BEHAVIOURAL EFFECTS INDUCED BY CHRONIC TREATMENT WITH EPIGALLOCATECHIN GALLATE (EGCG), THE MAJOR CATECHIN OF GREEN TEA, IN SPONTANEOUSLY HYPERTENSIVE RAT (SHR)

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EGCG mimics metabolic actions of insulin besides its antioxidant, anticarcinogenic, antispastic and cardioprotective effects. Interestingly, EGCG is distributed in the brain after oral administration and increasing evidence suggests that EGCG is able to modulate neuronal activity. We observed that chronic treatment with EGCG ameliorates metabolic parameters and insulin resistance in 12-wk old SHR, an animal model of hypertension with features of the Metabolic Syndrome (1). Since insulin resistance profoundly affects nutritional state and EGCG improves metabolic homeostasis, we investigated whether beneficial effects of EGCG in SHR could be related to nutritional and/or behavioural changes. 9-wk old SHR were randomly assigned to 2 groups and treated by gavage for 3 weeks with vehicle or EGCG (200 mg/kg/d). Age-matched WKY controls were given vehicle alone. Body weight and food intake were monitored daily during the 3 weeks of the study. For the 3 groups (n=6/each), the open field behaviour was evaluated after 1, 2 and 3 weeks of treatment in a test session of 30 min. No significant difference in food intake was detected among the groups for the first 2 weeks. However, after the 3rd week of treatment, EGCG-SHR had a moderate decrease in food intake (vs vehicle-SHR: $p<0.05$). Moreover, the rate at which SHR gained weight over the 3-week of therapy was slightly slower in EGCG-SHR. Consistent with literature data, an increased motor activity during the 2nd and 3rd testing session was detected in vehicle-SHR (vs WKY: $p<0.05$, $p<0.001$ respectively). Surprisingly, EGCG treatment significantly reduced hyperactivity of SHR to levels comparable to those measured in WKY. A more in-deep analysis showed that the significantly higher vertical activity (rearing) measured in vehicle-SHR was greatly reduced in EGCG-SHR after 2 weeks of treatment ($p<0.05$), but this effect underwent tolerance on the 3rd session of testing. Conversely, the increased horizontal activity (crossing) observed in vehicle-SHR was significantly reduced in EGCG-SHR after 2 and 3 weeks of EGCG treatment. Taken together, these data suggest that EGCG differently affects distinct components of open field behaviour. In particular, rearing behaviour, indicative of exploratory activity, was temporary reduced after 2 weeks of treatment, while crossing was significantly and permanently normalized for the entire duration of the study. Therefore, body weight reduction and amelioration of metabolic homeostasis in EGCG-treated SHR do not seem to be linked to EGCG-mediated behavioural effects. However, the ability of EGCG to normalize motor activity may cast new light on central effects of EGCG in SHR, which are considered an animal model for Attention-Deficit/Hyperactive Disorders.

1. Potenza MA, Marasciulo FL, Tarquinio M, Tiravanti E, Colantuono G, Federici A, Kim JA, Quon MJ, Montagnani M.(2007) Am J Physiol Endocrinol Metab., Jan 16 [Epub ahead of print].