A calorie-restricted diet decreases brain iron accumulation and preserves motor performance in old rhesus monkeys.

Caloric restriction (CR) reduces the pathological effects of aging and extends the lifespan in many species, including nonhuman primates, although the effect on the brain is less well characterized. We used two common indicators of aging, motor performance speed and brain iron deposition measured in vivo using MRI, to determine the potential effect of CR on elderly rhesus macaques eating restricted (n = 24; 13 males, 11 females) and standard diets (n = 17; 8 males, 9 females). Both the CR and control monkeys showed age-related increases in iron concentrations in globus pallidus (GP) and substantia nigra (SN), although the CR group had significantly less iron deposition in the GP, SN, red nucleus, and temporal cortex. A diet x age interaction revealed that CR modified age-related brain changes, evidenced as attenuation in the rate of iron accumulation in basal ganglia and parietal, temporal, and perirhinal cortex. Additionally, control monkeys had significantly slower fine motor performance on the Movement Assessment Panel, which was negatively correlated with iron accumulation in left SN and parietal lobe, although CR animals did not show this relationship. Our observations suggest that the CR-induced benefit of reduced iron deposition and preserved motor function may indicate neural protection similar to effects described previously in aging rodent and primate species.

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