

## Changes in human cerebral blood flow and myocardial blood flow during mental stress measured by dual positron emission tomography

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Mental stress causes a substantial sympathetic response, thus increasing myocardial blood flow (MBF). However, the effects of mental stress on global CBF have not been elucidated. In this study, changes in CBF and MBF in relation to mental stress were measured by a dual positron emission tomography system that can measure CBF and MBF simultaneously. CBF and MBF were measured in 10 healthy men with O-15 labeled water at rest (baseline) and during the performance of a mental task that required subtraction of 7s serially from a four-digit number. Baseline global CBF and values obtained during the mental activity were  $0.42 \pm 0.05$  and  $0.45 \pm 0.06$  ml/ml/min (mean  $\pm$  SD), respectively. Baseline MBF and values obtained during mental activity were  $0.61 \pm 0.12$  and  $1.09 \pm 0.58$  ml/ml/min, respectively. Percent changes in CBF and MBF during mental stress were  $6 \pm 11\%$  and  $78 \pm 73\%$ , respectively. No significant difference was observed in  $P_aCO_2$  level between the mental stress and baseline conditions. MBF, blood pressure, heart rate, and plasma concentrations of adrenaline and noradrenaline increased significantly during mental stress. Sympathetic stimulation is reported to cause cerebral vasoconstriction and reduce CBF in animals. Although such a sympathetic response was observed in relation to mental stress, no significant change in CBF was observed in our subjects.

**Key words:** mental stress, CBF, MBF, human, PET