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Original Investigation | Geriatrics

Meat Consumption and Cognitive Health by *APOE* Genotype

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Abstract

IMPORTANCE The apolipoprotein E (*APOE*) ε4 allele increases Alzheimer disease risk. Understanding genotype-specific dietary needs could inform more personalized prevention strategies.

OBJECTIVE To test the hypothesis that higher meat consumption may be associated with cognitive health benefits in individuals with *APOE* genotypes ε3/ε4 and ε4/ε4 (*APOE*34/44) and to examine whether this association differs from that in other genotypes.

DESIGN, SETTING, AND PARTICIPANTS This population-based cohort study used panel data analyses conducted in January 2025 to January 2026 over 15 years of follow-up in the Swedish National Study on Aging and Care-Kungsholmen (SNAC-K), using strategies aligned with causal inference principles. Recruitment was done in 2001 to 2004 among adults without dementia aged 60 years or older.

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Key Points

Question Is higher meat consumption associated with better cognitive health among individuals with *APOE* genotypes ε3/ε4 and ε4/ε4, and does this association differ from that observed in other genotypes?

Findings In this cohort study among 2157 older adults without dementia, higher total meat consumption was associated with slower cognitive decline and a reduced dementia risk among older adults with *APOE* ε3/ε4 and ε4/ε4 genotypes. Interactions by *APOE*

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The **APOE** (apolipoprotein E) gene is the strongest genetic risk factor for late-onset Alzheimer’s disease, with the **APOE4** variant significantly increasing risk and lowering the age of onset, while **APOE2** is protective. *APOE4* accelerates amyloid plaque accumulation, tau phosphorylation, and neuroinflammation

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Genetic Risk Types

APOE ε4 (Risk): About 25% of people carry one copy of APOE4, which doubles or triples the risk. Carrying two copies increases the risk to roughly 10–15 times higher than those with the common APOE3 variant.

APOE ε3 (Neutral): The most common variant, not believed to affect risk.

APOE ε2 (Protective): A rare form that may reduce the risk of developing Alzheimer's

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- **Pathological Mechanisms:** APOE4 impacts brain health by disrupting lipid metabolism (cholesterol transport), increasing amyloid-beta ($A\beta$) plaque formation, accelerating tau pathology, and triggering inflammation.
- **Impact on Dementia Timing:** Individuals with APOE4 tend to develop symptoms 5–10 years earlier than those without it.
- **Other Dementia Types:** Beyond Alzheimer's, APOE4 is associated with a higher risk of vascular dementia due to its role in affecting blood-brain barrier integrity and cholesterol levels.

Limitations: *Having the APOE4 variant does not guarantee that a person will develop Alzheimer's, and conversely, many people without it still develop the disease*

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RESEARCH ARTICLE OPEN ACCESS

High- and Low-Fat Dairy Consumption and Long-Term Risk of Dementia

Evidence From a 25-Year Prospective Cohort Study

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Abstract

Background and Objectives
The association between dairy intake and dementia risk remains uncertain, especially for dairy products with varying fat contents. The aim of this study was to investigate the association between high-fat and low-fat dairy intake and dementia risk.

Methods
This study used data from a prospective cohort in Sweden, the Malmö Diet and Cancer cohort, which consisted of community-based participants who underwent dietary assessment at baseline (1991–1996). Dietary intake was evaluated using a comprehensive diet history method that combined a 7-day food diary, a food frequency questionnaire, and a dietary interview. Dementia cases were identified through the Swedish National Patient Register until December 31, 2020, and cases diagnosed until 2014 were further validated. The primary outcome of the study was all-cause dementia, and the secondary outcomes were Alzheimer disease (AD) and vascular dementia (VaD). Cox proportional hazard regression models were used to estimate hazard ratio (HR) and 95% CI.

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Key Findings on Full-Fat Dairy and Dementia

- **High-Fat Cheese/Cream:** Linked to lower risk, potentially due to beneficial nutrients in fat that may improve brain health.
- **No Link Found:** No significant association was found between dementia risk and consuming low-fat dairy, high-fat milk, fermented milk, or butter.
- **Contextual Factors:** The study suggests that high-fat cheese consumption did not appear to increase risk, but observers noted the findings are observational.

APOE ε4 Variant: The study noted that the reduced Alzheimer's risk linked to high-fat cheese was particularly evident in those without the APOE ε4 gene variant (a known Alzheimer's risk factor).

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Nutritional Epidemiology

Association of Egg Intake With Alzheimer's Dementia Risk in Older Adults: The Rush Memory and Aging Project

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A B S T R A C T

Background: Alzheimer's disease (AD) is a neurodegenerative disorder with increasing prevalence due to population aging. Eggs provide many nutrients important for brain health, including choline, omega-3 fatty acids, and lutein. Emerging evidence suggests that frequent egg consumption may improve cognitive performance on verbal tests, but whether consumption influences the risk of Alzheimer's dementia and AD is unknown.

Objectives: To examine the association of egg consumption with Alzheimer's dementia risk among the Rush Memory and Aging Project cohort.

Methods: Dietary assessment was collected using a modified Harvard semiquantitative food frequency questionnaire. Participants' first food frequency questionnaire was used as the baseline measure of egg consumption. Multivariable adjusted Cox proportional hazards regression models were used to investigate the associations of baseline egg consumption amount with Alzheimer's dementia risk, adjusting for potential confounding factors. Subgroup analyses using Cox and logistic regression models were performed to investigate the associations with AD pathology in the brain. Mediation analysis was conducted to examine the mediation effect of dietary choline in the relationship between egg intake and incident Alzheimer's dementia.

Results: This study included 1024 older adults (mean [\pm standard deviation (SD)] age = 81.38 \pm 7.20 y). Over a mean (\pm SD) follow-up of 6.7 \pm 4.8 y, 280 participants (27.3%) were clinically diagnosed with Alzheimer's dementia. Weekly consumption of >1 egg/wk (hazard ratio [HR]: 0.53; 95% confidence interval [CI]: 0.34, 0.83) and \geq 2 eggs/wk (HR: 0.53; 95% CI: 0.35, 0.81) was associated with a decreased risk of Alzheimer's dementia. Subgroup analysis of brain autopsies from 578 deceased participants showed that intakes of >1 egg/wk (HR: 0.51; 95% CI: 0.35, 0.76) and \geq 2 eggs/wk (HR: 0.62; 95% CI: 0.44, 0.90) were associated with a lower risk of AD pathology in the brain. Mediation analysis showed that 39% of the total effect of egg intake on incident Alzheimer's dementia was mediated through dietary choline.

Conclusions: These findings suggest that frequent egg consumption is associated with a lower risk of Alzheimer's dementia and AD pathology, and the association with Alzheimer's dementia is partially mediated through dietary choline.

Keywords: Alzheimer's disease, egg, dementia, diet, choline, cognition

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Recent studies suggest that consuming at least one egg per week is associated with a reduced risk of Alzheimer's disease in older adults. Research suggests that egg consumption may lower Alzheimer's risk by up to 47%, driven largely by choline, which helps reduce toxic brain protein buildup.

Key Findings on Eggs and Alzheimer's Risk

- **Reduced Risk:** A [study of 1,024 older adults](#) found that eating 1 or more eggs per week was associated with a 47% lower risk of Alzheimer's dementia.
- **Reduced Brain Pathology:** Consuming more than 1 egg per week was linked to a lower accumulation of Alzheimer's-related toxic proteins in the brain.
- **Role of Choline:** The protective effect is likely driven by dietary choline—an essential nutrient for memory—with 39% of the protective impact linked to this component.

Nutrient-Dense: Eggs contain high levels of nutrients that support brain health, such as vitamin D and folate, which are crucial in preventing neurodegeneration

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Most Protective:

1. unprocessed, grass-fed red meat (more protective for those with APOE 3/4 and 4/4)
2. wild salmon, mackerel, sardines and other oily fish
3. extra virgin olive oil
4. full-fat dairy, grass-fed dairy products
5. spinach, Swiss chard, beet greens, arugula, kale, and similar greens
6. pasture-raised eggs
7. small, dark berries
8. turmeric and curry
9. Freshly-ground flaxseeds
10. unfiltered, light roast coffee



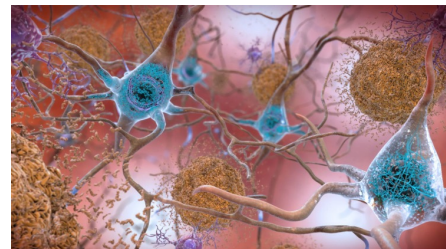
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Highest Risk Increasing Foods:

1. pastries and sweetened, baked goods or deserts
2. fried foods and foods containing oils that have been brought to high temperatures such as fries, chips, fried chicken or wings
3. sugar-based, sweetened drinks/soda
4. processed red meats such as bacon, salami, sausage, and beef jerky
5. heavily processed and spray dried dairy foods such as powdered milk and cheeses
6. spray dried or powdered eggs
7. refined grains and cereal products, foods made with flour, such as breakfast cereals
8. pre-packaged instant foods such as ramen and frozen pizzas
9. candy, chocolate-based and all other types
10. granola/snack bars



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