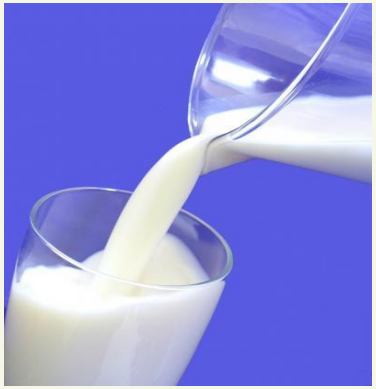
Calcium, milk and teeth in the elderly

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Oral health is often viewed separate from general health

- Oral health status influences overall wellbeing
- Tooth loss
  - low self-esteem
  - Speech impairment
  - chewing impairment
  - poor ability to eat a nutritious diet

- The proportion of elderly people with natural teeth is increasing

Background

Prevalence of edentulism *(complete loss of natural teeth)*

- Iceland and Austria: 15% (65-74 y)
- Italy: 19% (65-74 y)
- Poland : 25% (65-74 y)
- Denmark: 27% (65-74 y)
- Finland: 41% (65+ y)
- UK: 46% (65+ y)

Source: WHO Global Oral Health Data bank (estimates based on national representative surveys) cited by Moynihan 2004

Diet & Oral Health

- Research on **nutrition** and **oral health** has been neglected
- Recently, interest has been directed towards **foodstuffs** that may have a beneficial influence on the **oral health**
- The intake of **calcium** from **dairy products** is highlighted

Background

Systemic effects, ***absorbed nutrients/minerals affect***:

- Tooth development in infants and children
- Prevention of alveolar bone loss in adults
- The individual's resistance to oral disease

Local effects, ***'enamel-protective effects'***

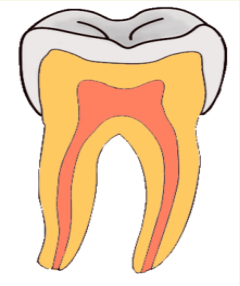
- Reduce demineralization
- Enhance remineralization *(tissue repair)*
- Reduce bacterial attachment

Background

Lack of studies

Evidence suggesting that calcium intake prevents **caries** and **periodontitis** comes basically from cross-sectional studies.

→ **Tooth Loss** ←
(via extraction)



It is still not clear whether **calcium** intake affects **tooth retention.**

Objectives

- To investigate the association between dietary **Ca** intake and **tooth loss** among **adults** and **elderly** in Denmark (STUDY I)

- To explore the **gender differences** in **tooth loss** (STUDY II)

Methods

- Data from the Danish MONICA (Monitoring Trends and Determinants in Cardiovascular Disease)
- Equal-sized samples of **30**, **40**, **50** and **60** y-old men and women, were randomly selected in **1982/83**
- Follow-up: **1987/88** and **1993/94**

Methods

Dietary Calcium (Baseline)

- Ca intake at baseline (1982/83) ➔ at least 5 years before the outcome
- Ca intake was estimated by a 7-d food record within a 3-wk period or diet history interview

Methods

Oral Examination (follow-up)

- The natural teeth including the 3rd molars was counted using a mouth mirror and light

- Examination:
  - a dentist in 1987/88
  - a trained nurse in 1993/94

Methods

Outcome

- **Tooth Loss** = (Nr. teeth in 87/88 – Nr. teeth in 93/94)

Exposure (STUDY I)

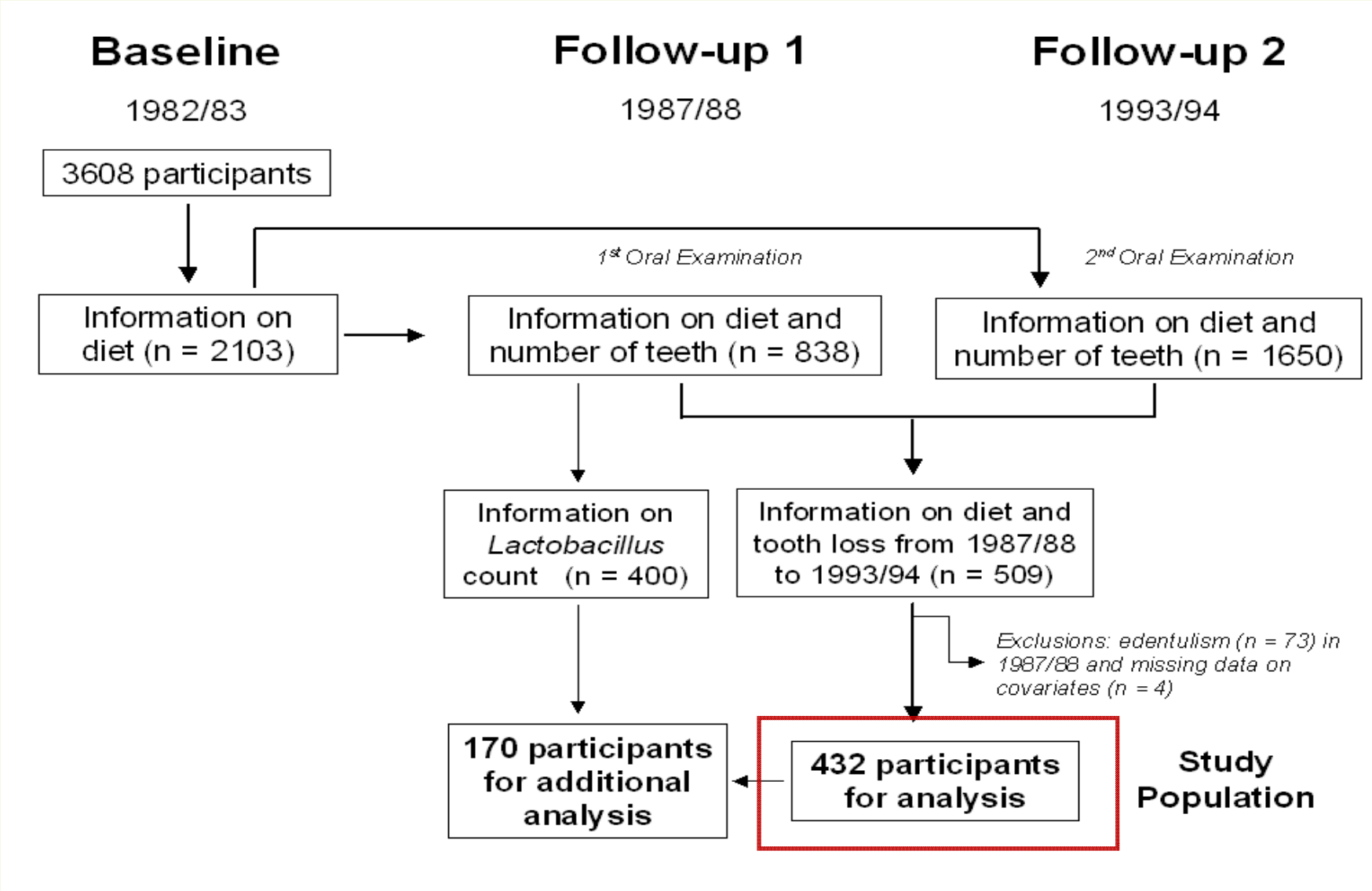
- Total dietary Ca intake (mg/d) was log-transformed
- Ca intake adjusted for energy intake - 1000 KJ (Ca/(MJ^{-1}.d))
- Ca intake as ***below vs. within recommendations***
  - < 50 y:1000 mg/d; > 50 y: 1200 mg d

Methods

Covariates

- Number of teeth in 1987/88
- Age
- Education
- Smoking
- Alcohol consumption
- Sucrose consumption
- Intake of vitamin and/or mineral supplements
- Time since last dental care visit
- Self-reported oral dryness

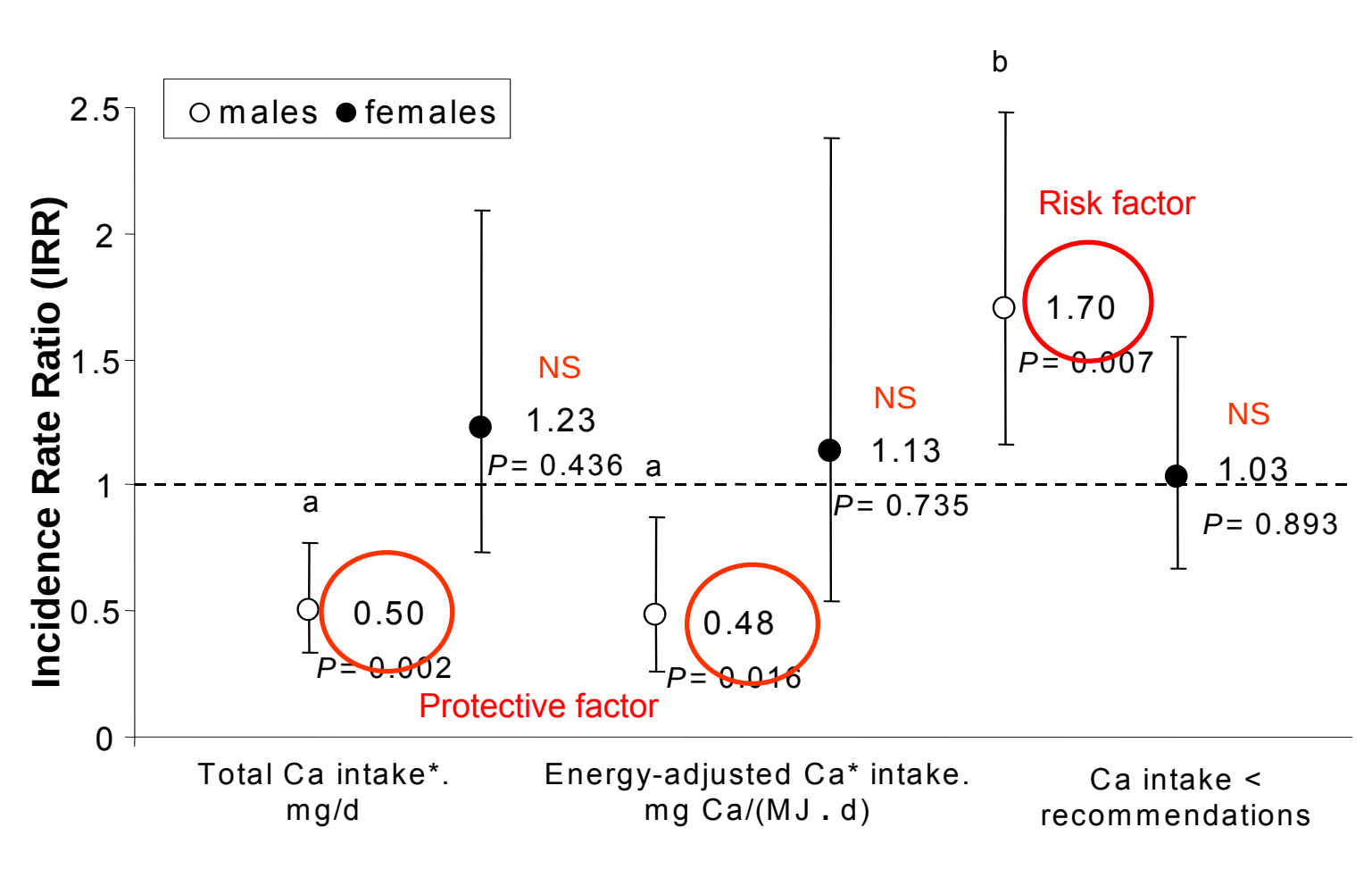
Fig 1. Flow chart for participants in the Danish MONICA



Results (STUDY I)

- 55% **women** and 45% men ($p < 0.001$) had Ca intake < recommendations:
- Absolute mean intake of Ca was higher in men (1370 mg) than **women** (1111 mg)
- Mean intake adjusted for energy intake: Ca intake higher in **women** than men
- Individuals reporting Ca intake < recommendations were:
  - more likely older
  - had lower education
  - had higher sucrose consumption and
  - fewer visits to dentists

Fig. 2. Association between Ca intake and tooth loss from 1987/88 to 1993/94



* Natural logged

Adjusted for age, education, smoking, alcohol and sucrose consumption, subjective oral dryness and time since last dental care visit and number of teeth in 1987/88

[a] increased Ca intake is a protective factor; [b]low Ca intake is a risk factor

Adegboye AR, et al. J Nutr. 140(10):1864-8

Discussion (STUDY I)

Calcium had no effect on tooth loss among females

- This might be due to gender differences in **oral hygiene**
  - females brush their teeth more often, have more frequent dental visit for regular cleaning and spend more money preserving their natural dentition
  - Men often choose extraction as a low-cost alternative, especially for posterior teeth
  - these behaviours might compensate for low Ca intake among females

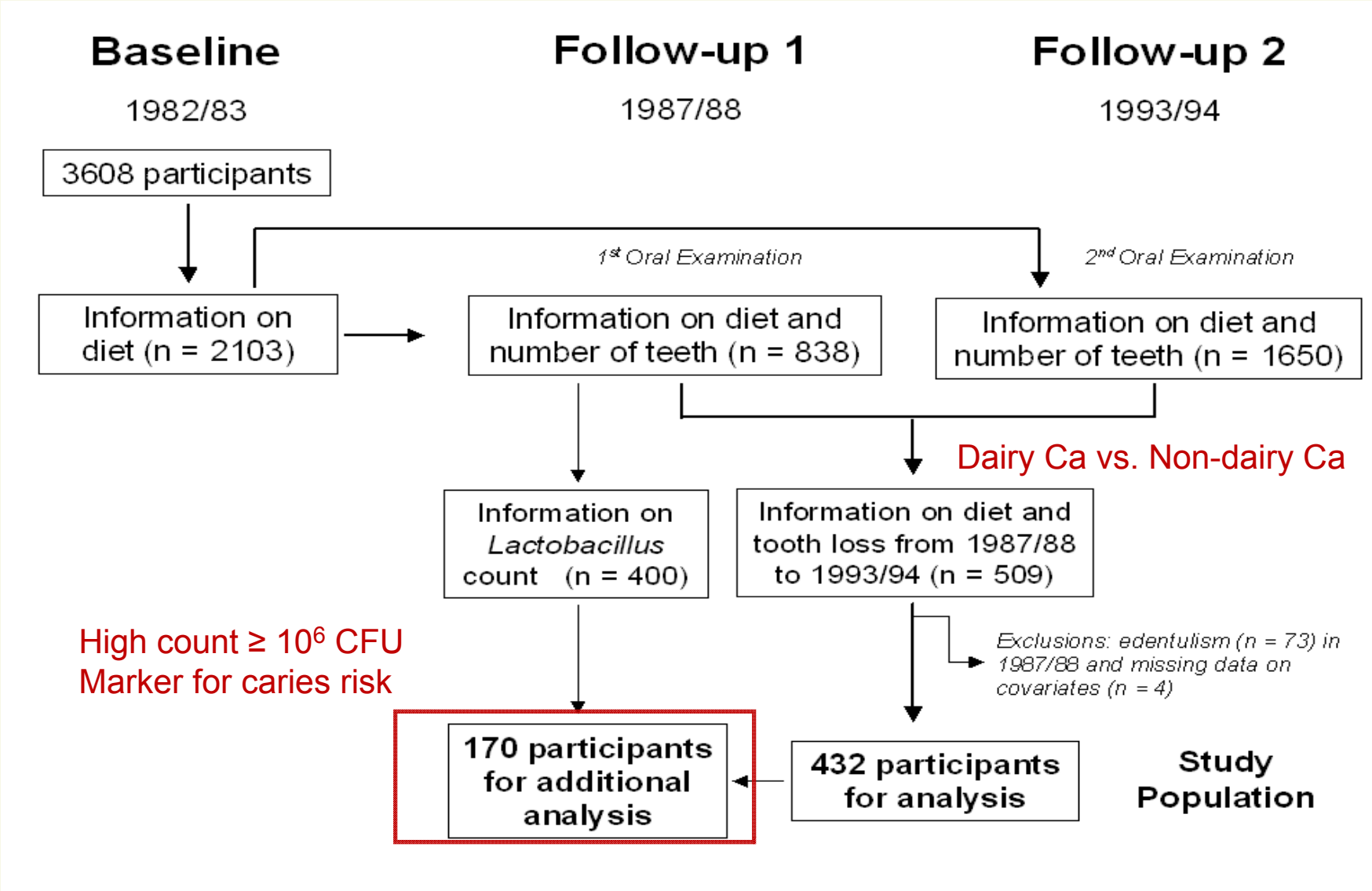
QUESTION?

Does this gender variation reflect differences between men and women in oral-health-related risk and source of dietary Ca intake (*dairy vs. non-dairy Ca*)?

Hypothesis (STUDY II)

- The lack of association between Ca intake and tooth loss among women is related to **source of Ca** consumed by men and women or partially confounded by gender differences in **caries potential.**

Fig 1. Flow chart for participants in the Danish MONICA



Results (STUDY II)

- **Men** were more likely to:
  - smoke daily
  - report alcohol consumption > recommendations
  - report oral dryness
  - have fewer visits to dentists

- Dairy foods were the major sources of Ca
  - 59% among **men**
  - 63% among **women**

Table 2. Association between Dairy Ca intake and tooth loss

Sex	Models	Dairy calcium mg/d IRR* (95% CI)	*P*	Dairy calcium mg/1000 kcal^{-1}.d IRR* (95% CI)	*P*
Men	Crude	0.69 (0.52 – 0.91)	0.01	0.67 (0.49 – 0.95)	0.03
	Model 1	0.71 (0.55 – 0.93)	0.01	0.72 (0.52 – 0.98)	0.04
	Model 2	0.72 (0.55 – 0.94)	0.01	0.73 (0.54 – 0.99)	0.04
	Model 3	0.69 (0.53 – 0.90)	<0.01	0.70 (0.52 – 0.95)	0.02
	Model 4†	0.61 (0.44 – 0.85)	0.003	0.64 (0.44 – 0.95)	0.03
Women	Crude	0.89 (0.67 – 1.18)	0.4	0.90 (0.64 – 1.26)	0.6
	Model 1	0.94 (0.71 – 1.24)	0.7	0.94 (0.68– 1.30)	0.7
	Model 2	0.95 (0.72 – 1.25)	0.7	0.98 (0.70 – 1.37)	0.9
	Model 3	1.04 (0.78 – 1.38)	0.8	1.07 (0.76 – 2.51)	0.7
	Model 4†	0.55 (0.34 – 0.87)	0.01	0.56 (0.33 – 0.95)	0.03

NS

NS

*Incidence-rate ratio (IRR) is for each log10 increase in calcium intake.

† Analyses performed for a subset of the study population (84 men and 86 women)

Model 1: tooth count in 1987/88 and socio-demographic factors

Model 2: model 1 plus lifestyle

Model 3: model 2 plus last dental visit and subjective oral dryness

Model 4: model 3 plus *Lactobacillus* count in 1987/88

Adegboye AR, et al. Nutrition 2011 Ahead of print

Results (STUDY II)

- **Non-dairy Ca** was NOT significantly associated with tooth loss *(data not shown)*
  - in both **men** and **women**
  - in the **crude** and **fully adjusted** models

- Inclusion of ***Lactobacillus*** count into the model did not strengthen the associations *(data not shown)*

Conclusion

- Dietary Ca intake seems to protect against tooth loss in **men** and **women**
- Previous differences seen in the protective effect of Ca are likely to be influenced by **differences in caries risk** between genders
- Further studies with a specific focus on refined measures of oral hygiene and detailed information on oral microflora profile are warranted
- Decreasing **caries risk** and increasing **dairy consumption** may help preserving the natural dentition

Thanks