Alzheimer’s Disease and Nutrition

ALZHEIMER’S Brain Diabetes??

The "Vicious-Cycle" Model of Obesity and Cognitive Decline

Excessive Intake of Western Diet

Hippocampal Dysfunction

Obesity and Cognitive Decline

Increased Appetitive Responding to Cues Associated with Food

Decreased inhibitory control by satiety cues
Alzheimer's Disease—Yes, It's Preventable!

Heart Disease May Increase Your Odds of Developing Alzheimer's

Subtype of Alzheimer's Disease Is Often Misdiagnosed

How to Prevent Alzheimer's Disease—A Neurologist Speaks Out

Alzheimer's Is Directly Related to Elevated Blood Sugar Levels

Hit the Reset Button with Intermittent Fasting

The Importance of Saturated Fats for Healthy Brain Function

Other Dietary Considerations

General Lifestyle Guidelines for Alzheimer's Prevention

Preventing Alzheimer's Is Possible

Iron: This Life-Saving Mineral Found to Actually Increase Senility in Many

Reducing Iron Levels May Protect Your Brain from Alzheimer's

How do You Know if Your Iron Levels are High?

What to Do if You Have High Iron Levels

Tips for Preventing Alzheimer's Disease
Nutrition and Alzheimer's disease: The detrimental role of a high carbohydrate diet

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Abstract

Alzheimer's disease is a devastating disease whose recent increase in incidence rates has broad implications for rising health care costs. Huge amounts of research money are currently being invested in seeking the underlying cause, with corresponding progress in understanding the disease progression. In this paper, we highlight how an excess of dietary carbohydrates, particularly fructose, alongside a relative deficiency in dietary fats and cholesterol, may lead to the development of Alzheimer's disease. A first step in the pathophysiology of the disease is represented by advanced glycation end-products in crucial plasma proteins concerned with fat, cholesterol, and oxygen transport. This leads to cholesterol deficiency in neurons, which significantly impairs their ability to function. Over time, a cascade response leads to impaired glutamate signaling, increased oxidative damage, mitochondrial and lysosomal dysfunction, increased risk to microbial infection, and, ultimately, apoptosis. Other neurodegenerative diseases share many properties with Alzheimer's disease, and may also be due in large part to this same underlying cause. Keywords Advanced glycation end-products; Alzheimer's disease; Cholesterol

Recent Studies Link Sugar to Acid Reflux, Alzheimer’s and Hypertension

Acid Reflux Related to Sugar and Refined Grains – Gastro-Esophageal Reflux Disease known as GERD or Heartburn is caused by stomach acid that moves up into the esophagus. It is one of the top eight diagnoses in the US, said to affect 33% of adults. It is our most expensive chronic gut disorder, costing nearly $10 b per year. Acid reflux can be caused by refined foods such as sugars and grains. Other factors may be stress, spicy or acid foods, random meals, incompatible food combining, gluten intolerance and toxic build-up in the intestines.

Alzheimer's Disease called Diabetes 3 - Researchers find that when blood sugar and insulin are not correctly regulated in the brain, there is a strong link to Alzheimer's disease. More

“There is increasing evidence that insulin problems are a possible trigger for Alzheimer’s disease,” says Dr. Emmett Blalock. More New data shows that Metabolic Syndrome, obesity and diabetes together increase the risk of Alzheimer’s by up to 65%. 5.3 million Americans have Alzheimer’s now. More info

Metabolic Syndrome and Sugar – This syndrome is a combination of high risk factors such as hypertension, high blood sugar, inflammation, high cholesterol, high triglycerides and obesity. Metabolic syndrome has been directly linked to high sugar consumption. Read more

Hypertension, High blood pressure related to sugar. Studies on rats show that sugar consumption is a key factor in animal hypertension and high blood pressure. More

Alzheimer’s disease is on the rise. It is projected to reach over 12 million cases by 2050. View video
Nutritional approaches to combat oxidative stress in Alzheimer’s disease

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Abstract

Alzheimer’s disease (AD) brains are characterized by extensive oxidative stress. Additionally, large depositions of amyloid β-peptide (Aβ) are observed, and many researchers opine that Aβ is central to the pathogenesis of AD. Our laboratory combined these two observations in a comprehensive model for neurodegeneration in AD brains centered around Aβ-induced oxidative stress. Given the oxidative stress in AD and its potentially important role in neurodegeneration, considerable research has been conducted on the use of antioxidants to slow or reverse the pathology and course of AD. One source of antioxidants is the diet. This review examines the literature of the effects of endogenous and exogenous, nutritionally-derived antioxidants in relation to AD. In particular, studies of glutathione and other SH-containing antioxidants, vitamins, and polyphenolic compounds and their use in AD and modulation of Aβ-induced oxidative stress and neurotoxicity are reviewed.

Keywords

- Alzheimer’s disease
- Antioxidants
- Glutathione
- Polyphenols
- Vitamins
- Oxidative stress
- Amyloid beta-peptide
- Cellular response genes
Cholesterol in Alzheimer's disease

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Summary

Alzheimer's disease (AD) is the most common form of neurodegenerative dementia and affects up to 15 million people worldwide. Although no single cause of AD has been identified, recent research has suggested that several pathogenetic factors influence risk and expression. A growing amount of evidence underscores a mechanistic link between cholesterol metabolism in the brain and the formation of amyloid plaques. Excess brain cholesterol has been associated with increased formation and deposition of amyloid-β peptide from amyloid precursor protein. Cholesterol-lowering statins have become a focus of research in AD. Genetic polymorphisms associated with pivotal points in cholesterol metabolism in brain tissues may contribute to the risk and pathogenesis of AD. In this review, we summarise current knowledge of the role of cholesterol metabolism in the pathogenesis of AD and examine the potential of statins in the prevention and treatment of AD.

[Western diet and Alzheimer's disease].
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Abstract

Alzheimer Disease, characterised by a global impairment of cognitive functions, is more and more common in Western societies, both because of longer life expectancy and, probably, because of increasing incidence. Several hints suggest that this degenerative disease is linked to western diet, characterised by excessive dietary intake of sugar, refined carbohydrates (with high glycaemic index), and animal product (with high content of saturated fats), and decreased intake of unrefined seeds--cereals, legumes, and oleaginous seeds--and other vegetables (with high content of fibres, vitamins,polyphenols and other antioxidant substances, phytoestrogens) and, in several populations, of sea food (rich in n-3 fatty acids). It has been hypothesised, in fact, that AD, may be promoted by insulin resistance, decreased endothelial production of nitric oxide, free radical excess, inflammatory metabolites, homocysteine, and oestrogen deficiency. AD, therefore, could theoretically be prevented (or delayed) by relatively simple dietary measures aimed at increasing insulin sensitivity (trough reduction of refined sugars and saturated fats from meat and dairy products), the ratio between n-3and n-6 fatty acids (e.g. from fish and respectively seed oils), antioxidant vitamins, folic acid, vitamin B6, phytoestrogens (vegetables, whole cereals, and legumes, including soy products), vitamin B12(bivalve molluscs, liver), and Cr, K, Mg, and Si salts. This comprehensive improvement of diet would fit with all the mechanistic hypotheses cited above. Several studies, on the contrary, are presently exploring mono-factorial preventive strategies with specific vitamin supplementation or hormonal drugs, without, however, appreciable results.
Big Sodas, Bad Health
Facts About Sugary Soda

Average amount of soda* consumed by Americans:
50 Gallons
A Year/Person
*Includes diet soda and other sugar sweetened beverages
California Center for Public Health Advocacy

42 oz Super-Sized Soda
Calories: 477
Sugars: 123g
Sodium: 52mg

16 oz Small Soda
Calories: 182
Sugars: 47g
Sodium: 20mg

Soda...

- Is the single largest source of added sugar and empty calories in the modern American diet.
- Is the leading cause of childhood obesity in the United States.
- Has been linked to increased risk of heart disease among men, high triglycerides among women, and increased risk for aggressive behavior in kids.
- Can spike insulin levels in the body, increasing belly fat and diabetes risk.
- Has no nutritional value, but can lead to weight gain, obesity, and cavities.

The Amyloid Plaque Process

Beta-amyloid precursor protein (βAPP) is broken down in one of several ways. Alpha- and gamma-secretase enzymes cut it, giving rise to the harmless p3 fragment. Or it is cut by beta- and gamma-secretase, yielding a harmless 40-amino-acid-long β-amyloid peptide or a toxic 42-amino-acid version.

Toxic β-amyloid fragments build up outside the cell. In some people this occurs because the ε4 form of apolipoprotein E (APOE) is selectively removed from extracellular space instead of the β-amyloid—leaving the latter to cause mischief.

β-amyloid forms plaques that cause damage in several possible ways: by interfering with calcium regulation, by leading to the creation of destructive free radicals, or by causing immune cells such as microglia to aggregate—leading to inflammation and exacerbating earlier injury.
Metabolic syndrome and the role of dietary lifestyles in Alzheimer’s disease

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Abstract

Since Alzheimer’s disease (AD) has no cure or preventive treatment, an urgent need exists to find a means of preventing, delaying the onset, or reversing the course of the disease. Clinical and epidemiological evidence suggests that lifestyle factors, especially nutrition, may be crucial in controlling AD. Unhealthy lifestyle choices lead to an increasing incidence of obesity, dyslipidemia and hypertension – components of the metabolic syndrome. These disorders can also be linked to AD. Recent research supports the hypothesis that calorie intake, among other non-genetic factors, can influence the risk of clinical dementia. In animal studies, high calorie intake in the form of saturated fat promoted AD-type amyloidosis, while calorie restriction via reduced carbohydrate intake prevented it. Pending further study, it is prudent to recommend to those at risk for AD – e.g. with a family history or features of
metabolic syndrome, such as obesity, insulin insensitivity, etc. – to avoid foods and beverages with added sugars; to eat whole, unrefined foods with natural fats, especially fish, nuts and seeds, olives and olive oil; and to minimize foods that disrupt insulin and blood sugar balance.

Abbreviations used

**AD**
Alzheimer’s disease

**APP**
amyloid precursor protein

**BMI**
body mass index

**CR**
calorie restriction

**DHA**
docosahexaenoic acid

**EGCG**
epigallocatechin gallate

**IDE**
insulin-degrading enzyme

**OXPHOS**
oxidative phosphorylation

**ROS**
reactive oxygen species

Alzheimer’s disease (AD) is a growing public health concern with potentially devastating effects, especially among the elderly population. Ever since the first description of clinical dementia by Alois Alzheimer in 1907, the disease has increased exponentially worldwide. At present, 4 million Americans are affected with AD, with an estimated annual health care cost of almost 100 billion dollars. With the expected increase in the population of people over the age of 65, it is estimated that the total incidence of AD will quadruple by 2050 (Brookmeyer et al. 1998).

Currently, AD has no cure or preventative treatment. Research on drugs to prevent it or to slow its progression may pay off at some point in the distant future. Meanwhile, an urgent need exists to find a means of preventing, delaying the onset, or reversing the course of AD. Since the disease typically strikes very late in life, for some people delaying its symptoms could be just as good as a cure. It is now widely accepted that delaying the onset of AD by just five years can cut its incidence in half (http://www.alz.org/national/documents;http://www.alz.org/national/documents).

Clinical and epidemiological evidence suggests that lifestyle factors, especially nutrition, may be crucial in controlling AD. Evidence supporting a direct link between nutrition and AD neuropathology continues to grow, as the disease’s mechanistic pathways are defined and biochemical functions scrutinized. We, among others, have recently reported
experimental dietary regimens that may promote, attenuate, or even partially reverse features of AD

(Wang et al. 2005; Qin et al. 2006a,b).

AD amyloid neuropathology as a target for therapeutic dietary lifestyle factors

Alzheimer’s disease is characterized by extracellular amyloid-β (Aβ) plaques and intracellular neurofibrillary tangles composed of abnormally hyperphosphorylated microtubular protein tau in the brains of these patients. The disease manifests clinically as a progressive loss of cognitive abilities. It is also well recognized that Aβ exists in multiple assembly states, which have different physiological or pathophysiological effects. Although the classical view is that Aβ is deposited extracellularly, emerging evidence from transgenic mice and humans indicates that this peptide can also accumulate intraneuronally, which may contribute to disease progression (LaFerla et al. 2007). While currently no cure exists for AD, even delaying AD onset by a few years would lead to significant reductions in disease prevalence and, consequently, its burden on health care systems. A long-recognized hallmark of AD is the accumulation of neurotoxic Aβ peptides and their deposition into extracellular Aβ plaques in the brain (Selkoe 2001). Aβ species with different amino and carboxy termini are generated from the ubiquitously expressed amyloid precursor protein (APP) through sequential proteolysis by β- and γ-secretases (Haass et al. 1992; Shoji et al. 1992; Busciglio et al. 1993). A third proteolytic enzyme, α-secretase, may reduce Aβ generation by cleaving APP within the Aβ peptide sequence (Vassar and Citron 2000). In the twenty years since the APP gene was cloned, evidence continues to accumulate that supports a seminal role for Aβ in AD. In addition, other factors linked to AD, including Apolipoprotein E, insulin-degrading enzyme, and presenilins, all affect Aβ metabolism.

Aβ neuropathology and mitochondrial energy metabolism in AD pathogenesis

Recent evidence links a potential pathogenetic role of Aβ neuropathology in AD with mitochondria pathogenesis, ultimately playing a pivotal role in the onset and possibly in the progression of clinical dementia (Bubber et al. 2005). Mitochondria, in the presence of elevated Aβ peptides, increase the formation of reactive oxygen species (ROS) which act as damaging agents and as signaling molecules. Interestingly, inhibition of energy metabolism alters the processing of the amyloid precursor protein (APP) and induces potentially amyloidogenic Aβ fragments (Gabuzda et al. 1994). Moreover, highly reactive ROS are capable of unleashing mechanisms involving the liberation of cytochrome c, which leads to neuronal apoptosis (Picklo and Montine 2007; Vina et al. 2007), a feature of the AD brain.

Consistent with these observations, a recent genome-wide microarray study of the AD brain found a strong association between the decreased expression of mitochondrial gene products involved in mitochondrial oxidative phosphorylation (OXPHOS) and glucose metabolism as a function of the progression of clinical dementia (Qin et al., unpublished data). In line with this observation, recent positron emission tomography studies demonstrated that
Mitochondrial glucose utilization is also reduced in the brain of patients with AD, supporting the hypothesis that glucose hypometabolism in AD-afflicted brains might ultimately result in increased steady-state concentrations of cerebral glucose (Haley et al. 2006).

This evidence is quite interesting, especially in view of recent evidence from our laboratory suggesting that, in an in vitro model of AD-type amyloidogenesis, the predicted elevation of amyloidogenic Aβ peptides coincides with hyperglycemic culture conditions in a dose-dependent manner (Qin et al., unpublished data). This evidence strongly associates abnormal brain glucose metabolism with abnormal OXPHOS mitochondria in the AD brain and possibly provides further evidence supporting a causal role for hyperglycemic conditions associated with metabolic syndrome as risk factors in AD (Jagust et al. 1991; Minoshima et al. 1995; Craft and Watson 2004; Craft 2007). Although evidence exists that hyperglycemia in type 2 diabetes causes up to a fourfold increase in neuronal glucose levels (Tomlinson and Gardiner 2008), the molecular mechanisms through which impaired glucose metabolism/mitochondrial oxidative phosphorylation contributes to AD amyloid neuropathology is currently the subject of intensive investigation (Lin and Beal 2006), especially in respect to the potential role of dietary lifestyle factors (discussed below) in the prevention of AD dementia.

We also note, however that recent studies suggest that the antioxidant diet in aged beagles although not decreasing Aβ-amyloid neuropathology may enhance cognitive performance (Head et al. 2008), further supporting the hypothesis that control of mitochondrial OXPHOS activities among other factors, might be also further exploited as novel therapeutic targets for the beneficial role of certain dietary life style factors involved in the prevention of clinical dementia independent from AD Aβ amyloid neuropathology (Smith et al. 2000).

Metabolic syndrome as a risk factor for AD: the role of obesity

Much epidemiological evidence indicates that type 2 diabetes (a non-insulin dependent form of diabetes mellitus, NIDDM) is associated with a two- to threefold increased relative risk for AD, independent of the risk for vascular dementia (Skoog et al. 1996; Leibson et al. 1997; Stolk et al. 1997; Foredet et al. 1998; Kilander et al. 1998; Grant 1999; Meyer et al. 2000; Pyorala et al. 2000; Petot et al. 2003). High calorie intake and diets high in sugar and refined flour are major health concerns in the Western diet; along with sedentary lifestyles, they have been linked to an increased relative risk of AD. These unhealthy lifestyle choices have led to the growing incidence of obesity and altered insulin receptor (IR) signaling due to hyperglycemic condition, also known as IR-insensitivity, among other conditions. This complex of symptoms is generally known as metabolic syndrome (Torpy et al. 2006). While, until lately, metabolic syndrome was recognized for its aggravating role in several diseases – in particular, cardiovascular disorders – recent evidence strongly suggests metabolic syndrome as a major risk factor for AD dementia.

Obesity has received a large amount of attention as a risk factor for AD (Craft and Watson 2004; Fewlass et al. 2004; Craft 2007; Whitmer 2007). Indeed, growing evidence suggests a possible association between obesity in middle age, as measured by body mass index (BMI) and skinfold thickness, and risk of dementia later in life (Whitmer 2007). For example, obese participants (BMI greater than or equal to 30) in this study had a 35 percent greater risk of dementia compared with those of normal weight (BMI ranging from 18.6 to 24.9). The study
concluded that obesity in middle age increased the risk of future dementia independently of comorbid conditions. Finally, consistent with this evidence, Balakrishnan et al. (2005) investigated the association between plasma Aβ levels, BMI and fat mass. They found that certain molecular indexes recently implicated in inflammation processes, cardiovascular disorders, and hyperglycemic conditions in type 2 diabetes – which in turn are major risk factors in AD – contribute to the association between BMI/fat mass and plasma Aβ content, further linking obesity mechanistically with the onset, and possibly the progression, of AD dementia. More recently, obesity has been further linked mechanistically to AD pathogenesis based on abnormal metabolism of the obesity-related protein leptin (Fewlass et al. 2004). Leptin, a peptide hormone secreted by adipose tissue, exhibits a wide range of central and peripheral actions. Among other functions, it was proposed that leptin’s participation in diseases such as obesity is due, at least in part, to its impaired transport across the blood-brain barrier (Dietrich et al. 2007). Interestingly, leptin was shown to attenuate β-secretase processing of APP in neuronal cells, possibly through mechanisms involving altered lipid composition of membrane lipid rafts. Most strikingly, chronic administration of leptin to AD-transgenic animals reduced the brain Aβ load, suggesting its therapeutic potential in AD (Fewlass et al. 2004). Consistent with this evidence, Dietrich et al. (2007) demonstrated that circulating leptin is transported into the brain by binding to the lipoprotein receptor megalin at the choroid plexus epithelium. In line with this hypothesis, attenuation of megalin expression in physiological and pathological conditions, such as during aging or in AD dementia, correlates with poor entry of leptin into the brain (Dietrich et al. 2007). Collectively, this information provides support to the hypothesis that pharmacological manipulation of leptin might be developed into a novel therapeutic strategy for AD.

The role of diabetogenic dietary lifestyles and altered IR signaling in AD: experimental approaches and therapeutic implications

Experimental evidence suggests that abnormalities in insulin metabolism in diabetic conditions mechanistically influence the onset of AD via their influence on the synthesis and degradation of amyloidogenic Aβ peptides. For example, insulin itself may significantly promote Aβ accumulation by accelerating amyloid precursor protein (APP)/Aβ trafficking from the trans-Golgi network, a major cellular site for Aβ generation, to the plasma membrane (Gasparini et al. 2001). Moreover, elevated levels of circulating insulin in diabetic conditions may also provoke amyloid accumulation by directly competing with Aβ for the insulin-degrading enzyme (IDE), thereby limiting Aβ degradation by IDE. Accumulating evidence has shown that, under diabetic conditions, impairments in certain IR-responsive cellular signaling pathways may also mechanistically promote AD-related neuropathology and cognitive deterioration (Phiel et al. 2003; Ho et al. 2004; Cao et al. 2007; Craft 2007; Li et al. 2007). Building on this observation, a recent hypothesis suggested that, regardless of diabetic or non-diabetic status, impaired insulin signaling in the brain may be a common underlying cause for sporadic AD (Steen et al. 2005). Cellular insulin signaling is initiated by the coupling of extracellular insulin with the IR in the plasma membrane, leading to IR activation and subsequent promotion of cellular IR-signaling processes (Taniguchi et al. 2006). Despite the central
role of IR activation in cellular IR-signaling processes, there is limited and conflicting information on the regulation and activity of IR in the brains of subjects with sporadic AD. In particular, Frolich et al. (1998) reported significantly increased IR-binding activity in the brains of subjects afflicted with sporadic AD. In contrast, Steen et al. (2005) and Rivera et al. (2005) observed that AD is associated with significantly reduced IR content and IR activity in the brain. While this evidence tentatively suggests that abnormal carbohydrate metabolism might play an important role in AD through mechanisms that involve Aβ peptide generation, experimental studies also suggest that insulin resistance may promote AD amyloid neuropathology in Tg2576 mice, possibly by limiting Aβ degradation via competition with insulin for degradation by IDE (Farris et al. 2003).

While insulin has received major attention for its potential role in amyloid neuropathology, recent evidence also suggests a role for insulin in normal memory function, supporting the hypothesis that insulin, by itself, affects many mechanisms related to neuronal activity and cognitive function. Chronic hyperinsulinemia and insulin resistance, or reduced insulin effectiveness, may negatively influence memory (Luchsinger et al. 2004a). Hoyer (2002) proposed that low concentrations of circulating insulin in the central nervous system—along with reduced IR expression and subsequent altered downstream signaling—would ultimately lead to reduced levels of acetylcholine and a corresponding decrease in cerebral blood flow.

We recently explored the role of experimental type 2 diabetes in a mouse model of AD amyloid neuropathology. We found that a diabetogenic diet resulting in hyperglycemic and hyperinsulinemic conditions coincided with increased amyloidogenic Aβ1-40 and Aβ1-42 peptide levels and AD-type Aβ neuropathology in the brains of AD mice (Ho et al. 2004). Moreover, the increased AD-type amyloid burden also coincided with a significant potentiation of cognitive deterioration (Ho et al. 2004). Further exploration of the apparent interrelationship of insulin resistance to brain amyloidosis revealed a functional decrease in IR-mediated signal transduction in the brain (Ho et al. 2004). Collectively, these studies strongly suggest that one mechanism through which diet-induced insulin resistance in AD mice can significantly promote AD-type amyloidosis in the brain is the impairment of IR signaling, which results in elevation of γ-secretase activities. The studies suggest that hyperglycemic conditions associated with experimental type 2 diabetes conditions may further contribute to AD-amyloid neuropathology by attenuating the degradation of Aβ peptide pathways associated with IDEs (Scheme 1) (Ho et al. 2004; Zhao et al. 2006).
Figure Scheme 1. Hypothetical role of diabetogenic diet in AD amyloid pathogenesis. IRS, insulin receptor substrate; PI3K, phosphoinositide kinase-3.

Consistent with our finding, Li et al. (2007) examined whether AD-type neuropathology and cognitive deterioration occurred in two rat models with spontaneous onset of type 1 and type 2 diabetes; they found that endogenous Aβ peptides, phospho-tau accumulation, and neurodegeneration are primarily features of rats with hyperglycemic type 2 diabetic rather than with type 1 insulin-independent diabetes insipidus. The severity of AD-type neuropathologic changes was greater in the type 2 diabetic model and appeared to be associated with hypercholesterolemic conditions. A more recent study also suggests that a hyperglycemic condition may also exacerbate intra-cerebral administration of Aβ peptides, with respect to spatial learning and memory function, relative to control normoglycemic mice (Huang et al. 2007). Finally, a recent study suggests that intake of sucrose-sweetened water induces insulin resistance and exacerbates memory deficits and amyloidosis in a transgenic mouse model of AD neuropathology (Cao et al. 2007). However, we also note that vascular factors could also contribute and predict the rate of progression in AD (Mielke et al. 2007). Thus, despite the exciting evidence from experimental rodent models of AD-type neuropathology further discussed below suggesting a pathogenetic role of Aβ in the onset and progression of AD dementia, Aβ amyloidosis might not be both necessary and/or sufficient to explain the development of AD clinical dementia, under certain conditions (Hayden et al. 2006).

Collectively, these studies suggest that controlling certain cardiovascular risk factors e.g. hyperglycemic conditions by engaging in healthy dietary lifestyles might prove to be an effective way to curtail the risk of developing AD through the control of either Aβ dependent or independent brain pathogenetic mechanisms as further discussed below.
Calorie restriction as a potential preventative dietary lifestyle factor in AD

Recent studies support the hypothesis that calorie intake, among other non-genetic factors, influences the relative risk for AD clinical dementia. Most remarkably, while, as discussed above, high calorie intake may promote AD neuropathology, recent experimental evidence strongly supports the hypothesis that calorie restriction (CR; primarily via reduced carbohydrate intake) can prevent it (see below). This exciting evidence is consistent, in part, with current epidemiological studies suggesting that obesity and diabetes are associated with a more than fourfold increased risk for developing AD. Clarifying the mechanisms through which calorie intake may ultimately influence AD neuropathology, and eventually discovering future ‘mimetics’ capable of recapitulating ‘anti-Aβ activities’ will provide new avenues for the design of healthy dietary lifestyle therapeutic strategies for the treatment of AD and, possibly, other neurodegenerative disorders. The preventive effects of calorie reduction on the etiology of mild cognitive impairment, which are cases at high risk for developing AD cognitive decline, are supported in part by recent epidemiological evidence suggesting that individuals who habitually consume fewer calories demonstrate a reduced incidence of AD (Luchsinger et al. 2002; Gustafson et al. 2003).

Although evidence supports a potential neuroprotective role for calorie reduction in neurodegeneration (Mattson 2003), until recently there was no information on whether reduced calorie intake could attenuate AD neuropathology. Based on this consideration, we explored whether a clinically applicable weight reduction/calorie reduction regimen could attenuate the AD-type phenotype and found, for the first time, that calorie intake restriction based on an approximately 30 percent reduction of carbohydrate content in a mouse model of AD may prevent AD-type neuropathology through mechanisms associated with longevity (Wang et al. 2005).

Most importantly, in more recent studies consistent with the evidence from Tg2576 mice, discussed above, our laboratories confirmed this evidence by showing that a similar 30 percent calorie reduction in squirrel monkeys coincides with a significant reduction in Aβ1-40 and Aβ1-42 peptide content in the brain (Qin et al. 2006a). In view of the fact that several studies of squirrel monkeys have been successfully used to provide important human physiological and biological information at the organism, tissue, cellular, and molecular levels, these studies in squirrel monkeys strongly support the hypothesis that clinically applicable calorie reduction regimes might prevent amyloid neuropathology in humans, possibly preventing mild cognitive impairment and AD.

Although these studies are encouraging, and tentatively suggest that changes in dietary lifestyle such as lowering calorie intake might beneficially influence AD, we note that malnutrition remains a general problem among the elderly. Hence, dietary recommendations in AD may need to be made according to the needs of such comorbidities as type 2 diabetes and cardiovascular diseases.

Sirtuins at the crossroads of the promotion of longevity and the prevention of AD amyloid neuropathology following calorie restriction
Sirtuins, also known as silent information regulators, are class III histone deacetylases that catalyze deacetylation reactions in an NAD\(^+\)-dependent manner (Qin et al. 2006b). Sirtuins regulate important cell functions by deacetylating histone and non-histone targets. Activation of sirtuin extends lifespan and promotes longevity and healthy aging in a variety of species, potentially delaying the onset of age-related neurodegenerative disorders. Based on this consideration, we tested the hypothesis whether promotion of the NAD\(^+\)-dependent sirtuin, SIRT1, mediated deacetylase activity – a mechanism by which CR influences AD-type amyloid neuropathology – and found that it did (Qin et al. 2006b). Most interestingly, we found that the predicted attenuation of A\(\beta\) content in the brain during CR can be reproduced in mouse neurons \textit{in vitro} by manipulating cellular SIRT1 expression/activity, ultimately promoting the non-amyloidogenic \(\alpha\)-secretase processing of the APP, which precludes the generation of A\(\beta\) peptides. These results demonstrate, for the first time, a role for SIRT1 activation in the brain as a novel mechanism through which CR may influence AD amyloid neuropathology. The study provides a potentially novel pharmacological strategy for AD prevention and/or treatment. We also note that, in mammalian systems, sirtuin activators may also protect against axonal degeneration, polyglutamine toxicity, and microglia-mediated A\(\beta\) toxicity, suggesting the potential therapeutic value of sirtuins for patients with AD (Gan 2007). SIRT1 was recently shown to play a protective role against microglia-dependent A\(\beta\) toxicity through inhibition of NF-kappa B signaling (Chen et al. 2005).

### Dietary phytonutrients and food supplements: a role in the prevention of AD dementia?

An unprecedented consumer demand has arisen for foods or food constituents that help prevent or manage health conditions, including AD (ANON 2003; Howes et al. 2003; Anekonda and Reddy 2005). In 2002, 8 percent of consumers indicated that they had purchased food products aiming to prevent an undesirable health condition, and 50 percent of consumers reported purchasing foods to manage or treat conditions. Much of this consumer demand for therapeutic food products is for foods containing polyphenols. Over 35 thousand plant species currently used for medicinal purposes around the world possess more than 4 thousand polyphenolic structures (Macheix et al. 1990; Maclennan et al. 2002; Manach et al. 2005; Williamson and Manach 2005). These dietary polyphenolics provide numerous health benefits, such as anti-inflammation and antioxidation (Niijoldt et al. 2001; Duncan et al. 2003; Williams and Spencer 2004). Evidence is mounting that grape-derived polyphenols may beneficially influence AD amyloid neuropathology (Dai et al. 2006). Mounting evidence also shows that moderate consumption of red wine (which contains these grape-derived polyphenols) may causally attenuate AD amyloid pathogenesis and cognitive deterioration in preclinical models of AD (Wang et al. 2006) and reduce the incidence of AD (Luchsinger et al. 2004b). However, because polyphenolic compositions and bioactivities vary considerably due to plant-growth environments, there are problems with the preparation of grape-derived polyphenolics (and other dietary polyphenolics) (McGraw and Furedi 2005). For the same reason, there are also issues that complicate the harvest, storage, and processing/preparation of certain dietary sources of polyphenols (Anekonda and Reddy 2005).
These limitations have recently inspired a diverse group of interdisciplinary scientists with expertise in AD and nutritional-botanical sciences to design a series of studies with the ultimate goal of isolating and identifying bioactive natural compounds capable of providing beneficial AD-modifying activities, as discussed below.

**Fish and fish oil**

Epidemiological and animal studies have suggested that dietary fish or fish oil rich in omega-3 fatty acids, docosahexaenoic acid (DHA) and eicosapentaenoic acid, may affect psychiatric and behavioral symptoms in AD (Morris et al. 2003; Young and Conquer 2005). Lim et al. (2005) used a transgenic AD-type mouse to evaluate the impact of DHA on AD neuropathology. They found that DHA-enriched diets significantly reduced total AD-type amyloid neuropathology by more than 70 percent when compared with low-DHA or control chow diets. The results suggest that DHA could be protective against AD-type amyloid deposition in the brain and could eventually prevent downstream neurodegenerative conditions. Hashimoto et al. (2005) showed that DHA suppressed increases in the levels of lipid peroxide and ROS in the cerebral cortex and hippocampus of Aβ-infused rats, suggesting that DHA increases antioxidative defenses. Further, the authors were of the opinion that DHA is a possible therapeutic agent for ameliorating learning deficiencies due to AD. Although a number of epidemiologic studies reported that higher intake of omega-3 fatty acids (largely associated with fish consumption) is protective against Alzheimer’s disease (AD), other human studies reported no such effect (Arendash et al. 2007; Freund-Levi et al. 2007).

**Plant extract and spices**

Various parts of plants, including leaf, fruit, outer bark, root, etc., are used to enhance memory in traditional Asian medicine. Since plant products are known to enhance memory, various laboratories are working on mouse models of AD to observe which plant extracts decrease the severity of disease. Most recently, Niidome et al. (2007) reported that mulberry leaf extract may protect hippocampal neurons against the neurotic effect of Aβ1-42-induced cell death in a concentration-dependent manner. Ginkgo biloba has been shown to improve age-related memory deficits; most interestingly, recent evidence showed that the Ginkgo biloba extract scavenges NO with neuroprotective properties (Bastianetto et al. 2000; Luo et al. 2002).

The Ginkgo biloba extract EGb761 exhibited neuroprotective effects in several mouse models (Defeudis 2002), as well as maintaining and improving cognitive function in AD patients (Oken et al. 1998; Le Bars et al. 2002). Finally, recent in vitro studies indicate that the ginkgo extract’s activity is due to inhibition of Aβ-induced free radical generation and occurs in a dose-dependant manner (Yao et al. 2001). Because free cholesterol may be involved in the generation of neurotoxic Aβ peptides, Yao et al. (2004) examined the ginkgo extract EGb761 in relation to cholesterol and amyloidogenesis. Exposure of PC12 cells to EGb761 decreased the processing of APP, ultimately precluding the generation of neurotoxic Aβ peptides.

Recently, curcumin, a polyphenolic yellow pigment used in turmeric spice in Indian curries and food preservation has received much attention for its potentially beneficial role in AD dementia and neuropathology. Interestingly, the prevalence of AD in populations that are between the ages of 70 and 79 is 4.4-fold less in India than in the USA.
The compound is neuroprotective against Aβ toxicity in vitro (Shishodia et al. 2005), while also being anti-amyloidogenic (Aksenov and Markesbery 2001; Ringman et al. 2005). Furthermore, aged transgenic mice with high amyloid plaque loads that were either fed or injected with curcumin had less brain amyloid load and plaque burden, and fewer curcumin-labeled plaques (Yang et al. 2005). To evaluate whether curcumin could beneficially influence amyloid neuropathology in a mouse model of AD-type neuropathology, Lim et al. (2001) tested different doses of dietary curcumin on inflammation, oxidative damage, and plaque pathology. Curcumin significantly lowered oxidized proteins and interleukin-1β, a proinflammatory cytokine elevated in the brains of these mice, strongly supporting a further link between inflammation and AD neuropathology.

As discussed above, mitochondria-generated ROS are proposed to be involved in the apoptotic mechanism of Aβ-mediated neurotoxicity. Finally, recent evidence also shows that aged garlic extract not only suppressed the generation of ROS but also attenuated caspase-3 activation, DNA fragmentation, and poly ADP ribose polymerase cleavage and eventually protected against Aβ-induced apoptosis (Peng et al. 2002). These findings further suggest that garlic compounds can reduce apoptosis, possibly by enhancing the endogenous antioxidant defenses.

**The potential beneficial role of fruit polyphenols in AD**

Lau et al. (2005, 2007) reported that polyphenolic compounds found in fruits such as blueberries may exert their beneficial effects through signal transduction and neuronal communication. Furthermore, they showed that short-term blueberry supplementation increases hippocampal plasticity. Interestingly, recent evidence also suggests that pomegranates contain very high levels of antioxidant polyphenolic substances. Hartman et al. (2006) observed that mice treated with pomegranate juice had significantly (approximately 50 percent) less accumulation of soluble Aβ1-42 and amyloid deposition in the hippocampus than control mice. Quercetin is one of the major flavonoids found in many fruits and vegetables. Heo and Lee (2004) investigated the protective effects of quercetin on hydrogen-peroxide-induced neurodegeneration. Results showed that cell viability was clearly improved with quercetin, which showed a higher protective effect than vitamin C. They also observed that quercetin decreased oxidative-stress-induced neuronal cell membrane damage more than vitamin C. Finally, a recent study further confirmed that polyphenol-rich fruits, such as bananas, oranges, and apples, may protect against oxidative stress in an in vitro model of AD (Heo et al. 2008).

**The benefits of moderate consumption of red wine in the prevention of AD**

Another important component of the typical Mediterranean diet that was recently implicated as a healthy dietary lifestyle for the prevention of AD is the moderate consumption of red wine. Interestingly, recent experimental evidence found that moderate consumption of red wine, in the form of Cabernet Sauvignon, significantly attenuated AD-type cognitive deterioration and amyloid neuropathology in a mouse model of AD (Wang et al. 2006). The study found that regular consumption of wine over seven months significantly reduced AD-type changes in the brains of
mice bred to have AD type symptoms. This supports epidemiological evidence suggesting that moderate wine consumption, one glass per day for women and two for men, may help reduce the relative risk for AD clinical dementia (Russo et al. 2003; Savaskan et al. 2003; Luchsinger et al. 2004b). Based primarily on this evidence, current studies are focused on identifying natural compounds in wines or other foods, including grapes, that might be neuroprotective.

Resveratrol, a naturally occurring polyphenol found mainly in grape skins and red wine, markedly lowers the levels of secreted and intracellular Aβ peptides. Savaskan et al. (2003) showed that resveratrol maintains cell viability and exerts an antioxidative action by enhancing the intracellular free radical scavenger glutathione. Tea represents another large family of plants containing high amounts of polyphenols that may confer a variety of health benefits. Recently, it has been hypothesized that tea consumption may also reduce the risk of age-related neurodegenerative pathologies. Considering the deleterious role of Aβ in the etiology of AD, Bastianetto et al. (2006) investigated green and black tea extracts and flavan-3-ols (present as monomers and dimers in green and black forms, respectively) against the toxicity induced by Aβ-derived peptides using primary cultures of rat hippocampal cells. Both green and black tea extracts displayed neuroprotective action against Aβ toxicity. These effects were shared by gallic acid (the most potent flavan-3-ol), epicatechin gallate, and epigallocatechin gallate (EGCG). Interestingly, EGCG and gallic acid inhibited Aβ aggregation and/or the formation of Aβ-derived diffusible neurotoxin ligands. Catechin gallates contribute to the neuroprotective effects of both green and black teas. Moreover, the protective effect of EGCG is likely to be associated, at least in part, with its inhibitory action on the formation of Aβ fibrils/oligomers. The authors hypothesized that not only green but also black teas are benefit the AD-afflicted brain. The primary target of existing drugs for the treatment of AD is the inhibition of the enzyme acetylcholinesterase. Okello et al. (2004) reported that both green and black teas inhibited human acetylcholinesterase.

Accumulation of iron at sites where neurons degenerate in Parkinson's disease and AD is thought to play a major role in the oxidative-stress-induced process of neurodegeneration. The main polyphenol constituent of green tea, EGCG, possesses iron-chelating, radical-scavenging and neuroprotective properties, offering potential therapeutic benefits. Lin et al. (2007) used a human neuronal cell line, MC65, and conditional expression of an APP protein fragment (APP-C99) to investigate the protection mechanism of EGCG and, excitingly, found that treatment with EGCG may, through the promotion of the non-amyloidogenic processing of APP, significantly reduce and even ultimately prevent the generation of neurotoxic Aβ peptides in the brain.

The role of dietary homocysteine in AD

Recent epidemiologic studies of different sample populations have suggested that the risk of AD may be increased in individuals with high-calorie diets and in those with increased homocysteine levels. Dietary restriction and supplementation with folic acid can reduce neuronal damage and improve behavioral outcomes in mouse models of AD (Mattson 2003). Animal studies have shown that the beneficial effects of dietary restriction result, in part, from increased production of neurotrophic factors and cytoprotective protein chaperones in neurons. By keeping homocysteine levels low, folic acid can protect cerebral vessels and can prevent the accumulation of DNA damage in
neurons caused by oxidative stress and facilitated by homocysteine. Emerging data suggest that high-calorie diets and elevated homocysteine levels may render the brain vulnerable to neurodegenerative disorders (Mattson 2003). However, two recently published papers provide conflicting results on the benefits of using supplementation with folic acid to lower homocysteine levels and its impact on cognitive function. A two-year trial on 276 healthy, older people (65 and older) lowered homocysteine but failed to improve cognitive function in these healthy subjects (McMahon et al. 2006). A three-year study supplementing folic acid significantly improved certain aspects of cognitive function that tend to decline with age in people between 50 and 70 years of age (Durga et al. 2007). However, more research in this area is required. Until then, it is certainly reasonable to recommend, especially to people at risk for AD, inclusion in their diets of foods high in folic acid. These include leafy green vegetables, lentils, and unrefined whole grains.

**Dietary lifestyles: recommendations for the prevention of metabolic syndrome and AD dementia**

Based in part on the evidence discussed in this review article, it appears possible that in the near future we might consider employing dietary intervention in preventative and possibly therapeutic strategies for AD. However, we want to point out that if modifications of dietary lifestyle prove to be helpful in either the prevention or treatment of AD, patients will have to undertake a permanent lifestyle change. Just as with many other chronic disorders, temporary changes in diet are not usually of any long-term benefit. We note that better long-term compliance with any lifestyle change is more likely if choices are available that address food preferences, satiety, availability of foods, and other factors. We must not make the mistake of thinking that one size fits all.

A diet that emphasizes whole foods and avoids refined and heavily processed foods will decrease exposure to added sugars, refined grains devoid of nutritional benefit, and manufactured trans fats. None of these foods should be a part of a healthy diet for any member of our population. Luckily, lifestyle changes that may have positive effects on AD will favorably impact a variety of chronic health conditions relating to obesity. An effective treatment will not only address AD but will also normalize weight, improve the components of metabolic syndrome, and treat or prevent diabetes and cardiovascular disease; it could revolutionize preventive care.

The Mediterranean diet, which is rich in healthy oils – especially fish containing omega-3 fatty acids, and unrefined whole foods – while decreasing the intake of other animal proteins and lowering saturated fats, has also shown benefits for treating AD. The moderate intake of red wine, also associated with a Mediterranean-type diet, provides important nutrients that may play a role in ameliorating AD (Wang et al. 2006). Mediterranean-type diets do not have to contain excessive quantities of carbohydrate foods but do contain primarily those foods high in nutrients, such as polyphenols and other foods with antioxidant effects, to protect from ROS, which detrimentally affect mitochondrial and energy metabolism activities.

In recent years, a plethora of studies on low-carbohydrate ketogenic diets have been published. None of the studies that looked at numerous factors supported the many theories that these dietary plans are dangerous. No study has
demonstrated damage to kidney or liver function or loss of bone mass. Such diets have also performed better than, or at least as well as, other diets with similar long-term weight loss results (Gardner et al. 2007).

For those with no clinical experience with low-carbohydrate diets, one significant group of findings related to cardiovascular risk factors presented rather surprising results. Virtually every study has demonstrated that such diets provide significant improvements in triglyceride and high-density lipoprotein levels as compared to low-fat, calorie-restricted diets (Feinman and Volek 2006). Since no good therapy exists to increase high-density lipoprotein levels to lower cardiovascular risk, controlling both the quality and quantity of carbohydrate foods should be considered a viable choice. It appears that even natural saturated fats, as compared to manufactured trans fats, behave in a positive way, especially when restricting carbohydrates. Postprandial lipids and a number of other atherogenic markers are improved (Forsythe et al. 2008). Individuals with dangerous small, dense low-density lipoprotein (pattern B) have been shown to shift their LDL particle size to the safer pattern A (Seshadri et al. 2004; Krauss et al. 2006; Westman et al. 2006). When consuming foods with a lower glycemic load, as happens with low-carbohydrate diets, inflammatory markers have improved even when compared to people on diets providing a lower fat intake (Forsythe et al. 2008). In subjects with type 2 diabetes, controlling both the quality and quantity of carbohydrate foods leads to better insulin sensitivity, better glycemic control and, most importantly the need for fewer medications (Gutierrez et al. 1998; Volek and Feinman 2005).

It is quite common for those on a very low carbohydrate diet to spontaneously lower their calorie intake without actively counting calories. This likely occurs because of the satiety effects of a higher protein and natural fat intake. If a lifelong dietary change must take place to address the risk of AD, then hunger control must be a prime consideration, or the diet simply will not be followed (Nichols-Richardson et al. 2005). When controlling carbohydrates one is able to concentrate on an adequate protein intake, a quantity of low-glycemic vegetables and fruits, natural fats from all sources including fish, nuts and seeds, avocado, olives and olive oil.

**Conclusion**

Our studies, and recent work by others, support existing epidemiological evidence indicating that calorie intake is positively associated with increased incidence of AD. These findings raise the possibility that changes in dietary regimens may be used in the future as preventative measures aimed at delaying the onset of AD amyloid neuropathology. Investigations in experimental mouse models of AD-type amyloid neuropathology are of great potential benefit in terms of public health. They provide insights into possible interventions aimed at preventing or ameliorating conditions associated with aging, obesity, and diabetes, all of which indicate a high risk of developing AD dementia.

We want to point out, however, that decisions about diet recommendations in AD can be a complex endeavor and must, of course, be a healthy diet. Recommendations should be made on the basis of combined evidence from prospective epidemiological studies, and, ultimately, controlled clinical studies. While we believe that the ultimate
evidence to support such recommendations should come from controlled clinical studies, we are also aware of the potential limitations of this approach. For example, we point out that, in view of the chronic nature of AD dementia and its relatively long latency period, it may be difficult to execute appropriate clinical studies over a long enough time and with large enough samples to draw accurate and repeatable conclusions. Despite these limitations, however, we believe that the recent prospective studies identifying increased calorie intake as a risk for AD offer practitioners enough evidence to prudently address the dietary issues facing their patients at risk for AD. We also believe that a diet rich in protein (especially fish), non-starchy vegetables, low glycemic fruits, and natural fats; low in foods with added sugars (especially high fructose corn syrup) and processed foods; and with moderate wine intake will be beneficial in normalizing insulin and blood sugar pathology, will provide a variety of antioxidant nutrients, will improve brain function, and may possibly prevent AD.

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J.Physiol 2012 590:2485-2499 Gomez-Pinella see also Lustig / Yudkin*

References

  o CrossRef,


  o CrossRef,
  o PubMed,
  o CAS,
  o Web of Science® Times Cited: 112

  o CrossRef,
  o PubMed,
  o CAS,
  o Web of Science® Times Cited: 41

  o CrossRef,
  o PubMed,
  o CAS,
  o Web of Science® Times Cited: 146

  o CrossRef,
  o PubMed,
  o CAS,
  o Web of Science® Times Cited: 51

  o CrossRef,
  o PubMed,
  o CAS,
  o Web of Science® Times Cited: 22

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  ○ Web of Science® Times Cited: 126
  ○ CrossRef,
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  ○ CAS,
  ○ Web of Science® Times Cited: 332,
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  ○ CAS,
  ○ Web of Science® Times Cited: 12
  ○ CrossRef,
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  ○ CAS,
  ○ Web of Science® Times Cited: 42


  - CrossRef, PubMed, CAS, Web of Science® Times Cited: 408, ADS
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    - References
    - Web of Science® Times Cited: 81
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Direct Link:


  o [PubMed](https://www.ncbi.nlm.nih.gov/pubmed),
  o [CAS](https://www.cas.org),
  o [Web of Science® Times Cited: 355](https://www.scopus.com/inward/record.uri?eid=2-s2.0-0139049008&partnerID=40&md5=8a620aa31e2a5d6c6f0d7e8deb2d5f7f)

  o [Abstract](https://www.ncbi.nlm.nih.gov/pubmed/15039124),
  o [PDF(104K)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC528611/pdf/ptr18_624.pdf),
  o [References](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC528611/)
  o [Web of Science® Times Cited: 14](https://www.scopus.com/inward/record.uri?eid=2-s2.0-0444247765&partnerID=40&md5=8a620aa31e2a5d6c6f0d7e8deb2d5f7f)

  o [CrossRef](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC528611/),
  o [PubMed](https://www.ncbi.nlm.nih.gov/pubmed/9745067),
  o [CAS](https://www.cas.org),
  o [Web of Science® Times Cited: 280](https://www.scopus.com/inward/record.uri?eid=2-s2.0-0044247765&partnerID=40&md5=8a620aa31e2a5d6c6f0d7e8deb2d5f7f)

  o [PubMed](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC528611/),
  o [CAS](https://www.cas.org),
  o [Web of Science® Times Cited: 355](https://www.scopus.com/inward/record.uri?eid=2-s2.0-0044247765&partnerID=40&md5=8a620aa31e2a5d6c6f0d7e8deb2d5f7f)

  o [CrossRef](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC528611/),
  o [PubMed](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC528611/),
  o [CAS](https://www.cas.org),
  o [Web of Science® Times Cited: 21](https://www.scopus.com/inward/record.uri?eid=2-s2.0-0044247765&partnerID=40&md5=8a620aa31e2a5d6c6f0d7e8deb2d5f7f)

  o [CrossRef](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC528611/),
  o [PubMed](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC528611/)


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  - Web of Science® Times Cited: 1108,
  - ADS
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  - CAS,
  - Web of Science® Times Cited: 691
  - PubMed,
  - CAS,
  - Web of Science® Times Cited: 282
  - PubMed,
  - CAS,
  - Web of Science® Times Cited: 127
  - CrossRef,
  - PubMed,
  - CAS,
  - Web of Science® Times Cited: 87
  - CrossRef,
  - PubMed,
  - CAS,


Increased Fructose Intake as a Risk Factor For Dementia

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Abstract

The transition in the world age demographic toward older age is associated with an increased risk of neurodegenerative diseases, such as Alzheimer’s disease. Risk profiles for dementia may also be changing. Obesity and type 2 diabetes have increased in prevalence in the last half-century and have been associated with increased dementia risk. Specific changes in nutrition may also represent a direct risk. A diet transition in the United States has occurred in the intake of refined sugar, particularly high-fructose corn syrup (HFCS) from a yearly estimate of 8.1 kg/person at the beginning of the XIX century to a current estimate of 65 kg/person. This article considers the association between refined sugar intake, markers of cardiovascular disease risk, and the possible promotion of the development of dementia.

Key words Fructose intake Dementia Ageing Vascular health

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Processed foods lack key nutrients. 1tsp = fruits

J.Physiol 2012 590:2485-2499 Gomez-Pinella see also Lustig / Yudkin*
Alzheimer’s Disease—Yes, It’s Preventable!

By Dr. Mercola
An estimated 5.4 million Americans have Alzheimer’s disease, a severe form of dementia, and hundreds of thousands more may suffer from an often misdiagnosed subtype called "hippocampal sparing" Alzheimer's, according to recent findings. The most recent data suggests that well over half a million Americans die from Alzheimer's disease each year, making it the third leading cause of death in the US, right behind heart disease and cancer.

As discussed by Dr. Danielle Ofri in a recent New York Times blog, losing your mind, and with it, much of your personality and dignity, is a terrifying proposition. Making matters worse, many doctors shy away from addressing dementia—both with colleagues and their patients.

The reasons are many. Dr. Ofri suggests Alzheimer's strikes at the emotional heart of many clinicians, whose careers depend on the stability and functioning of their own minds and intelligence. In short, it frightens them too much to talk about it.

However, I strongly disagree with her commentary on the lack of strategies to prevent or modify the course of Alzheimer's.

"I suspect... that our reticence stems from deeper issues," Dr. Ofri writes. "All the top 10 killers in America are potentially preventable, or at least modifiable — all except dementia... We have tests to screen for many cancers, and treatments that prolong life... But there’s nothing, really, that we can do about dementia. There aren't any screening tests that can pick up the disease before symptoms appear. And even if there were, there aren't any treatments that make a substantial difference. For doctors, this is profoundly frustrating. No wonder dementia gets pushed onto the back burner. In the dishearteningly limited time of a medical visit, we're forced to focus on the diseases we can treat."

On the contrary, while early diagnostic tests are in short supply and successful treatments are virtually nonexistent, the evidence shows there’s plenty of hope when it comes to prevention!

This is exactly why doctors need to get with the program and start directing their patients toward healthier lifestyles rather than fall into the trap of thinking the situation is hopeless and their patients are helpless victims.
Heart Disease May Increase Your Odds of Developing Alzheimer's

I firmly believe that since there's no conventional cure, now or in the foreseeable future, the issue of prevention is absolutely critical if you want to avoid becoming an Alzheimer's statistic.

Ideally, doctors would begin counseling patients who are in their 20s and 30s on lifestyle strategies that promote heart and brain health throughout life. Then we would probably see a major shift in Alzheimer's statistics for that generation.

As it stands, the evidence points to lifestyle factors, primarily diet, as the driving forces of dementia. There are also many connections between Alzheimer's and other dietary-related diseases, such as diabetes and heart disease, suggesting that ALL of these diseases are preventable through identical means.

For example, previous research suggests diabetics have a doubled risk of developing Alzheimer's disease. Alzheimer's disease was even tentatively dubbed "type 3 diabetes" in 2005, when researchers discovered that your brain produces insulin that is necessary for the survival of your brain cells.

They found that a toxic protein called ADDL removes insulin receptors from nerve cells, thereby rendering those neurons insulin resistant, and as ADDLs accumulate, your memory begins to deteriorate. Recent research also points out that heart disease increases your odds of developing Alzheimer's. As reported by MedicineNet.com:

"Researchers found that artery stiffness -- a condition called atherosclerosis -- is associated with the buildup of beta-amyloid plaque in the brain, a hallmark of Alzheimer's disease."

'This is more than just another example of how heart health relates to brain health. It is a signal that the process of vascular aging may predispose the brain to increased amyloid plaque buildup,' said lead researcher Timothy Hughes...

Plaque builds with age and appears to worsen in those with stiffer arteries, he said. 'Finding and preventing the causes of plaque buildup is going to be an essential factor in the prevention of Alzheimer's disease and extending brain health throughout life,' Hughes added."

Subtype of Alzheimer's Disease Is Often Misdiagnosed

In related news, research presented at the 2014 American Academy of Neurology's meeting in Pennsylvania sheds new light on Alzheimer's cases that are often misdiagnosed. Researchers from the Mayo Clinic believe they have identified a variant of the disease, referred to as "hippocampal sparing" Alzheimer's, which is thought to affect an estimated 600,000 Americans. As explained by Medical News Today:

"All subtypes of Alzheimer's have two specific hallmarks in the brain. Amyloid beta is responsible for the formation of brain plaques, while tau produces tangles in the brain. In order to classify each subtype, the team used tangle counts to create a mathematical algorithm."
They found that while all Alzheimer's subtypes had the same amount of amyloid beta, the hippocampal sparing variant showed tau tangles in unequal areas of the hippocampus. They discovered that in patients with this subtype, tau specifically damages neurons in areas of the brain associated with behavior, motor recognition and awareness, and use of speech and vision."

Of the more than 1,800 Alzheimer's patients included in the study, 11 percent were found to have hippocampal sparing Alzheimer's, which does not destroy memory to the degree typically associated with Alzheimer's. Instead, this subtype of the disease tends to alter behavior, causing uncontrollable anger, visual impairments, speech problems, and the feeling that your limbs do not belong to you. Hippocampal sparing appears to affect more men than women, and the disease tends to set in much earlier than traditional Alzheimer's. Patients with hippocampal sparing also tend to deteriorate at a fast pace.

Misdiagnosis is common, as this subtype spares your memory. Quite often these patients end up being diagnosed with frontotemporal dementia or corticobasal syndrome instead. The former is associated with personality changes, while the latter is a progressive neurological disorder that can involve your motor system, cognition, or both, but patients typically present language problems first, followed by motor symptoms.

While the researchers believe that currently available Alzheimer's medications may be more effective for those with hippocampal sparing Alzheimer's than those with more traditional dementia, I firmly believe that drugs are not the answer to any of these conditions. Clearly, at the heart of it all is insulin and leptin resistance, fueled by a diet too high in refined sugars, processed fructose, and grains, combined with far too little healthful fats.

How to Prevent Alzheimer's Disease—A Neurologist Speaks Out

Last year, and again this spring, I interviewed Dr. David Perlmutter, author of the New York Times' bestseller Grain Brain. In my view, Dr. Perlmutter is probably the leading integrative medicine neurologist in the US, and his advice is clear: Alzheimer's is preventable through proper diet. After spending years treating people's neurological symptoms, he grew increasingly frustrated with his profession's lack of ability to get to the root cause. This frustration eventually led him to investigate the role of nutrition, and he became convinced that brain dysfunction is rooted in our modern-day high-grain diet. According to Dr. Perlmutter:

"[Alzheimer's] is a preventable disease. It surprises me at my core that no one's talking about the fact that so many of these devastating neurological problems are, in fact, modifiable based upon lifestyle choices… What we've crystallized it down to now, in essence, is that diets that are high in sugar and carbohydrates, and similarly diets that are low in fat, are devastating to the brain. When you have a diet that has carbohydrates
in it, you are paving the way for Alzheimer’s disease. I want to be super clear about that. Dietary carbohydrates lead to Alzheimer's disease. It's a pretty profound statement, but it's empowering nonetheless when we realize that we control our diet. We control our choices, whether to favor fat or carbohydrates.”

His book, Grain Brain, reveals how and why sugars and carbohydrates destroy your brain, and how to eat for neurological health. He notes Mayo Clinic research that reveals diets rich in carbohydrates are associated with an 89 percent increased risk for dementia while high-fat diets are associated with a 44 percent reduced risk. This combination of very little sugar and carbs, along with higher amounts of healthful fats is KEY for addressing not only Alzheimer's, but diabetes and heart disease as well. All of these conditions are rooted in insulin and leptin resistance, and the dietary answer is identical for all of them. Understanding this can make your life easier, as you don't need to memorize the dos and don'ts for each and every disease you seek to avoid. Instead, what you need to do is shift over to a mindset that is focused on optimizing health. Disease prevention then becomes a beneficial "side effect."

**Alzheimer's Is Directly Related to Elevated Blood Sugar Levels**

A study published in the New England Journal of Medicine in August 2013 demonstrates that even mild elevation of blood sugar—a level of around 105 or 110—is associated with an elevated risk for dementia. Dr. Perlmutter believes it's very important for physicians to become cognizant of this link, and to stop downplaying the risks associated with even mildly elevated blood sugar. So what is an ideal fasting blood sugar level?

Dr. Perlmutter suggests that anything over 92 or 93 is too high. He believes the ideal fasting blood sugar level is around 70-85, with 95 as the maximum. If your fasting blood sugar is over 95 mg/dl, it's definitely time to address your diet to lower it. If you're fat adapted, there's no reason to shun fasting blood sugar levels below 70, as your body is then able to tap into body fat as an energy source. According to Dr. Perlmutter:

"This notion that your brain needs sugar is really old news. Fat, specifically ketones, which your body produces by metabolizing your fat, is now called a 'brain superfuel.' There is even a pharmaceutical product; a medical food that you can write as a prescription, which raises the level of ketones or fat in the bloodstream of patients, offered up now as a treatment for Alzheimer's disease. Who knew? The point is the brain loves to burn fat. That's what we have to shift it over to..."

**Hit the Reset Button with Intermittent Fasting**

Intermittent fasting is a great tool to help "reset" your body to burn fat as its primary fuel again. Dr. Perlmutter also recommends starting off with a period of fasting, and he's particularly aggressive about it in patients who are insulin/leptin resistant. I typically recommend keeping your fasting insulin level below 3. The so-called normal, however, is anywhere from 5-25 microU per mL. As with fasting blood sugar, please do not make
the mistake of thinking that the "normal" insulin range equates to optimal! As noted by Dr. Perlmutter:

"If somebody has an insulin level of 26, they need a lot of work. They need to fast; drop the carbs; add back the good fat. They need to add in some anti-glycating agents like benfotiamine and resveratrol. We need to hit these people aggressively. This is what works. This is what reduces their risk of converting to diabetes, and therefore has a huge role to play in protecting their brains."

**The Importance of Saturated Fats for Healthy Brain Function**

Our ancestral diet was very high in saturated fats and virtually void of non-vegetable carbohydrates. Today, not only do we eat tremendous amounts of carbohydrates, these carbs are refined and highly processed. In the last decade, we've also shifted over to genetically engineered grains and sugar (GMO sugar beets and corn). Adding insult to injury, for the past 60 years conventional medical authorities have also warned that saturated fats cause heart disease and should be severely restricted.

This inappropriate fat phobia has undoubtedly played a significant role in the dramatic rise in dementia and other neurological disorders, because your brain cannot function properly without fats! The type of fat you eat makes all the difference in the world, though. You want to avoid all trans fats or hydrogenated fats that have been modified in such a way to extend their longevity on the grocery store shelf. This includes margarine, vegetable oils, and various butter-like spreads. Sources of healthy fats to add to your diet include:

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<tr>
<th>Avocados</th>
<th>Butter made from raw, grass-fed organic milk</th>
<th>Raw dairy</th>
<th>Organic pastured egg yolks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coconuts and coconut oil (<a href="https://example.com/coconut-oil">coconut oil</a> actually shows promise as an effective Alzheimer's treatment in and of itself)</td>
<td>Unheated organic nut oils</td>
<td>Raw nuts, such as pecans and macadamia, which are low in protein and high in healthy fats</td>
<td>Grass-fed meats or pasture raised poultry</td>
</tr>
</tbody>
</table>
Other Dietary Considerations

Here's a summary run-down of diet-related strategies that will help optimize your brain function and prevent Alzheimer's:

- **Avoid sugar and refined fructose.** Ideally, you'll want to keep your sugar levels to a minimum and your total fructose below 25 grams per day, or as low as 15 grams per day if you have insulin/leptin resistance or any related disorders.

- **Avoid gluten and casein (primarily wheat and pasteurized dairy, but not dairy fat, such as butter).** Research shows that your blood-brain barrier is negatively affected by gluten. Gluten also makes your gut more permeable, which allows proteins to get into your bloodstream, where they don't belong. That then sensitizes your immune system and promotes inflammation and autoimmunity, both of which play a role in the development of Alzheimer's.

- **Optimize your gut flora** by regularly eating fermented foods or taking a high-potency and high-quality probiotic supplement.

- **Increase consumption of all healthy fats, including animal-based omega-3.** Health-promoting fats that your brain needs for optimal function are listed above. Also make sure you're getting enough animal-based omega-3 fats, such as krill oil. (I recommend avoiding most fish because, although fish is naturally high in omega-3, most fish are now severely contaminated with mercury.) High intake of the omega-3 fats EPA and DHA help by preventing cell damage caused by Alzheimer's disease, thereby slowing down its progression, and lowering your risk of developing the disorder.

- **Reduce your overall calorie consumption, and/or intermittently fast.** Ketones are mobilized when you replace carbs with coconut oil and other sources of healthy fats. As mentioned above intermittent fasting is a powerful tool to jumpstart your body into remembering how to burn fat and repair the inulin/leptin resistance that is also a primary contributing factor for Alzheimer’s. To learn more, please see this previous article.

- **Improve your magnesium levels.** There is some exciting preliminary research strongly suggesting a decrease in Alzheimer's symptoms with increased levels of magnesium in the brain. Unfortunately, most magnesium supplements do not pass the blood brain levels, but a new one, magnesium threonate, appears to and holds some promise for the future for treating this condition and may be superior to other forms.

- **Eat a nutritious diet, rich in folate.** Vegetables, without question, are your best form of folate, and we should all eat plenty of fresh raw veggies every day. Avoid supplements like folic acid, which is the inferior synthetic version of folate.
Bright colors, rich diet

Some of the most health-enhancing nutrients in fruits and vegetables are bright red, orange, yellow and green.

A simple guide: Go for color

Dark and intensely-colored plant foods usually contain more chemically active antioxidant pigments than pale ones.

Some of the best:
- Pumpkin, winter squash
- Grapes, blueberries
- Sweet potato, yams
- Kale, spinach, dark greens
- Sweet peppers, all colors
- Plums, prunes
- Fresh corn
- Mango and papaya
- Oranges, other citrus
- Watermelon, other melons
- Strawberries
- Tomatoes
- Carrots

Magic chemicals
The most important chemically active nutrients
- Anthocyanins
- Apigenin
- Hesperetin
- Luteolin
- Proanthocyanidin
- Myricetin
- Quercetin
- Lycopene
- Beta carotene

What do antioxidants do?

“Free radicals” are small, cell-damaging molecules produced by the body as waste products; antioxidants neutralize them.

Oxygen

Body uses oxygen in metabolism

Free radical
Attacks and damages cells

Antioxidant
Neutralized free radical

*Environmental factors like pollution, sunlight, X-rays and smoking also create free radicals

© 2007 MCT

Source: Produce for Better Health Foundation, Dole Food Company, Florida Department of Agriculture and Consumer Services, Oregon State University, “Understanding Free Radicals and Antioxidants”
Graphic: Cindy Jones-Huflachor, Sun Sentinel
Besides diet, there are a number of other lifestyle factors that can contribute to or hinder neurological health. The following strategies are therefore also important for any Alzheimer's prevention plan:

- **Exercise regularly.** It's been suggested that exercise can trigger a change in the way the amyloid precursor protein is metabolized, thus, slowing down the onset and progression of Alzheimer's. Exercise also increases levels of the protein PGC-1alpha. Exercise also leads to hippocampus growth and memory improvement. I would strongly recommend reviewing the Peak Fitness Technique for my specific recommendations.

- **Optimize your vitamin D levels with safe sun exposure.** Strong links between low levels of vitamin D in Alzheimer's patients and poor outcomes on cognitive tests have been revealed. Researchers believe that optimal vitamin D levels may enhance the amount of important chemicals in your brain and protect brain cells by increasing the effectiveness of the glial cells in nursing damaged neurons back to health. Vitamin D may also exert some of its beneficial effects on Alzheimer's through its anti-inflammatory and immune-boosting properties. Sufficient vitamin D (50-70 ng/ml) is imperative for proper functioning of your immune system to combat inflammation that is also associated with Alzheimer's.

- **Avoid and eliminate mercury from your body.** Dental amalgam fillings, which are 50 percent mercury by weight, are one of the major sources of heavy metal toxicity, however you should be healthy prior to having them removed. Once you have adjusted to following the diet described in my optimized nutrition plan, you can follow the mercury detox protocol and then find a biological dentist to have your amalgams removed.

- **Avoid and eliminate aluminum from your body.** Sources of aluminum include antiperspirants, non-stick cookware, vaccine adjuvants, etc. For tips on how to detox aluminum, please see my article, "First Case Study to Show Direct Link between Alzheimer's and Aluminum Toxicity."

- **Avoid flu vaccinations** as most contain both mercury and aluminum, well-known neurotoxic and immunotoxic agents.

- **Avoid anticholinergics and statin drugs.** Drugs that block acetylcholine, a nervous system neurotransmitter, have been shown to increase your risk of dementia. These drugs include certain nighttime pain relievers, antihistamines, sleep aids, certain antidepressants, medications to control incontinence, and certain narcotic pain relievers. Statin drugs are particularly problematic because they suppress the synthesis of cholesterol, deplete your brain of coenzyme Q10 and neurotransmitter precursors, and prevent adequate delivery of essential fatty acids and fat-soluble antioxidants to your brain by inhibiting the production of the indispensable carrier biomolecule known as low-density lipoprotein.

- **Challenge your mind daily.** Mental stimulation, especially learning something new, such as learning to play an instrument or a new language, is associated with a decreased risk of Alzheimer's. Researchers suspect that mental challenge helps to build up your brain, making it less susceptible to the lesions associated with Alzheimer's disease.

## Preventing Alzheimer's Is Possible

According to Dr. David Perlmutter, fat avoidance and carbohydrate overconsumption are at the heart of the Alzheimer's epidemic. To learn more about how you can protect your brain health by eliminating non-vegetable carbs from your diet, I highly recommend reading his book, *Grain Brain*. In order to reverse the Alzheimer's trend, we...
simply must relearn how to eat for optimal health. Processed "convenience foods" are quite literally killing us, inducing diabetes, heart disease, cancer, and dementia. The beauty of following my optimized nutrition plan is that it helps prevent and treat virtually ALL chronic degenerative diseases, including diabetes, heart disease, and Alzheimer's. Other lifestyle factors, particularly sun exposure and exercise, are also potent allies against all forms of dementia. Ideally, you'll want to carefully review the suggested guidelines above, and take steps to incorporate as many of them as you can into your daily lifestyle. The sooner you begin, the better, considering that one in nine Americans over the age of 65 end up with Alzheimer's.

Iron: This Life-Saving Mineral Found to Actually Increase Senility in Many

July 19, 2012 | 332,011 views

By Dr. Mercola
Iron is essential for virtually every life form, including humans, where it is a key part of various proteins and enzymes, involved in the transport of oxygen and the regulation of cell growth and differentiation, among other uses.

One of the most important roles of iron is to provide hemoglobin (the protein in red blood cells) a mechanism through which it can bind to oxygen and carry it throughout your tissues, as without proper oxygenation your cells quickly start dying.

If you have too little iron, you may experience fatigue, decreased immunity or iron-deficiency anemia, which can be serious if left untreated.

However, if you have more iron than your body needs to satisfy your hemoglobin requirement (for cell oxygenation), the excess becomes a dangerous surplus.

Your body has a very limited capacity to excrete iron, which means it can build up in your tissues and organs, a dangerous occurrence because iron is a potent oxidizer and can damage your body tissues contributing to serious health issues, including Alzheimer's disease.

Reducing Iron Levels May Protect Your Brain from Alzheimer's

High iron levels in your blood can lead to the production of free radicals that can damage neurons in your brain. It's also believed that iron accumulates at high levels,
and is extremely reactive in the beta-amyloid plaques found in the brains of Alzheimer's patients.

A new animal study revealed that reducing iron levels in the blood triggered levels of beta-amyloid and phosphorylated tau protein, which disrupts the ability of neurons to conduct electrical signals, to return to normal.1 Experts on metal metabolism in the body said the research highlights the role of metal ions in the development of Alzheimer's, as excess iron accumulation in the brain is a consistent observation in Alzheimer's disease.

Separate research also showed that reducing excess iron in your brain can alleviate Alzheimer's-like symptoms in mice,2 while measuring brain iron has been suggested as a way to detect Alzheimer's disease in its early stages.3 Iron is also known to accumulate specifically in brain regions associated with memory and thought processes, which are gradually lost as Alzheimer's progresses. At this time it's not entirely clear whether the excess iron is the result of external sources, such as supplements or metal pans, or due to a genetic predisposition to absorbing too much iron or biochemical changes that cause an imbalance internally -- likely it's a combination of factors.

What is known is that too much iron in the wrong places is clearly toxic, and when accumulated in neurons may be a "final end-stage event in neurodegeneration."4

**How do You Know if Your Iron Levels are High?**

Checking your iron levels is done through a simple blood test called a serum ferritin test. I believe this is one of the most important tests that everyone should have done on a regular basis as part of a preventive, proactive health screen. The test measures the carrier molecule of iron, a protein found inside cells called ferritin, which stores the iron. If your ferritin levels are low it means your iron levels are also low.

The healthy range of serum ferritin lies between 20 and 80 ng/ml. Below 20 is a strong indicator that you are iron deficient, and above 80 suggests you have an iron surplus. The ideal range is between 40-60 ng/ml. The higher the number over 100 the worse the iron overload, with levels over 300 being particularly toxic and will eventually cause serious damage in nearly everyone that sustains those levels long term.

Fortunately most premenopausal women lose iron every month when they menstruate. As a result, menstruating women rarely suffer from iron overload syndromes, as removing blood from your body is the most effective way to lower iron levels. However, most adult men and postmenopausal women tend to be at a high risk for iron overload and all of its toxicity, as they don't have this monthly blood loss.

Additionally, some people also have a genetic predisposition to absorbing too much iron, which is called either hemochromatosis or hemosiderosis. Interestingly, one of the
most common causes of excess iron is the regular consumption of alcohol. Alcohol consumed on a regular basis will increase the absorption of any iron in your diet. For instance, if you drink some wine with your steak, you will likely be absorbing more iron than you need. Other potential causes of high iron levels include:

- Cooking in iron pots or pans. Cooking acidic foods in these types of pots or pans will cause even higher levels of iron absorption.
- Eating processed food products like cereals and white breads that are "fortified' with iron. The iron they use in these products is inorganic iron not much different than rust and it is far more dangerous than the iron in meat.
- Drinking well water that is high in iron. The key here is to make sure you have some type of iron precipitator and/or a reverse osmosis water filter.
- Taking multiple vitamins and mineral supplements, as both of these frequently have iron in them.

**What to Do if You Have High Iron Levels**

Some people advise using iron chelators like phytic acid or IP6, but I don't think that is a wise approach as donating your blood is a far safer and more effective and inexpensive approach for this problem. If, for some reason, a blood donor center is unable to accept your blood for donation you can obtain a prescription for therapeutic phlebotomy. At the same time, you will want to be sure to avoid consuming excess iron in the form of supplements, in your drinking water (well water), from iron cookware, or in fortified processed foods.

Certain phenolic-rich herbs and spices can reduce iron absorption, such as green tea and rosemary. Curcumin actually acts as an iron chelator, and in mice studies, diets supplemented with this spice extract exhibited a decline in levels of ferritin in the liver. Lastly, astaxanthin, which has been researched to have over 100 potential health benefits, has been shown to reduce iron-induced oxidative damage. Keep in mind, however, that iron is only one problematic metal for your brain. Others, including zinc, aluminum and copper, are also known to accumulate in your brain and are similarly linked to Alzheimer's disease.

**Tips for Preventing Alzheimer’s Disease**

Alzheimer's disease is currently at epidemic proportions, with 5.4 million Americans -- including one in eight people aged 65 and over -- living with Alzheimer's disease, according to the Alzheimer’s Association's 2011 Alzheimer's Disease Facts and Figures. By 2050, this is expected to jump to 16 million, and in the next 20 years it is projected that Alzheimer’s will affect one in four Americans.
You do not, however, have to feel powerless against this disease, as although there is no known cure as of yet, there are simple strategies available to significantly lower your risk. Some of the best strategies for Alzheimer's prevention, aside from avoiding excess iron, include:

- **Fructose.** Most everyone benefits from keeping their total fructose consumed to below 25 grams per day. Fructose has several modes of neurotoxicity, including causing damage to the circulatory system upon which the health of nervous system depends, as well as changing the brain's craving mechanism. Since the average person is exceeding this recommendation by 300% this is a pervasive and serious issue. I view this as the MOST important step you can take. Additionally, when your liver is busy processing fructose (which your liver turns into fat), it severely hampers its ability to make cholesterol, an essential building block of the brain crucial to its health. This is yet another important facet that explains how and why excessive fructose consumption is so detrimental to your health.

- **Improve Magnesium Levels.** There is some exciting preliminary research strongly suggesting a decrease in Alzheimer symptoms with increase levels of magnesium in the brain. Unfortunately most magnesium supplements do not pass the blood brain levels, but a new one magnesium threonate appears to do and holds some promise for the future for treating this condition.

- **Optimize your vitamin D levels with safe sun exposure.** Strong links between low levels of vitamin D in Alzheimer's patients and poor outcomes on cognitive tests have been revealed. Researchers believe that optimal vitamin D levels may enhance the amount of important chemicals in your brain and protect brain cells by increasing the effectiveness of the glial cells in nursing damaged neurons back to health. Vitamin D may also exert some of its beneficial effects on Alzheimer's through its anti-inflammatory and immune-boosting properties. Sufficient vitamin D is imperative for proper functioning of your immune system to combat inflammation that is also associated with Alzheimer's.

- **Keep your fasting insulin levels below 3.** This is indirectly related to fructose, as it will clearly lead to insulin resistance. However other sugars, grains and lack of exercise are also important factors.

- **Vitamin B12:** According to a small Finnish study recently published in the journal Neurology, people who consume foods rich in B12 may reduce their risk of Alzheimer's in their later years. For each unit increase in the marker of vitamin B12 (holotranscobalamin) the risk of developing Alzheimer's was reduced by 2 percent. Very high doses of B vitamins have also been found to treat Alzheimer's disease and reduce memory loss.

- **Eat a nutritious diet, rich in folate,** such as the one described in my nutrition plan. Strict vegetarian diets have been shown to increase your Alzheimer's risk, whereas diets high in omega-3's lower your risk. However, vegetables, without question, are your best form of folate, and we should all eat plenty of fresh raw veggies every day.

- **High-quality animal based omega-3 fats,** such as krill oil. (I recommend avoiding most fish because although fish is naturally high in omega-3, most fish are now severely contaminated with mercury.) High intake of the omega-3 fatty acids EPA and DHA help by preventing cell damage caused by Alzheimer's disease, thereby slowing down its progression, and lowering your risk of developing the disorder. Researchers have also said DHA "dramatically reduces the impact of the Alzheimer's gene."
Avoid and remove mercury from your body. Dental amalgam fillings are one of the major sources of mercury, however you should be healthy prior to having them removed. Once you have adjusted to following the diet described in my optimized nutrition plan, you can follow the mercury detox protocol and then find a biological dentist to have your amalgams removed.

Avoid aluminum, such as antiperspirants, non-stick cookware, vaccine adjuvants, etc.

Exercise regularly. It's been suggested that exercise can trigger a change in the way the amyloid precursor protein is metabolized,14 thus, slowing down the onset and progression of Alzheimer's. Exercise also increases levels of the protein PGC-1alpha. Research has also shown that people with Alzheimer's have less PGC-1alpha in their brains,15 and cells that contain more of the protein produce less of the toxic amyloid protein associated with Alzheimer's. I would strongly recommend reviewing the Peak Fitness Technique for my specific recommendations.

Avoid flu vaccinations as most contain both mercury and aluminum!

Eat plenty of blueberries. Wild blueberries, which have high anthocyanin and antioxidant content, are known to guard against Alzheimer's and other neurological diseases.

Challenge your mind daily. Mental stimulation, especially learning something new, such as learning to play an instrument or a new language, is associated with a decreased risk of Alzheimer's. Researchers suspect that mental challenge helps to build up your brain, making it less susceptible to the lesions associated with Alzheimer's disease.

Avoid anticholinergic and statin drugs. Drugs that block acetylcholine, a nervous system neurotransmitter, have been shown to increase your risk of dementia. These drugs include certain nighttime pain relievers, antihistamines, sleep aids, certain antidepressants, medications to control incontinence, and certain narcotic pain relievers. A study found that those who took drugs classified as 'definite anticholinergics' had a four times higher incidence of cognitive impairment.16 Regularly taking two of these drugs further increased the risk of cognitive impairment. Statin drugs are particularly problematic because they suppress the synthesis of cholesterol, deplete the brain of coenzyme Q10 and neurotransmitter precursors, and prevent adequate delivery of essential fatty acids and fat-soluble antioxidants to the brain by inhibiting the production of the indispensable carrier biomolecule known as low-density lipoprotein.
Foods That May Induce Memory Loss and Increase the Risk of Alzheimer’s

WHITE FOODS
- White Bread
- White Flour
- White Rice
- Pasta
- White Sugar

Processed Foods & Meats
- American Cheese
- Processed Cheese
- Mozzarella Sticks
- Sausages
- Processed Meats
- Cold Cut Meats

Foods Containing Diacetyl or Nitrate
- Margarine
- Microwave Popcorn
- Beer

10 Ways to Prevent Alzheimer’s

1. Speak a second language. Bilingualism may strengthen overall cognitive skills and delay the development of Alzheimer’s disease by an average of four years. (The Journal of Neurology)

2. Flex your brainpower. Older adults who frequently read books and newspapers, do crossword puzzles or play cards could reduce their risk of developing Alzheimer’s disease by 47%. (The National Alzheimer’s Disease Center)

3. Eat like a Mediterranean. A diet rich in vegetables, legumes, fruits, fish and monounsaturated fats has been linked with a 48% reduction in risk for cognitive impairment, a precursor to Alzheimer’s. (Columbia University)


5. Drink coffee. People who drink 3-5 cups of coffee a day may reduce the risk of dementia and Alzheimer’s by 65%. (The Journal of Alzheimer’s Disease)

6. Lower your blood pressure. Controlling hypertension in the pre- or early stages of Alzheimer’s may reduce or delay the effects of the condition. (The Journal of the American Medical Association Neurology)

7. Get your fatty acids. Omega-3 fatty acids found in salmon, anchovies, walnuts and other foods have been associated with a lower risk of Alzheimer’s disease and slower cognitive decline. (The Journal of Neurology)

8. Don’t smoke. People who smoke heavily during middle age have a 137% higher risk of developing Alzheimer’s. Also, quitting smoking earlier can result in fewer risk factors for dementia overall. (The Archives of Internal Medicine)

9. Get moving. Moderate aerobic exercise such as walking may strengthen connections between circuits in the brain associated with cognitive abilities, including planning, prioritizing, multitasking and strategizing. (University of Illinois)

10. Sap your stress. Stressful life experiences may be linked to the onset and severity of Alzheimer’s disease. However, stress-busting activities like yoga and meditation may improve cognitive function and slow this decline. (The Journal of Neuroscience)
Sugar and your Brain:

Is Alzheimer's Disease actually Type 3 Diabetes?
Eat at least five servings of fruits and vegetables a day, use vegetables as the center of the meal.

Remember: do not eat foods boiled in oil, get good cold processed vegetable oils and thus good fatty acids, not trans or cooked animal oils. Eat only Levulose (fructose fruit sugars) not Dextrose (cane, corn, potato, grape sugar). Wellness is your Reward. Remember to chew your food, fruits alone, fluids alone, and melons alone.

Make vegetable and fruit juice part of your daily Wellness Healthy Regime.
PROOF SUGAR IS BAD, VERY BAD, REALLY LISTEN IT IS EXTREMELY BAD AND A MAJOR CAUSE AND AGGRAVATOR OF ALL DISEASE

http://youtu.be/Ah88gjejCTU short story of sugar

http://indavideo.hu/video/Bad_Bacteria_Take_over_the_Brain

http://www.downloads.imune.net/medicalbooks/Bad%20Bowel%20Bacteria%20can%20take%20control%20of%20your%20Brain.pdf


http://www.downloads.imune.net/medicalbooks/California%20bill%20would%20require%20warning%20labels%20on%20sugary%20drinks.pdf


http://www.downloads.imune.net/medicalbooks/Foods%20That%20Kill%20and%20should%20be%20banned%20and%20must%20be%20avoided.pdf
**SCHIZOPHRENIA: Wave of Gray Matter Loss**

**EARLY DEFICIT**

5 YEARS LATER (SAME SUBJECTS)

**ALZHEIMER'S DISEASE: Wave of Gray Matter Loss**

**EARLY DEFICIT**

1.5 YEARS LATER (SAME SUBJECTS)
Cauliflower & Eggplant Curry

Add some Red Pepper

Best Dish For Alzheimers

Curry Powder
Stimulates the mind and prevents alzheimers while cleaning the kidney
What is Alzheimer's disease?
Alzheimer's disease is a progressive disease in which healthy brain tissue degenerates, resulting in problems with memory, behavior, and other mental abilities. It is the most common cause of dementia (the loss of memory and other intellectual abilities serious enough to interfere with daily life) and the seventh-leading cause of death in the United States. Alzheimer's disease currently affects an estimated four million older Americans, a number that is expected to triple by the year 2050.
The world is awakening to WELLNESS. This was not even a word until recently. Now it is a world wide movement, people want to become WELL. Desire has developed and credentialed a new Doctorate in Wellness to awaken people and teach the art of making themselves and others WELL. For more details go to the International University at www.imune.net