

Overweight, Obesity, and Weight Loss Affect Brain Function

Being overweight and obese can affect the functioning of the brain leading to early memory loss and increasing the ultimate risks of dementia. Poor brain function as measured by tests of brain health questionnaires has been demonstrated in overweight and obese individuals in numerous studies. Overweight and obesity are associated with decline in brain function among middle aged individuals (1). Based on an analysis of the results of 21 different studies in 62,425 individuals, being obese was associated with about a 40% increased risk of dementia in people below the age of 65 years(1).

However, until recently the effects of weight loss on brain function were not known. In January 2017, an analysis of twenty studies of intentional weight loss and brain functioning in more than 1000 obese and overweight subjects (2), suggested that weight loss appears to benefit brain functions as measured by specific questionnaires in both randomized controlled studies and observations over time in the same individuals.

Intentional weight loss could be beneficial for overweight and obese subjects through several different mechanisms. For example, weight loss reduces insulin resistance which has been associated with lower glucose metabolism rates in the brains of pre-diabetic and diabetic subjects (3). Insulin also regulates the activity of a number of brain areas important for memory, reward, eating behavior and the regulation of whole-body metabolism (4). Weight loss reduces inflammation and oxidative stress, factor important for healthy brain function (5). More research is needed to specify the exact mechanisms involved in the benefits of weight loss on brain function.

1. Pedditizi, E., Peters, R., Beckett, N., 2016. The risk of overweight/obesity in mid-life and late life for the development of dementia: a systematic review and meta-analysis of longitudinal studies. *Age Ageing* 45, 14–21,
2. Veronese N, Facchini S, Stubbs B, Luchini C, Solmi M, Manzato E, Sergi G, Maggi S, Cosco T, Fontana L. Weight loss is associated with improvements in cognitive function among overweight and obese people: A systematic review and meta-analysis. *Neurosci Biobehav Rev.* 2017;72:87-94
3. Baker, L.D., Cross, D.J., Minoshima, S., Belongia, D., Watson, G.S., Craft, S., 2011. Insulin resistance and Alzheimer-like reductions in regional cerebral glucose metabolism for cognitively normal adults with prediabetes or early type

2diabetes. Arch. Neurol. 68, 51–57,

4. Heni, M., Kullmann, S., Preissl, H., Fritsche, A., Häring, H.-U., 2015. Impaired insulin action in the human brain: causes and metabolic consequences. Nat. Rev. Endocrinol. 11, 701–711
5. Schmidt, R., Schmidt, H., Curb, J.D., Masaki, K., White, L.R., Launer, L.J., 2002. Early inflammation and dementia: a 25-year follow-up of the Honolulu-Asia Aging Study. Ann. Neurol. 52, 168–174