

DAIRY PRODUCTS NUTRITION & HEALTH - MAJOR STUDIES

# BEST *of*

2012



Special Issue: **Cheese**

## Say Cheese!

- ▶ Reasonable cheese consumption is perfectly compatible with everyone's diet, even for those watching their heart health.
- ▶ In reasonable quantities, cheese does not cause weight gain and does not prevent weight loss when combined with a diet.
- ▶ It is very difficult or even impossible to reach recommended calcium levels with low consumption of dairy products, especially cheese.
- ▶ For the elderly, cheese helps to protect against undernourishment. In small volumes, it is an excellent source of calcium and many other nutrients (protein, phosphorus, zinc, selenium, vitamins K, D, A, B2 and B12, etc.).
- ▶ Cheese is an integral part of the "French Dietary Model" characterized by an even distribution between three main, structured meals (breakfast, lunch and dinner) and minimal snacking. Cheese lovers have a more balanced diet and more regular eating times.

### Do you need scientific references?

This *Best of*, which summarizes a selection of articles published in 2011 and 2012, has been written for you.

**Dr Yvette Soustre**

Cniel Nutrition Manager

Every year sees positive scientific studies published on the nutrition and health benefits of dairy products. In order to track them and make them easily usable by dairy professionals at various levels (regulatory, lobbying, communication, R&D, etc.), the scientific and technical division of CNIEL has created the "Best of". This publication compiles summaries (written for you) of (positive) articles on a given topic. The language has been simplified as much as possible in order to be accessible to as many people as possible and to highlight the essentials of the subject.

# BEST of

A theme-based publication  
of the Scientific and Technical Affairs Division of CNIEL  
aimed at professionals in the dairy industry.

#### For this issue

**Editors:** Yvette Soustre (PhD Science) and Christian Rayr

**Editorial Office:** Marie-Claude Lozet

**Researcher:** Vanessa Bodot

**Translation from French:** Arnaud Clément

**Proofreading of the English version:** Laurence Rycken (IDF)

Multiple copies available on request from: [nutritionssante@maisondulait.fr](mailto:nutritionssante@maisondulait.fr)

Cniel - 42 rue de Châteaudun - F 75314 PARIS CEDEX 09 - Tel: +33(1) 49 70 72 24



# “Cheese, at the heart of the French paradox...”

- Cheese may partly explain the relatively high cardiovascular protection enjoyed by the French.
- Two Cambridge researchers listed the beneficial effects of cheese on most indicators of cardiovascular health.



## Could cheese be the missing piece in the French paradox puzzle?

Petyaev IM, Bashmakov YK.  
Lycotec Ltd., Granta Park Campus, Cambridge, United Kingdom.  
Medical Hypotheses 2012 ; 79 (6) : 746-749.

*“We hypothesize that cheese consumption, especially of molded varieties, may contribute to the occurrence of the French paradox.”*

**T**he French eat more fat than Americans and their diet is higher in saturated fatty acids, and yet, their cardiovascular mortality rate is lower (50/100,000 in France, compared with 129/100,000 in the US). Cheese may be a missing piece in the explanation for this well-known “French paradox”. Many epidemiological,

clinical and experimental studies suggest that its regular consumption may reduce the risk of cardiovascular disease. Cheese has a neutral or beneficial effect on total cholesterol, LDL cholesterol and triglyceride levels. It has a positive effect on the blood circulatory system and coagulation factors. It reduces the rate of many inflammation markers and

improves the body’s inflammatory status. And finally, many of its peptides, which have been identified and isolated, enable better control of blood pressure. Researchers conclude that cheese, which is an essential component of the French diet, may be an important factor in cardiovascular protection.

## Dairy lipids are neither inflammatory nor atherogenic

A study was conducted on overweight subjects to evaluate the effect of lipids from various types of dairy products on biological markers of inflammation and atherogenicity. The first part of the study compared, over the course of three weeks, the effects of two types of breakfasts. The first contained 45g of dairy lipids from either butter, cream, yogurt or cheese; the other contained 7g of lipids from lower fat milk (low fat, reduced fat). The high-lipid breakfasts did not lead to an increase in biological markers of inflammation.

The second part of the study, conducted over the course of four weeks, involved full meals containing 50g of dairy lipids from either butter and cream, ice cream, or cheese and yogurt. It did not demonstrate an increase in inflammation markers, nor a difference between the sources of lipids.

These results support studies demonstrating no association between cheese and cardiovascular risk.

*Circulating inflammatory and atherogenic biomarkers are not increased following single meals of dairy foods.*  
Nestel PJ, Pally S, MacIntosh GL, Greeve MA, Middleton S, Jowett J, Meikle J.  
Department of Lipoproteins, Baker IDI Heart and Diabetes Institute, Melbourne, Victoria, Australia  
European Journal of Clinical Nutrition 2012 ; 66 (1) : 25-31.



# “The risk of metabolic syndrome is reduced by cheese consumption”

- A phenomenon that can be observed across all age groups: under 30, adults between 40 and 45, seniors between 59 and 60, women between 75 and 76...
- An epidemiological study involving 17,500 Norwegians (7,815 men and 9,685 women).

## The Oslo Health Study: Cheese Intake Was Negatively Associated with the Metabolic Syndrome.

Høstmark AT, Tomten SE.  
University of Oslo, Norway, Section of Preventive Medicine and Epidemiology, Oslo, Norway.  
Journal of the American College of Nutrition 2011 ; 30(3) : 182-90.



*“In conclusion, this study shows that the frequency of cheese intake can be negatively associated with (1) an index estimating the combined effect of many MetS factors, (2) the number of MetS requirements present, (3) single MetS risk factors, and (4) the complete MetS, as defined in this article.”*

**T**his study shows that the risk of metabolic syndrome is reduced by cheese consumption. Metabolic syndrome - a cardiovascular risk factor - is characterized by the simultaneous presence of abdominal obesity, blood lipid abnormalities and high blood glucose and blood pressure. Regular cheese consumption was evaluated for 17,500 Norwegians (7,815 men and 9,685 women) and frequency of consumption was estimated by “number of times per week”. Analysis allowed the creation of a metabolic syndrome risk score

for each participant which considered blood pressure, waist circumference, body mass index, triglycerides and HDL cholesterol (good cholesterol). The results demonstrate that cheese consumption is inversely correlated with the risk of developing metabolic syndrome or one of its symptoms. This observation holds

across all age groups: under 30, adults between 40 and 45, seniors between 59 and 60, seniors between 75 and 76 (with the exception of men in this age group). The frequency of cheese consumption is also linked with a lower body mass index (except for the eldest women).

### Examination

This study follows up on previous work done by the same team of Norwegian epidemiologists, who had demonstrated that the frequency of cheese consumption was inversely correlated with blood triglyceride levels and positively correlated with HDL cholesterol levels<sup>1</sup>.

Those data support a series of studies associating dairy products with a lower frequency of metabolic syndrome, especially the recent French study “D.E.S.I.R” (Epidemiological data on insulin resistance syndrome) which discusses the role of cheese among other things<sup>2,3</sup>.

<sup>1</sup> Journal of Food Lipids 2009 ; 16 : 89-102.

<sup>2</sup> Diabetes Care 2011 ; 34(4) : 813-7.

<sup>3</sup> Journal of the American College of Nutrition 2011 ; 30(5 Suppl1) : 454S-63S.

# “Cheese for the protection of women’s hearts”

- 33,636 Swedish women between 48 and 83 followed up for over 11 years.
- Women who eat a lot of cheese have a 26% lower risk of myocardial infarction compared to women who eat very little.

## Association between Dairy Food Consumption and Risk of Myocardial Infarction in Women differs by Type of Dairy Food.

Patterson E, Larsson SC, Wolk A, Akesson A.  
*Nutritional Epidemiology, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden.*  
*Journal of Nutrition* 2013 ; 143(1) : 74-9.

*“Failure to consider dairy foods as a heterogeneous group in future studies could hamper important insights of relevance for the development of dietary guidelines.”*

**M**ost observational studies seeking a link between dairy consumption and risk of cardiovascular disease have failed to find one, including those focused on whole dairy products. Some of these studies have even demonstrated that various dairy products have a protective effect, especially cheese.

The authors of this study followed up 33,636 Swedish women for 11.6 years. These women were between 48 and 83 years old when they entered the study and completely free from cardiovascular disease, cancer and diabetes. Over the course of the study, 1,392 of them suffered a myocardial infarction (254 of which were fatal).

This study demonstrates that the women who consumed the largest quantity of dairy products had a lowered risk of myocardial infarction (23% lower). A more detailed analysis indicated that the lowest risk level was for women who consumed the most cheese. Indeed, those women who consumed cheese nearly six times a day had a 26% lower risk compared to women who consumed it less than once a day. It is also

noteworthy that the authors did not observe any difference in effect on the heart between women who consumed whole or low fat products.

As the researchers pointed out, these results are consistent with those of other recent studies demonstrating potentially beneficial effect of cheese on cardiovascular events in women. The theories proposed include: a “matrix” effect,

a promoter effect of calcium on fecal excretion of lipids, an effect of the bacteria used in cheese production, or the presence of compounds created during fermentation (such as certain types of bioactive peptides or vitamin K2).

It now appears to be essential to properly distinguish the role of each dairy product family before drawing conclusions or making recommendations.

### Cheese and the heart: conditioned reflexes must be reconsidered

Dairy professionals have been confronted with the same idea for far too long: *“Cheese contains saturated fatty acids, saturated fatty acids raise cholesterol levels, cholesterol increases the risk of cardiovascular disease, therefore cheese raises the risk of cardiovascular disease”.*

This dogma arisen from false syllogisms has influenced and continues to influence medical practice, media discourse, regulations and consumption...

Hopefully, increasing scientific data allow the arguments in this excessively well-oiled chain of inferences to be gradually disproven. Not only does cheese not increase cardiovascular disease, but it is very likely that it has a beneficial effect on its occurrence or on some of its risk factors (especially metabolic syndrome, see pp. 4 and 6).

*Best Of Milk Products and Prevention of Cardiovascular Disease*

# “Cheese does not increase cholesterol, blood pressure or diabetes risk!”

- An intervention study conducted in Denmark on 49 men and women between 22 and 69 years.
- Reasonable cheese consumption is perfectly compatible with every diet, including for those who are concerned about their heart health.

## Cheese intake in large amounts lowers LDL-cholesterol concentrations compared with butter intake of equal fat content.

Hjerpsted J, Leedo E, Tholstrup T.  
Department of Human Nutrition, Faculty of Life Sciences, University of Copenhagen, Frederiksberg, Denmark.  
American Journal of Clinical Nutrition 2011 ; 94 (6) : 1479-84.

*“Thus, dietary advice regarding the intake of full-fat hard cheese by persons with hypercholesterolemia may need to be revised.”*

**E**ven very high consumption of cheese does not appear to negatively affect cholesterol levels, blood pressure or diabetes risk. This is the conclusion of a Danish experiment conducted over two 6-week periods on around 50 men and women with an average age of 55 (between 22 and 69). Over the study period, up to 13% of daily energy intake was from cheese. The participants consumed up to 143g of cheese per day of cheese, about 5 times the amount normally consumed in France!

Compared with their normal diet, this high cheese consumption did not increase their total/HDL cholesterol ratio (a strong marker of heart attack risk) or change their LDL cholesterol (“bad cholesterol”) level, triglyceride level or blood pressure (systolic or diastolic), nor their diabetes risk (their glucose and insulin levels and other markers of

diabetes risk remained unchanged). All in all, cheese played a completely neutral role.

Though fecal lipid excretion, due to calcium content of cheese, may be a clue, the authors of the study believe that the underlying mechanisms have still to be

discovered. In the meantime, they emphasize the need to change medical mindsets: if cheese does not influence markers of cardiovascular risk, it should not be systematically prohibited for patients, including those deprived of cheese due to hypercholesterolemia.

### Cheese and the heart: a neutral or even beneficial effect

**2006:** a review of the scientific literature demonstrates that cheese is not associated with increased cardiovascular risk. A positive effect of cheese on certain risk markers (cholesterolemia, diabetes and arterial hypertension) has been observed...<sup>1</sup>

**2010:** a meta-analysis including 37,000 individuals with followed for up to 13 years demonstrates that cheese consumption is not associated with increased cardiovascular risk. Actually, data even indicate the contrary : a reduced risk (-10%)<sup>2</sup>.

<sup>1</sup> Current Opinion in Lipidology 2006 ; 17 (1) : 1-10.  
<sup>2</sup> Lipids 2010 ; 45 (10) : 925-39.

# “Cheese against diabetes”

- A study conducted in 8 countries on over 340,000 individuals.
- Cheese has a protective effect on type 2 diabetes.



## The amount and type of dairy product intake and incident type 2 diabetes: results from the EPIC-InterAct Study.

Sluijs I, Forouhi NG, Beulens JWJ, Van der Schouw YT, Agnoli C, Arriola L, et al.  
University Medical Center Utrecht, Netherlands.  
The American Journal of Clinical Nutrition 2012 ; 96(2) : 382-90.

*“This large prospective study found no association between total dairy product intake and diabetes risk. An inverse association of cheese intake and combined fermented dairy product intake with diabetes is suggested, which merits further study.”*

**W**hile many studies have demonstrated an association between dairy consumption and a reduced risk of type 2 diabetes, others have not found any relationship. Differences can often be explained by extreme variation in the categories and quantities of dairy products consumed, but also by methodological differences between studies. Researchers drew on the enormous EPIC (European Prospective Investigation into Cancer and Nutrition) study, conducted in 8 European countries on 340,234 individuals, in order to better define the role of dairy products. Over the course of the study, 12,403 cases of type 2 diabetes were diagnosed. Although the authors found no association between total consumption of dairy products (all types) and diabetes risk, different

results are revealed by a product-by-product analysis, which indicates cheese's potentially beneficial role. Compared to low daily consumption (11g or less per day), consumption of 55g of cheese per day (slightly less than 2 servings) lowers the relative risk of diabetes by 12%. Similarly, the combined

consumption of cheese, yogurt and other fermented milk products is inversely associated with type 2 diabetes risk. For the researchers, while additional work is needed for confirmation, the fermentation mechanism may be involved in these positive results.

## Diabetic mice prefer ripened cheese

In an experiment conducted on obese diabetic mice, researches at the Université Catholique de Louvain in Belgium demonstrated that ripened cheese such as Brie or Camembert can significantly lower blood glucose levels. By comparing the effect of three types of cheese (unripened, ripened for 15 days and ripened for 35 days), they demonstrated that the length of the ripening period may be an important factor. The cheese ripened for 35 days significantly improved glucose tolerance on test animals and lowered their blood sugar levels (without affecting insulin secretion). Ripening is associated with numerous changes in product composition. The lipolysis and proteolysis processes caused by various types of bacteria lead to an increased concentration of free fatty acids (such as butyric acid) and bioactive peptides, which may act on the digestive tract or even on other target organs once they have entered the bloodstream. Other products of fermentation, like vitamin K2, may also play a role.

Journal of agricultural and food chemistry 2012 ; 60(8) : 2063-8.



# “Cheese to halt bone loss after menopause”

- Cheese may be a useful nutritional supplement against osteoporosis and fractures after menopause.
- Two studies conducted with the same method, one on women from 73 to 94 and the other starting in the 50s...

## Nutritional approach for inhibiting bone resorption in institutionalized elderly women with vitamin D insufficiency and high prevalence of fracture.

Bonjour JP, Benoit V, Pourchaire O, Rousseau B, Souberbielle JC.  
Division of Bone Diseases, Geneva University Hospitals and Faculty of Medicine, Geneva, Switzerland.  
The Journal of Nutrition Health and Aging 2011 ; 15(5) : 404-409.

## Consumption of Vitamin D-and Calcium-Fortified Soft White Cheese Lowers the Biochemical Marker of Bone Resorption TRAP 5b in Postmenopausal Women at Moderate Risk of Osteoporosis Fracture.

Bonjour JP, Benoit V, Rousseau B, Souberbielle JC.  
The Journal of Nutrition 2012 ; 142(4) : 698-703.

*“The consumption of soft plain cheese increasing the supply of vitamin D, calcium and proteins, could reduce bone resorption and thereby reduce the risk of incidental fragility fractures in the long term.”*

**T**wo studies conducted on post-menopausal women demonstrate potential advantage of cheese in preventing fractures due to osteoporosis.

The first study, conducted on women from 73 to 94 years old in institutional care, demonstrates that twice-daily consumption of 100g of plain white cheese enriched with calcium and vitamin D for six weeks increases calcium intake by 51%, and protein intake by 33%. Vitamin D levels also increased and biological markers of bone turnover improved.

The second study, conducted with the same protocol, found similar results with younger women of an average age of 57, whose spontaneous calcium and vitamin D intakes were too low. Consumption over six

weeks of plain white cheese enriched with calcium and vitamin D increased their protein and calcium intake and improved their bone status markers, suggesting a halting effect on bone loss.

These two studies confirm the nutritional interest of cheese after menopause. It may be a useful adjuvant in prevention or treatment of osteoporosis and its consequences.

### A high-cheese diet to reduce fracture risk

Conducted in the three cities of Bordeaux, Dijon and Montpellier, the French "Three-City" study explored the relationship between many types of diet and the risk of fracture for 1,482 elderly subjects in the region of Bordeaux. The study highlights the positive role of high calcium, phosphorus, vitamin B12, protein and unsaturated fatty acid intake and low to moderate alcohol consumption. A diet high in cheese, milk and cured meats is linked with the lowest risk of wrist (reduced by 19% over 8 years) and hip (reduced by 33%) fracture.

Nutrient patterns and risk of fracture in older subjects : results from the Three-City Study.  
Samieri C, Ginder Coupez V, Lorrain S, Letenneur L, Allès B, Féart C, et al  
Osteoporosis International 2012 ; doi 10.1007/s00198-012-2132-5.



# “Cheese during pregnancy means children with fewer cavities!”

- Cheese consumption by Japanese expectant mothers is correlated with a reduced number of cavities for their children.
- Dairy product and calcium intake were studied for 315 pregnant women and the oral health of their children was evaluated between 3.5 and 4 years.



## Dairy products and calcium intake during pregnancy and dental caries in children.

Tanaka K, Miyake Y, Sasaki S, Hirota Y.  
Department of Preventive Medicine and Public Health, Faculty of Medicine, Fukuoka University, Japan.  
Nutrition Journal 2012 ; 11 : 33.

*“Higher maternal cheese intake during pregnancy was significantly inversely associated with the risk of dental caries in children, showing a clear inverse dose–response relationship.”*

A study conducted in Japan investigated the possible correlation between maternal dairy product and calcium consumption during pregnancy and their children's risk of developing dental cavities a few years later. Dairy product and calcium intake was evaluated for 315 expectant mothers during pregnancy. Their children's oral health was then studied 41 to 50 months after birth, with the number of decayed or filled teeth used as the criterion.

A significant association was observed between high cheese consumption (for Japanese women) and reduced cavity risk, with a dose-dependent effect: higher cheese intake showed an inverse correlation with the relative risk of cavities. Compared with intake of 0.5g/day, cheese intake of 10g/day reduces cavity risk by 63%. Dairy products in general also appear to be

associated with reduced risk, but the relationship only borders on statistical significance.

In this study, cheese appears to be the main food associated with a beneficial effect. However, this

effect remains to be explained and may not be only due to its calcium content.

Nevertheless, these first results show a link between cheese consumption during pregnancy and reduced cavity risk in children.

## Casein protects enamel of teeth

Milk proteins are undergoing studies with the aim of using them as active ingredients in oral care products for prevention of dental enamel erosion. The main protein, casein (which represents 80% of proteins in milk), was tested in an aqueous solution. Its effect on a model of eroded dental enamel was compared to that of demineralized water. Casein significantly reduced softening, enamel erosion and tissue loss. Found in high concentrations in cheese, casein has already been the subject of studies for its cavity-fighting potential. In the future, casein and its byproducts may be used as an active ingredient for the prevention or reduction of dental erosion.

Inhibition of dental erosion by casein and casein-derived proteins.  
White AJ, Graça LH, Barbour ME.  
School of Oral and Dental Sciences, University of Bristol, Bristol, UK.  
Caries Research 2011 ; 45 (1) : 13-20.



# “Cheese, a balancing dietary factor”

- Milk, cheese and yogurt are essential for reaching nutritional recommended daily intake levels. Replacing them with other foods leads to dietary imbalances and deficiencies in certain nutrients.
- A finding of the NHANES study, which examined the diet of 16,822 Americans.

## Nutrients from dairy foods are difficult to replace in diets of Americans: food pattern modeling and an analyses of the National Health and Nutrition Examination Survey 2003-2006.

Fulgioni III VL, Keast DR, Auestad N, Quann EE.  
Nutrition Impact LLC, Battle Creek, USA.  
Nutrition Research 2011 ; 31 (10) : 759-65.

*“The replacement of dairy with calcium-equivalent foods alters the overall nutritional profile of the diet and affects nutrients.”*

It is impossible to follow nutritional recommendations without milk, cheese and yogurt. Between 2003 and 2006, the American NHANES study analyzed the diets of nearly 17,000 people. At least three dairy products per day are required to meet recommendations on calcium and magnesium intakes. And at least 4 dairy products per day are required to ensure sufficient potassium intake in adolescents and some adults. Replacing dairy products with other foods is not satisfactory, since it leads to dietary imbalances and negatively affects intake of many nutrients: protein, potassium, magnesium, phosphorus, and vitamins A, D, B2 and B12. Nor is it realistic, since the foods that are supposed to replace dairy products cannot be consumed in sufficient quantities to be "effective". For example, one would have to consume 1.2 servings/portions of sardines (including the bones) or 2.2 servings/portions of vegetables to obtain the same amount of calcium as is found

in a single serving of dairy products. In total, there is no substitute which is nutritionally equivalent to dairy products. And eliminating them would only increase the nutrient deficiency that has been observed in Americans with regards to calcium, potassium and vitamin D. This defi-

ciency causes public health problems, since it is associated with the development of diseases such as osteoporosis, diabetes and cardiovascular disease. In the United States, average dairy consumption is of 1.8 servings per day, approximately half of the required amount.

## Cheese, a source of balance for the French as well

In France, cheese consumption is an essential source of calcium for both adults and children. The calcium intake of 41% of children who do not eat cheese is less than two thirds of the recommended intake, putting them at risk for deficiency.

The data from the INCA 2 study ("Individual and national study on food consumption") on a representative sample of the French population (1,918 adults between ages 18 and 79 and 1,444 children between ages 3 and 17) allowed the evaluation of the contribution of dairy products to micronutrient intake. Cheese is the first contributor to calcium intake for adults and the second-largest contributor for children (after milk).

Benefit of individual cheeses portions in dietary education of Children.  
Richonnei-Dubuis C, Cassuto DA. *Médecine & Nutrition* 2012 ; 48 (2) : 43-47.  
The Contribution of Dairy Products to Micronutrient Intakes in France.  
Coudray B. *Journal of the American College of Nutrition* 2011 ; 30(5 Suppl 1) : 410S-4S.

# “Children, TV and snacking: veggies and cheese would be better choices”

- A study on 201 children around 8 1/2 years old.
- Children consume fewer calories with snacks based on vegetables and cheese.

## Association of Nutrient-Dense Snack Combinations With Calories and Vegetable Intake.

Brian Wansink, Mitsuru Shimizu, and Adam Brumberg,  
Food and Brand Laboratory, Cornell University, Ithaca, New York.

*“For parents, eliminating snacking altogether is impractical and, in some cases, can backfire. However, parents could potentially replace some non nutrients dense snacks with high nutrients dense snacks such as a cheese and vegetable combination.”*



**A** lack of physical activity and an imbalanced diet are significant factors in the development of childhood obesity. “Excessively fatty, salty, sugary” snacks or snacks that are low in nutrients are also frequently mentioned.

American researchers compared the effect of different kinds of snacks on the calorie intake of 210 children (including 115 girls) with an average age of 8 1/2. The children were sat in front of a 45-minute TV show and had access to different kinds of snacks. The aim was to determine if there was a difference in total calorie intake if the snacks were of low (chips) or high nutritional value (cheese, vegetables, a mix of the two).

**Results:** cheese/vegetable snack eaters consumed 72% less calories than eaters of chips. They also needed to eat much less in order to feel full (53 calories versus 282). The beneficial effect of the mixed cheese/vegetable snacks was even more pronounced for obese children

and those from disadvantaged homes. It is difficult or even impossible to completely prevent children from snacking. Offering them snacks based on combinations of cheese and vegetables could be a good way to reduce their calorie intake due to snacking.

## For bones, too!

The growth and maintenance of bone tissue is largely connected to dietary intake of calcium during childhood and adolescence.

High peak of bone mass at entry into adulthood limits later risk of osteoporosis and fractures. Adequate consumption of dairy calcium is beneficial to bone health.

**It is extremely difficult or even impossible to achieve the recommended calcium intake with low consumption of dairy products, and cheese in particular (see p10).**

Cheese provides large quantities of calcium in low volumes.

Combined with vitamin D, this calcium is also very easily absorbed



# “Cheese to help fight undernutrition in the elderly”

- The risk of undernutrition increases with age. It is estimated to affect 5 to 10% of people over 70 and 30 to 65% of people living in institutional care.
- Cheese should be given a central place in the prevention of undernutrition and the maintenance of functional skills and autonomy in the elderly.



## Evidence-based dietary guidance and the role of dairy products for appropriate nutrition in the Elderly.

Van Staveren WA, De Groot L.  
Division of Human Nutrition, Wageningen University, Wageningen, the Netherlands.  
Journal of the American College of Nutrition 2011 ; 30(5 Suppl 1) : 429S-37S.

*“Because of the nutrient richness of dairy products and their good taste, these foods are helpful in the diet of healthy as well as frail elderly people.”*

## Frequency of dairy consumption and functional disability in older persons.

Kim J, Lee Y.  
Department of Preventive Medicine and Public Health, Ajou University School of Medicine, Youngtong-gu, Suwon, Republic of Korea.  
The Journal of Nutrition Health and Aging 2011 ; 15(9) : 795-800.

*“Further research is needed to ascertain the protective effect of dairy products consumption on functional disability in older persons...”*

**U**ndernutrition is a serious threat to the elderly. It is often discovered too late in those living in situation of dependency, in hospital or in institutional care. Current studies draw attention to the necessary conditions to ensure the health of the most fragile individuals: a suitable social environment for meals, nutritional quality, provision of appealing food and drinks... Due to their high nutritional quality and good taste, dairy products enjoy a privileged position in the diets of the elderly, both weakened and healthy individuals. They are the best source of calcium (up to 80% in some countries), iodine and vitamin B2. They are also the second-largest source of zinc, phosphorus, retinol, vitamin B12 and, in many countries, vitamin D.

Conducted on almost 750 people living in institutional care, a Korean study demonstrates that frequent dairy product consumption can positively affect the functional skills and autonomy of the elderly. Dairy product consumption is associated with a significant reduction in the risk of disability, measured on a scale

of instrumental tasks of daily living which measures physical autonomy or the degree of dependency with regards to the practical activities of daily life. Compared to men who consume dairy products less than once a week, those who consume

them one or more times per day see their risk of functional disability lowered by 65%. In France, health authorities recommend 3 or 4 dairy products per day for seniors; cheese is a good way for them to ensure proper nutrient intake.

## Cheese also appears to limit cognitive decline

A study analyzed the relationship between diet and cognitive function in 1,056 people living in institutions with an average age of 69. It demonstrates an association between cheese consumption and a lower prevalence of age-related cognitive decline. A dose-response relationship can even be observed: as cheese consumption increases, the probability of cognitive decline is reduced. Compared to elderly persons who never eat cheese or eat it less than once a week, those that eat cheese at least once a week have a 40% lower probability of cognitive decline. The explanation for this benefit is thought to lie in cheese's many components: fatty acids, micronutrients, proteins... Tyramine has especially hold researchers' attention. This amino acid, a precursor of dopamine, may play a beneficial role in the dopaminergic system.

Dietary factors and cognitive impairment in community-dwelling elderly.  
Rahman A, Sawyer Baker P, Allman RM, Zamrini E.  
Department of Neurology, School of Medicine, University of Alabama at Birmingham, USA.  
The Journal of Nutrition, Health & Aging 2007 ; 11 (1) : 49-54.

# “Cheese and dairy products are good for the brain”

- Higher consumption of dairy products - including cheese - is correlated with better preservation of cognitive abilities during aging.
- The results of a study conducted between 2001 and 2006 on 972 Americans of an average age of 62.

## Relation between dairy food intake and cognitive function: The Maine-Syracuse Longitudinal Study.

Crichton GE, Elias MF, Dore GA, Robbins MA.  
University of South Australia, Adelaide, Australia & University of Maine, Orono, USA.  
International Dairy Journal 2012 ; 22(1) : 15-23.

*“Frequent dairy food intake is associated with better cognitive performance but underlying causal mechanisms are still to be determined.”*



Certain dietary factors appear to limit age-related cognitive decline and many observational studies have indicated that dairy product consumption may play a positive role. As part of the Maine/Syracuse longitudinal study in the United States, researchers tested the cognitive function and evaluated the dairy product consumption of almost one thousand participants. Those who consumed dairy products at least once a day had significantly higher scores on various neuropsychological scores designed to evaluate cognitive function as a whole: visuospatial memory, verbal memory, attention span, concentration, verbal ability, executive functions, etc. Once cardiovascular, dietary and lifestyle factors were taken into account, frequent consumption of dairy products (milk, cheese, yogurt, dairy desserts, cream, ice cream) is associated with better cognitive function. The higher the intake, the better cognitive

function is preserved. The mechanisms behind this are yet to be determined and should be the subject of future studies. The potential to prevent cerebral decline has perhaps been discovered, but it has

yet to be tapped: only 37% of the subjects included in the study consumed dairy products at least once a day. And 44% ate cheese 2 to 4 times per week, 10% ate cheese 5 to 6 times...

## Lipids to stay smart?

There have been studies on the effects of consuming various dietary lipids on cognitive function during aging. As part of the famous American study WHI (the Women's Health Initiative), 482 women aged 60 or more were followed for three years. Their average daily fat consumption was calculated. At the same time, they took a series of cognitive tests on memory, vision, language, attention, etc. No association could be made between the degree of cognitive decline and the consumption (even of large quantities) of saturated fatty acids, trans fatty acids and cholesterol. However, in this study, high intake of monounsaturated fatty acids was associated with reduced cognitive decline. While monounsaturated fatty acids normally evoke olive oil, it is important to recall that in the French diet they are primarily provided by dairy products.

Monounsaturated, trans, and saturated fatty acids and cognitive decline in women.  
Naqvi AZ, Harty B, Mukamal KJ, Stoddard AM, Vitalins M, Dunn JE.  
Harvard Medical School, Boston, Massachusetts, USA.  
Journal of the American Geriatrics Society 2011 ; 59(5) : 837-843.



# “Probiotic cheese for athletes?”

- Cheese enriched with probiotics (lactobacillus + bifidobacterium) raises hopes of improving immune function in competitive athletes.
- An experience on male rats consuming 20g of cheese per day.

## Probiotic cheese attenuates exercise-induced immune suppression in Wistar rats.

Lollo PC, Cruz AG, Morato PN, Moura CS, Carvalho-Silva LB, Oliveira CA, et al.

Universidade Estadual de Campinas, Faculdade de Engenharia de Alimentos, Cidade Universitária Zeferino Vaz, 13083-862, Campinas, São Paulo, Brazil.

Journal of Dairy Sciences 2012 ; 95 (7) : 3549-58.

*“Because the consumption of dietary and supplemental milk proteins is common among athletes, it may be possible to improve the athlete’s regular diet by adding a functional food such as probiotic cheese.”*

Lactic acid bacteria have been part of our diet for a long time, especially in fermented milk products such as yogurt and cheese. Around twenty years ago, new bacteria were introduced into our diet for their potential beneficial effects on health. These bacteria are known as probiotics, meaning that “they can have beneficial effects on health after live ingestion in sufficient quantities” (OMS, 2001). Cheese enriched with probiotics (lactobacillus + bifidobacterium) is now raising hopes of improving the immune function of competitive athletes. This product, which is enjoying popularity in Brazil, has been tested on lab rats subjected to two weeks of non-stop physical exercise leading to exhaustion. It is well-known that high-intensity physical challenges, which generate a high degree of stress, result in a weakened immune system. The study compared the biological data of rats that had

been fed on cheese or not. While the number of lymphocytes (defense cells) was reduced for the two groups of rats after intense physical exercise, it only decreased of 22% for the rats fed on probiotic cheese, compared to 48% for the control group. The level of monocytes (another type of defense cells), however, does not change for the rats who consumed the probiotic cheese, while it decreased for the control group.

In addition, the probiotic cheese in this experiment enabled a 100% increase in the HDL cholesterol (“good cholesterol”) level and a 50% reduction of the triglyceride level.

For the authors of the study, this experiment demonstrates that a probiotic cheese could be an effective means to stimulate the immune system. It may also help prevent infections, especially in high-level athletes subjected to intense physical activity.

## Adding probiotics to cheese may also reduce the risk of contamination

For many cheeses, the risk of contamination by pathogenic micro-organisms in the environment remains a major problem. *Listeria*, *Salmonella*, *Staphylococcus*, *Pseudomonas*, *Escherichia coli*, etc. can indeed be sources of food poisoning. Portuguese researchers have demonstrated that by adding probiotics (*Bifidobacterium animalis* and *Lactobacillus casei*) to cheese made from whey (such as Requeijão), they could reduce the risk of microbial contamination.

Journal of food protection 2011 ; 74 (7) : 1194-9

## Other interesting articles...

### Protein dietary reference intakes may be inadequate for vegetarians if low amounts of animal protein are consumed.

Kniskern MA, Johnston CS. Nutrition Program, Healthy Lifestyles Research Center, Arizona State University, Mesa, Arizona, USA. *Nutrition* 2011 ; 27 (6) : 727-30.

- ▶ A vegetarian diet can lead to deficiencies in many nutrients: iron, zinc and calcium, but also vitamins B12 and D and protein.
- ▶ A study conducted on young vegetarian women demonstrates that animal proteins only represent 21% of their daily protein intake, instead of the recommended 45-50%.

### Intake of dairy calcium and tooth loss among adult Danish men and women.

Adegboye AR, Twetman S, Christensen LB, Heitmann BL. Institute of Preventive Medicine, Copenhagen University Hospital, Copenhagen, Denmark. *Nutrition* 2012 ; 28(7) : 779-84.

- ▶ Calcium from cheese and dairy products appears to contribute to teeth preservation in adults.
- ▶ A Danish study analyzed the dietary intake over two years of 432 men and women between 30 and 60 years old and evaluated tooth loss in the same participants 5 to 10 years later.

### Protein intake and fracture risk in elderly people: A case-control study.

Martínez-González MÁ, Delgado-Rodríguez M. Service of Endocrinology and Nutrition, Hospital of Jaén & Division of Medicine, University of Jaen, Spain. *Clinical Nutrition* 2012 ; 31 (3) : 391-5.

- ▶ The combination of calcium and animal protein may be associated with reduced risk of fracture in the elderly.
- ▶ A Spanish study conducted on subjects over 65 demonstrates that subjects with a history of fracture due to osteoporosis consume smaller amounts of animal protein.

### A cheese-containing diet modulates immune responses and alleviates dextran sodium sulfate-induced colitis in mice.

Hosoya T, Ogawa A, Sakai F, Kadooka Y. Milk Science Institute, Megmilk Snow Brand Co. Ltd., 1-1-2 Minamidai, Kawagoe, Japan. *Journal of Dairy Science* 2012 ; 95(6) : 2810-8.

- ▶ In an experimental colitis model, cheese improves immune and anti-inflammatory response, significantly relieves symptoms prevents their progression and prevents weight loss.
- ▶ An experiment on mice compared a high-cheese diet to a control diet.

## And for more information

Available upon request.

**nutritionssante@maisondulait.fr**

Available in English.

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