

# Quality and quantity of dietary protein modulates brain protein synthesis in aged rats

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Protein is one of the most important nutrients that we have to ingest every day. In Japan, the life expectancy at birth and the proportion of older population (individuals over age 65) increased rapidly for fifty years. Therefore, the possible effects of dietary composition (for example, dietary protein) on the brain function are of nutritional importance in mammals. The purpose of the present study was to determine the mechanism by which the quality and quantity of dietary protein affect the brain protein synthesis in the aged rats.

This study was to determine whether the quality and quantity of dietary protein affected the phosphorylation of ribosomal protein S6 kinase (S6K1) and eukaryotic initiation factor (eIF) 4E-binding protein 1 (4E-BP1) and regulated the brain protein synthesis in the aged rats. The phosphorylation of S6K1 in both cerebral cortex and cerebellum, and the phosphorylation of 4E-BP1 in the cerebral cortex declined with a decrease of quality and quantity of dietary protein. Two experiments were done on three groups of aged male rats (24 wk) given diets containing 20% casein, 5% casein or 0% casein (Experiment 1) and 20% casein, 20% gluten or 20% gelatin (Experiment 2) for 1d (only one 5-h period) after all rats were fed the 20% casein diet for 10d (only 5-h feeding per day). The results suggest that the ingestion of a higher quality and quantity of dietary protein stimulates the phosphorylation of 4E-BP1 and S6K1 in the brains and increases the brain protein synthesis in the aged rats. The phosphorylation of S6K1 is at least partly related to the mechanism by which the dietary protein affects brain protein synthesis in aged rats.