer. Urine levels of the gene damage marker 8-hydroxydeoxyguanosine (8-OHdG) were also measured. The relationship between amount of physical activity by intensity and urine 8-OHdG level for each polymorphism was then investigated by multiple regression analysis. Urine 8-OHdG level tended to be higher in individuals with the Val/Val polymorphism, which is believed to have low antioxidant enzyme induction activity. A significant negative relationship was found between total amount of physical activity and urine 8-OHdG level for Val/Val ($\beta = -0.03$, $P < 0.01$) but not

Ala/Val+Ala/Ala ($\beta = -0.01, P=0.39$). By intensity of physical activity, the same relationship was found at moderate- to high-intensity tasks of ≥ 3 metabolic equivalents (METs), but no relationship was found at physical activity of ≥ 6 METs. These results suggest the possibility that gene damage preventative effects of physical activity vary according to the antioxidant enzyme induction ability of the individual and the intensity of physical activity.

要 旨

本研究では加速度計で連続10日間測定した身体活動量と遺伝子損傷マーカーである尿中8-hydroxydeoxyguanosine (8-OHdG) のデータの揃った6,410人の男女の保存DNAを用いて、内因性抗酸化酵素の遺伝子であるsuperoxide dismutase 2 (SOD2) の遺伝子多型を測定し、多型ごとに強度別身体活動と尿中8-OHdGレベルの関連について重回帰分析を用いて検討した。尿中8-OHdGレベルは抗酸化酵素誘導の活性が低いとされるVal/Val型で高い傾向を認めた。総身体活動量と尿中8-OHdGレベルの関連はVal/Val型で有意な負の関連を認めたが ($\beta=-0.03, P<0.01$)、Ala/Val+Ala/Ala型ではそのような関連は認められなかった ($\beta=-0.01, P=0.39$)。Val/Val型強度別では、3METs以上の中高強度の身体活動においても同様の関連を認めたが、6METs以上の身体活動では認められなかった。身体活動による遺伝子損傷防止効果は、個人の抗酸化酵素誘導能および運動強度によって異なる可能性が示唆された。