

Canada's
food guide



BEYOND THE BREAK ***Does Canada's Food*** ***Guide meet*** ***requirements for*** ***vitamin D and*** ***calcium?***

Susan J Whiting

Distinguished Professor of Nutrition



OSTEOPOROSIS

“Where’s calcium?”

Canada’s
food guide



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Outline

1. Requirement for Calcium

- Recommended intakes (2011) from Health Canada (IOM) and Osteoporosis Canada
- Food sources of calcium - are they in the new Food Guide?
- Dietary factors affecting calcium retention

2. Concern about Excess

- More is not better ... the upper level
- Is there a concern about supplement use?

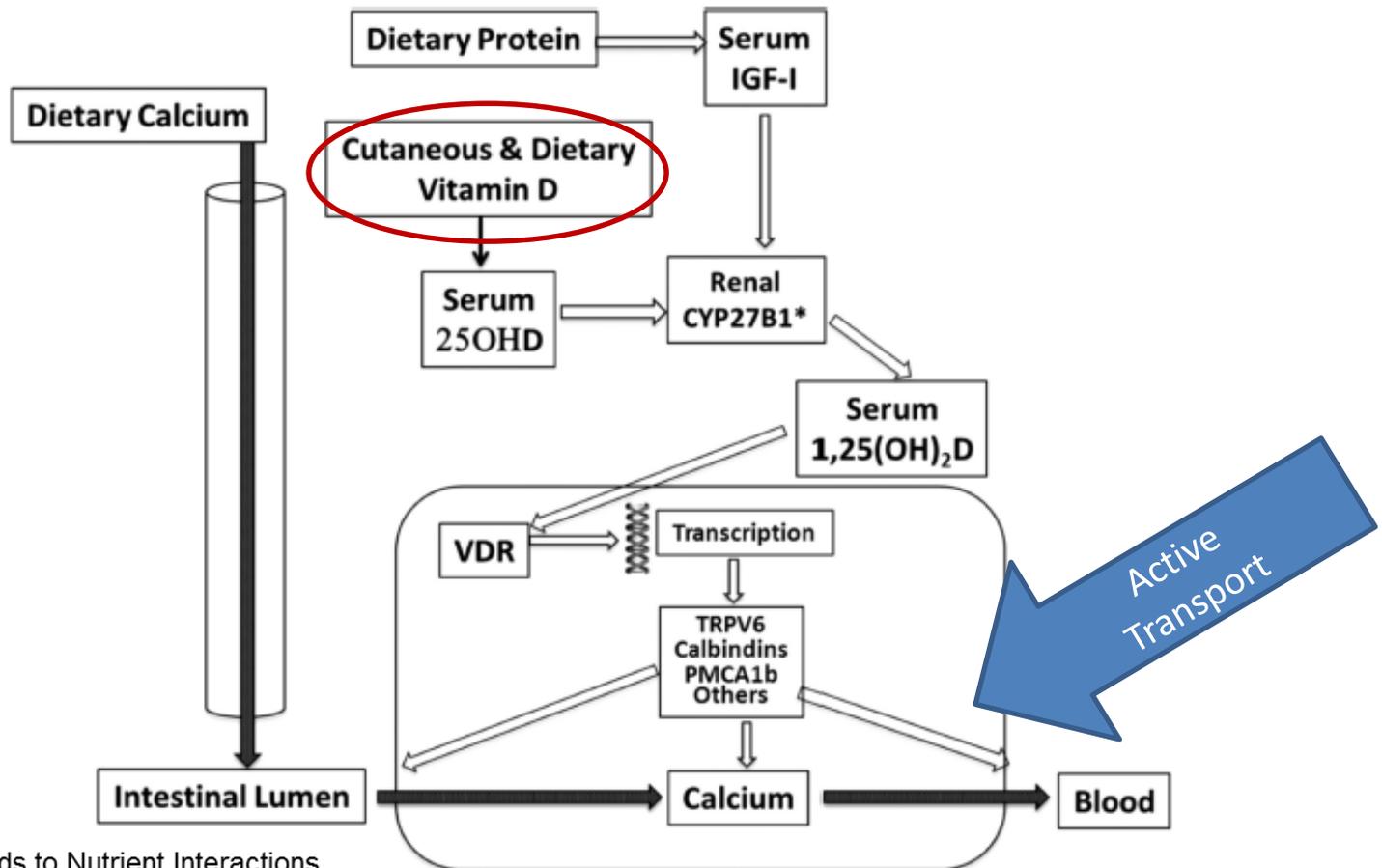
3. What are Canadians currently getting from foods and supplements?

- Who is most at risk for inadequacy (2015)

Calcium – still a nutrient of concern

What about Vitamin D?

- Bone Matters: The D-Lemmas of D* with Dr Stephanie Atkinson – March 20, 2019



Does the Canadian diet supply enough vitamin D to reach EAR of 10 µg (400 IU)?

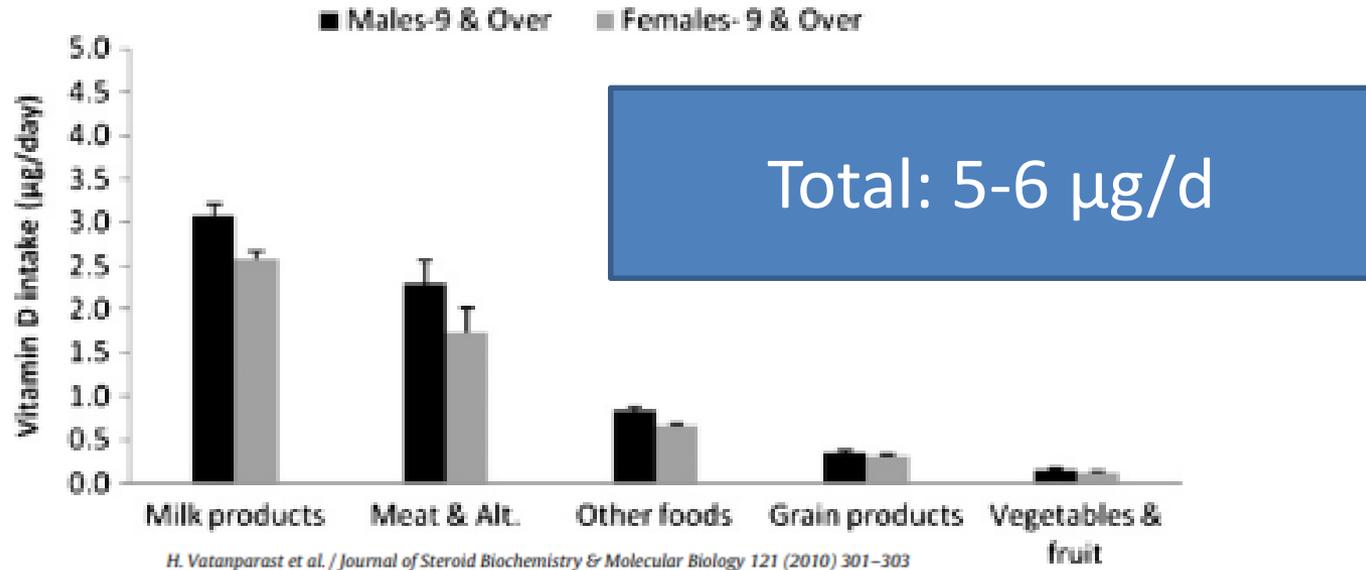


Fig. 2. Vitamin D intake (mean ± SEM, µg/day) of Canadians from food groups in males and females age 9 and over.

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Regulations Amending Certain Regulations Made Under the Food and Drugs Act (Nutrition Symbols, Other Labelling Provisions, Partially Hydrogenated Oils and Vitamin D)

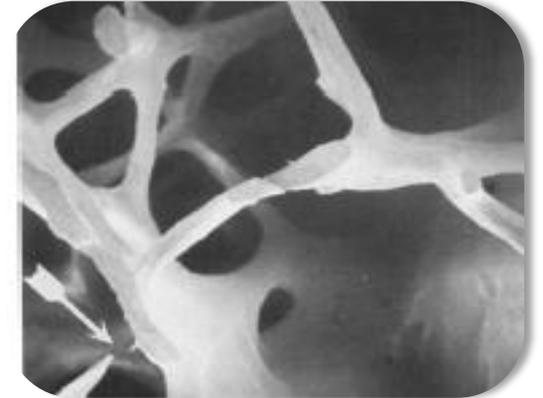
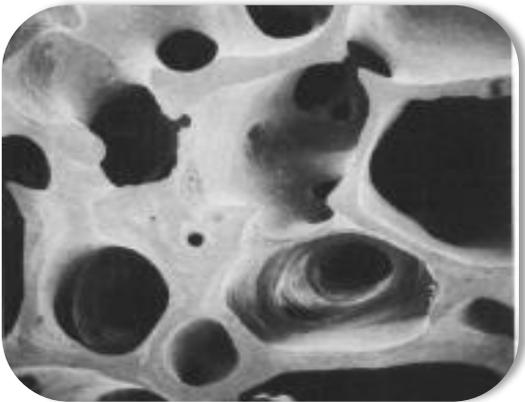
Statutory authority

Food and Drugs Act

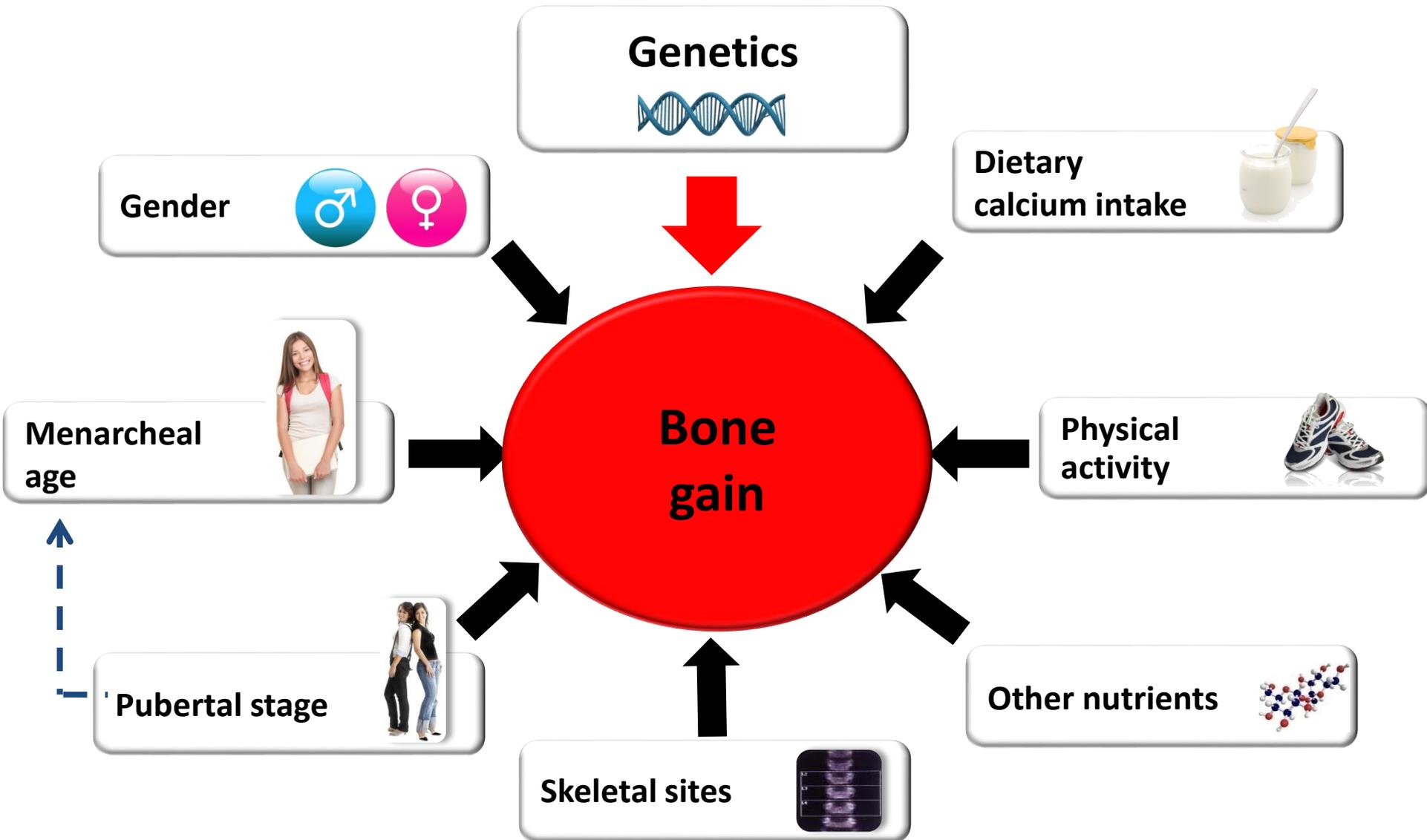
Calcium:

Important for bone health

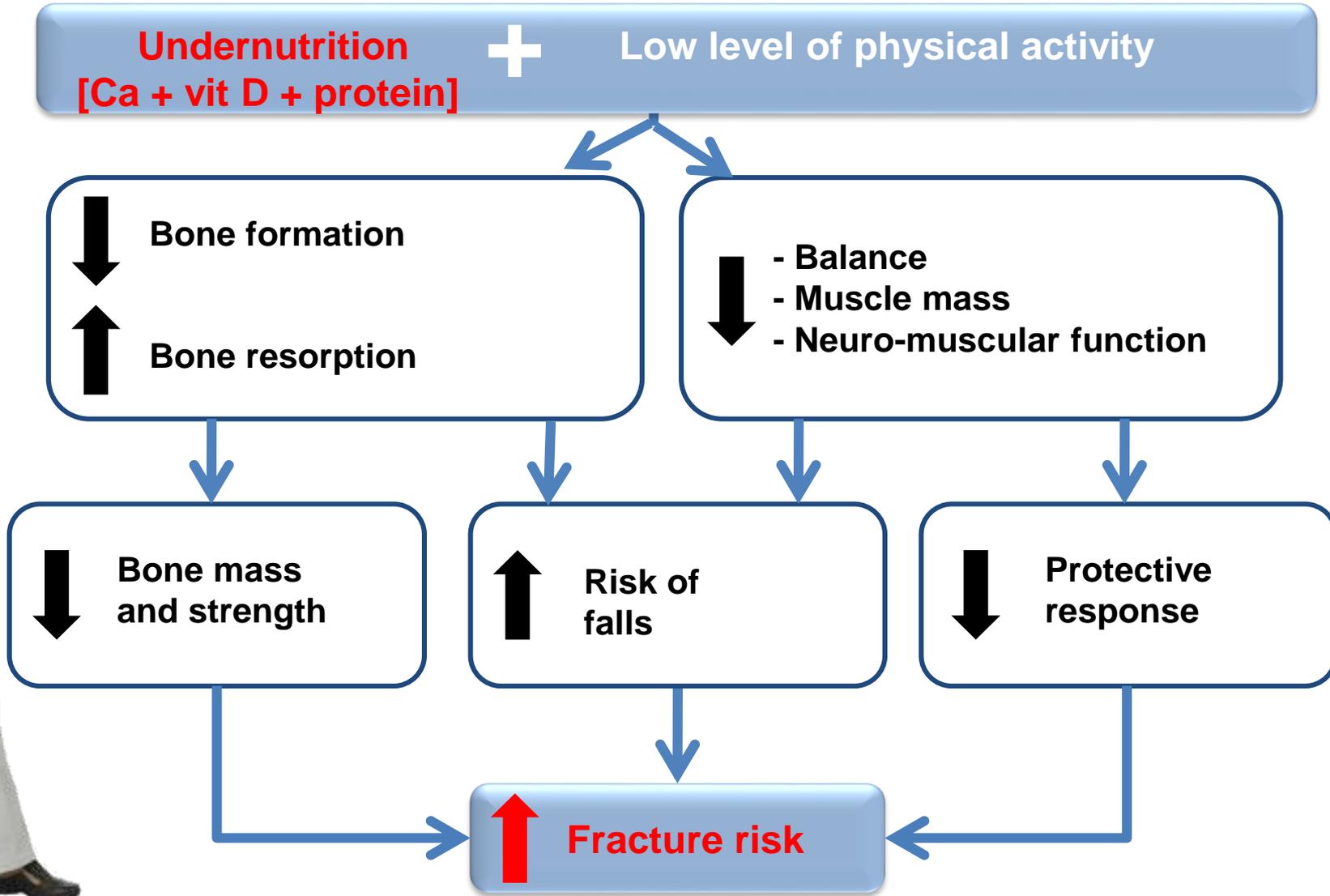
- RDA based on attaining Peak Bone – youth*
- RDA based on slowing bone loss - adults*



Many Factors Affect PBM



Pathophysiology of fragility fracture risk: Adults



Modified from Dairy in Adulthood: From Foods to Nutrient Interactions on Bone and Skeletal Muscle Health (Bonjour et al. 2013)

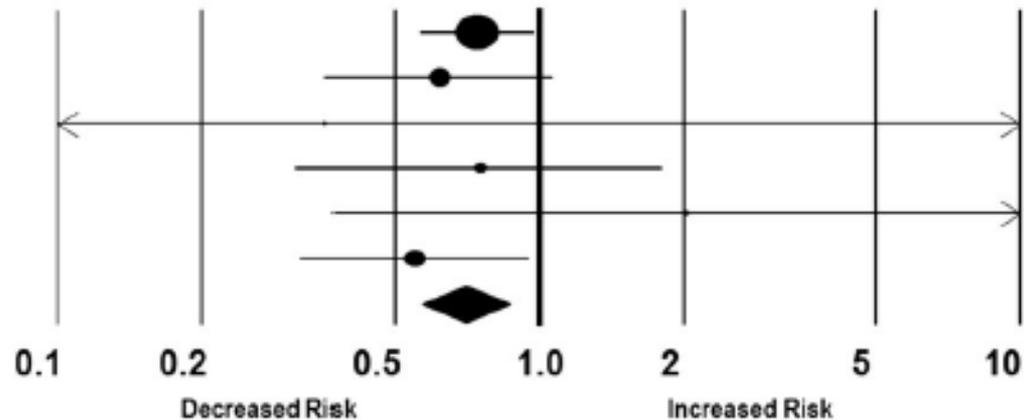
Both calcium and vitamin D are needed to reduce hip fracture risk

NOF 2016

Study Name

Rate Ratio and 95% CI

Chapuy, 1992 [20]
Chapuy, 2002 [21]
Dawson-Hughes, 1997 [22]
Porthouse, 2005 [23]
Salovaara, 2010 [24]
Prentice, 2013 [10]^a
SRRE = 0.70 (0.56–0.87)
P-heterogeneity = 0.74
*I*² = 0.00



**Benefit of
calcium + vitamin
D is a 30%
reduction in risk
of hip fx**

Describing Dietary Adequacy and Excess

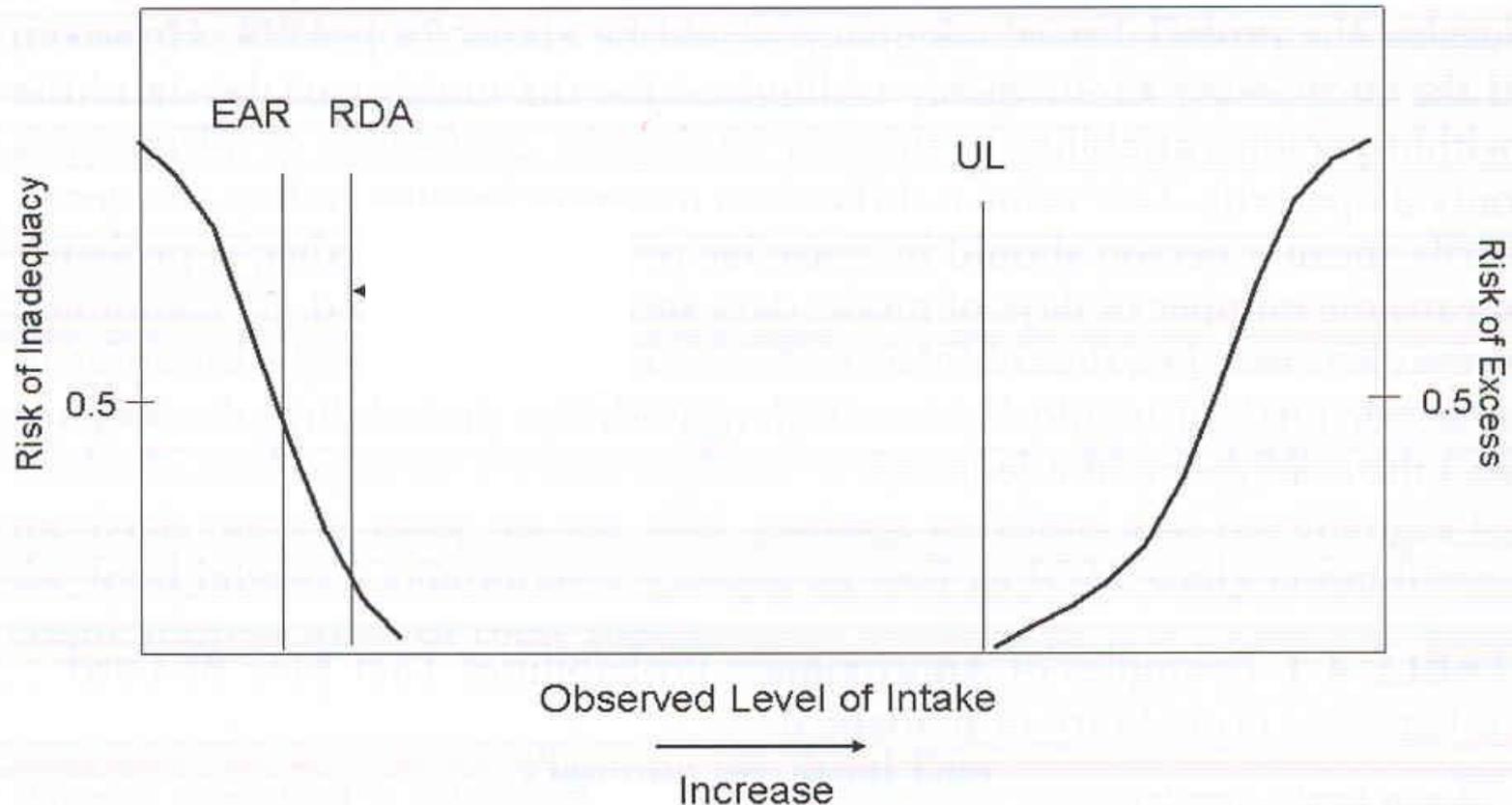


FIGURE 4-2 Relationship of the AI to the EAR and RDA.

NOTE: EAR = Estimated Average Requirement; RDA = Recommended Dietary Allowance; AI = Adequate Intake; UL = tolerable upper intake level.

Calcium has recommended intakes:

RDA and EARs

Population groups	Calcium (mg/d)	
	EAR	RDA
Children 1-3	500	700
Children > 3	800	1000
Adolescents 9 - 18	1100	1300
Adults 18 – 50 (F) 18-70 (M)	800	1000
Pregnancy/lactation	800	1000
Adult men > 70	1000	1200
Adult women > 50	1000	1200

EAR is cutoff for estimation of prevalence of inadequacy of a population

RDA is goal for optimal intake by an individual

“Where’s calcium?”

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Food Sources of Calcium

The Calcium Calculator™

Print version
 Calcium-rich foods
 organized by content
 50 mg, 75 mg, 150
 mg, 200 mg, 300 mg
 Online
 Calcium sources by
 amount

BC Dairy Foundation

CALCIUM-RICH FOODS	PORTION SIZE	# OF PORTIONS LATE	TOTAL PORTIONS	MILLOGRAMS PER PORTION	TOTAL MILLOGRAMS OF CALCIUM																				
 Black beans, Lima beans, Lentils—cooked Bread Broccoli Gal lan, Mustard greens Hummus Orange—fruit, not juice	(1 cup or 250 mL) (2 slices or 70 g) (¼ cup or 175 mL) (½ cup or 125 mL) (½ cup or 125 mL) (1 medium)] = _____		x 50 mg =																					
	 Almonds Bok choy, Kale, Rapini, Okra—cooked Chickpeas, Kidney beans, Pinto beans, Romano beans—cooked Cottage cheese—regular or low fat Dessert tofu Ice cream, Frozen yogurt Parmesan cheese					(¼ cup or 60 mL) (½ cup or 125 mL) (1 cup or 250 mL) (½ cup or 125 mL) (100 g) (½ cup or 125 mL) (1 Tbsp or 15 mL)] = _____		x 75 mg =																
						 Baked beans, Soybeans, White beans—cooked Blackstrap molasses Collards—cooked Cheese—soft and semi-soft such as Blue, Feta, Mozzarella Pancake or Waffle Pudding—made with milk Tofu—made with calcium					(1 cup or 250 mL) (1 Tbsp or 15 mL) (½ cup or 125 mL) (25 g) (1 large or 2 small) (½ cup or 125 mL) (100 g)] = _____		x 150 mg =											
											 Cheese—firm such as Cheddar, Swiss, Gouda Cheese—processed Salmon—canned with bones Sardines—canned with bones Soup—made with milk Yogurt, fruit flavoured—regular or low fat*					(25 g) (2 slices, 21 g each) (½ can) (½ can) (1 cup or 250 mL) (¾ cup or 175 mL)] = _____		x 200 mg =						
																 Milk—skim, 1%, 2%, whole, buttermilk, chocolate, “flavoured” Calcium-fortified beverages such as Soy, Rice, Orange juice Skim milk powder Yogurt—plain, regular or low fat*					(1 cup or 250 mL) (1 cup or 250 mL) (½ cup or 75 mL) (½ cup or 175 mL)] = _____		x 300 mg =	

SELECT YOUR FOODS

WHAT DID YOU EAT? ENTER THE NUMBER OF SERVINGS FOR EACH OF THE CALCIUM-RICH FOODS THAT YOU ATE YESTERDAY FROM EACH CATEGORY:



Amt mg	Food Examples	New FG Groups
50	1 cup lentils, 2 slices bread ¾ c broccoli, orange	Grain Fr&Veg Protein
75	1 cup chickpea, 1 pancake ½ c cottage cheese, 5 figs	Grain Fr&Veg Protein
150	1 cup soybeans, ½ c collards Instant oatmeal	Grain Fr&Veg Protein
200	½ can salmon, 25 g cheese	Protein
300	1 milk, 1 c fortified soy beverage	Protein

Amt mg	Food Examples	New FG Groups
50	1 cup lentils 3/4 c...	
75		
150	...ards (±)	Grain Fr&Veg Protein
200	...imon, 1 c yogurt	Protein
300	1 milk, 1 c fortified soy beverage	Protein

• Consideration of energy intake
 • Education needed to identify higher calcium foods

Calcium in Grains: Flour – 100 g

Food	Calcium (mg)
White flour	14
Whole wheat	26
Barley	52
Ca-enriched (NL- no longer made)	110
<i>Ancient grains</i>	
Amaranth	152
Teff	146
Quinoa	36

Other Calcium Sources

1 T Blackstrap Molasses = 150 mg

10 g dried kelp = 80 mg

1 L Mineral water (hard water) = 180 mg

Fortified foods:

- Calcium as a food ingredient
 - Some breakfast cereals – 110 mg/serving
- Fortified beverages = 30 % DV

Plant-based beverages (excluding soy)

Not all are
fortified &
all are
low in protein

Coconut “original”(L)
Almond “original” (R)
beverages

0.5 - 1 g protein
0% DV for Calcium

Nutrition Facts		Valeur nutritive			
Per 1 cup (250 mL) / pour 1 tasse (250 mL)		Per 1 cup (250 mL) / pour 1 tasse (250 mL)			
Amount	% Daily Value	Amount	% Daily Value		
Teneur	% valeur quotidienne	Teneur	% valeur quotidienne		
Calories / Calories	50	Calories / Calories	40		
Fat / Lipides	5 g	8 %	Fat / Lipides	2.5 g	4 %
Saturated / saturés	5 g	25 %	Saturated / saturés	0.2 g	1 %
+ Trans / trans	0 g		+ Trans / trans	0 g	
Cholesterol / Cholestérol	0 mg		Cholesterol / Cholestérol	0 mg	
Sodium / Sodium	110 mg	5 %	Sodium / Sodium	190 mg	8 %
Carbohydrate / Glucides	1 g	1 %	Potassium / Potassium	35 mg	1 %
Fibre / Fibres	0 g	0 %	Carbohydrate / Glucides	3 g	1 %
Sugars / Sucres	1 g		Fibre / Fibres	0 g	0 %
Protein / Protéines	0.5 g		Sugars / Sucres	0 g	
Vitamin A / Vitamine A	0 %		Protein / Protéines	1 g	
Vitamin C / Vitamine C	0 %		Vitamin A / Vitamine A	0 %	
Calcium / Calcium	0 %		Vitamin C / Vitamine C	0 %	
Iron / Fer	2 %		Calcium / Calcium	2 %	
			Iron / Fer	2 %	

*3 g MEDIUM CHAIN FATTY ACIDS (MCFAs) PER 250 mL SERVING. COCONUTS NATURALLY CONTAIN MCFAs, WHICH ARE EASILY DIGESTIBLE AND SUPPORT A HEALTHY METABOLISM.	
*3 g D'ACIDES GRAS À CHAÎNE MOYENNE (AGCM) PAR PORTION DE 250 mL. LA NOIX DE COCO CONTIENT DES AGCM, QUI SE DIGÈRENT FACILEMENT ET CONTRIBUENT À UN MÉTABOLISME SAIN.	
INGREDIENTS: COCONUT BASE (WATER, COCONUT CREAM), GELLAN GUM, XANTHAN GUM, SEA SALT.	INGRÉDIENTS : BASE D'AMANDE BIOLOGIQUE (EAU, AMANDES BIOLOGIQUES), AMIDON DE RIZ BIOLOGIQUE, SEL MARIN, VANILLE BIOLOGIQUE, ARÔME NATUREL, CARRAGHÉNINE. CONTIENT : NOIX (AMANDES).
INGREDIENTS: BASE DE NOIX DE COCO (EAU, CRÈME DE NOIX DE COCO), GOMME GELLAN, GOMME DE XANTHANE, SEL DE MER.	PRODUCED BY • FABRIQUÉ PAR : PACIFIC FOODS OF OREGON, INC., TUALATIN, OR 97062 USA
	CERTIFIED ORGANIC BY • CERTIFIÉ BIOLOGIQUE PAR : OREGON TILTH
	NON GMO VERIFIED • PRODUIT SANS OGM VÉRIFIÉ
	RECYCLABLE

Plant-based beverages

Original vs. Fortified

Low in protein (1 g)

**Almond “original” (L)
Almond (R) beverages**

Fortified:
30% DV Ca
-from calcium carbonate
45% DV as vitamin D2
Plus
vitamin A, B12, zinc,
riboflavin...

Nutrition Facts	
Valeur nutritive	
Per 1 cup (250 mL) / pour 1 tasse (250 mL)	
Amount	% Daily Value
Teneur	% valeur quotidienne
Calories / Calories 40	
Fat / Lipides 2.5 g	4 %
Saturated / saturés 0.2 g	1 %
+ Trans / trans 0 g	
Cholesterol / Cholestérol 0 mg	
Sodium / Sodium 190 mg	8 %
Potassium / Potassium 35 mg	1 %
Carbohydrate / Glucides 3 g	1 %
Fibre / Fibres 0 g	0 %
Sugars / Sucres 0 g	
Protein / Protéines 1 g	
Vitamin A / Vitamine A	0 %
Vitamin C / Vitamine C	0 %
Calcium / Calcium	2 %
Iron / Fer	2 %

INGREDIENTS: ORGANIC ALMOND BASE (WATER, ORGANIC ALMONDS), ORGANIC RICE STARCH, SEA SALT, ORGANIC VANILLA NATURAL FLAVOUR, CARRAGEENAN. **CONTAINS:** TREE NUTS (ALMONDS).

INGRÉDIENTS : BASE D'AMANDE BIOLOGIQUE (EAU, AMANDES BIOLOGIQUES), AMIDON DE RIZ BIOLOGIQUE, SEL MARIN, VANILLE BIOLOGIQUE, ARÔME NATUREL, CARRAGHÉNINE. **CONTIENT :** NOIX (AMANDES).

PRODUCED BY • FABRIQUÉ PAR : PACIFIC FOODS OF OREGON, INC., TUALATIN, OR 97062 USA

CERTIFIED ORGANIC BY • CERTIFIÉ BIOLOGIQUE PAR : OREGON TILTH



RECYCLABLE



Nutrition Facts	
Valeur nutritive	
Serving Size 1 cup (250 mL) / Portion 1 tasse (250 mL)	
Servings Per Container 4 / Portions par contenant 4	
Amount	% Daily Value
Teneur	% valeur quotidienne
Calories / Calories 80 (330 kJ)	
Fat / Lipides 2.5 g	4 %
Saturated Fat / lipides saturés 0.2 g	1 %
+ Trans Fat / lipides trans 0 g	
Polyunsaturated / polyinsaturés 0.6 g	
Omega-6 / oméga-6 0.5 g	
Omega-3 / oméga-3 0 g	
Monounsaturated / monoinsaturés 1.5 g	
Cholesterol / Cholestérol 0 mg	0 %
Sodium / Sodium 150 mg	6 %
Potassium / Potassium 170 mg	5 %
Carbohydrate / Glucides 13 g	4 %
Fibre / Fibres 1 g	4 %
Sugars / Sucres 12 g	
Protein / Protéines 1 g	
Vitamin A / Vitamine A	10 %
Vitamin C / Vitamine C	0 %
Calcium / Calcium	30 %
Iron / Fer	4 %
Vitamin D / Vitamine D	45 %
Vitamin E / Vitamine E	10 %
Riboflavin / Riboflavine	25 %
Vitamin B12 / Vitamine B12	50 %
Phosphorus / Phosphore	2 %
Magnesium / Magnésium	6 %
Zinc / Zinc	15 %

INGREDIENTS: WATER, CANE SUGAR, ALMONDS, CALCIUM CARBONATE, NATURAL VANILLA FLAVOUR, SEA SALT, POTASSIUM CITRATE, SUNFLOWER LECITHIN, GELLAN GUM, ZINC GLUCONATE, VITAMIN A PALMITATE, RIBOFLAVIN (VITAMIN B2), VITAMIN D2, VITAMIN B12. **CONTAINS ALMONDS**

NOT FOR USE AS AN INFANT FORMULA

INGRÉDIENTS : EAU, SUCRE DE CANNE, AMANDES, CARBONATE DE CALCIUM, ARÔME NATUREL DE VANILLE, SEL DE MER, CITRATE DE POTASSIUM, LÉCITHINE DE TOURNESOL, GOMME GELLANE, GLUCONATE DE ZINC, PALMITATE DE VITAMINE A, RIBOFLAVINE (VITAMINE B2), VITAMINE D2, VITAMINE B12. **CONTIENT DES AMANDES.**

Bioavailability

Foods that don't allow GI absorption



- Spinach – absorption < 5% due to oxalates
- Plant-based beverages made with tricalcium phosphate

Food constituents causing urine excretion



- High salt (NaCl) intake (> UL 2300 mg)
- Excessive caffeine
- Extreme dietary practices (e.g. paleo, keto)

Check the Nutrition Facts Label

ORIGINAL

Nutrition Facts
Valeur nutritive
Per 250 mL / par 250 mL

Amount Teneur	% Daily Value % valeur quotidienne
Calories / Calories 110	
Fat / Lipides 0 g	0 %
Saturated / saturés 0 g + Trans / trans 0 g	0 %
Cholesterol / Cholestérol 0 mg	
Sodium / Sodium 0 mg	0 %
Carbohydrate / Glucides 26 g	9 %
Fibre / Fibres 0 g	0 %
Sugars / Sucres 22 g	
Protein / Protéines 2 g	
Vitamin A / Vitamine A	0 %
Vitamin C / Vitamine C	120 %
Calcium / Calcium	2 %
Iron / Fer	10 %

NEW

Nutrition Facts
Valeur nutritive
Per 1 cup (250 mL)
pour 1 tasse (250 mL)

	% Daily Value* % valeur quotidienne*
Calories 110	
Fat / Lipides 0 g	0 %
Saturated / saturés 0 g + Trans / trans 0 g	0 %
Carbohydrate / Glucides 26 g	
Fibre / Fibres 0 g	0 %
Sugars / Sucres 22 g	22 %
Protein / Protéines 2 g	
Cholesterol / Cholestérol 0 mg	
Sodium 0 mg	0 %
Potassium 470 mg	10 %
Calcium 26 mg	2 %
Iron / Fer 0 mg	0 %

*5% or less is a little, 15% or more is a lot
*5% ou moins c'est peu, 15% ou plus c'est beaucoup

Calories is larger and stands out more with bold line below

mg amounts are shown

New % Daily Value footnote

Serving size stands out more and is more similar on similar foods

Daily Values updated

New % Daily Value for total sugars

Updated list of minerals of public health concern

DV based on 1100 mg

DV based on 1300 mg

Summary

1. Requirement for Calcium

- Recommended intakes (2011) from Health Canada (IOM) and Osteoporosis Canada

EAR (adults): 800-1000 mg

RDA (adults): 1000-1200 mg

- Food sources of calcium - they are in the new Food Guide

F&V, Grains: foods with 50-150 mg

- Dietary factors affecting calcium retention

Salt – expect to be less if follow CFG

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2. Concern about Excess

- More is not better ... the upper level
- Is there a concern about supplement use?

3. What are Canadians currently getting from foods and supplements?

- Who is most at risk for inadequacy

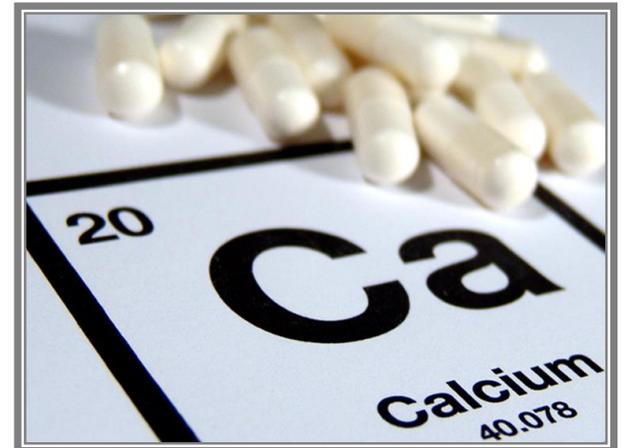
Upper Level for calcium

Since 2011, set to prevent **kidney stones**

- UL set in older adults (> 50y) as **2000 mg** as at this intake, there is risk of kidney stones
- For adults 19-50 y, UL set at **2500 mg** as risk of kidney stones from calcium not common
- In adolescents, UL increases to **3000 mg** as kidney stone risk very low.
- Younger children: UL is **2500 mg** due to smaller body size

Upper Level for Calcium

- Other concerns; “milk-alkali syndrome” which is soft tissue calcification when calcium is excessive
- Prostate cancer risk in men
- Possible risk of low iron or zinc with high intakes of calcium
- Risk of heart disease - evidence is conflicting...



Calcium in the News



Harvard Health Publishing
HARVARD MEDICAL SCHOOL

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Harvard Heart Letter

Calcium and heart disease: What is the connection?

There's no good evidence that calcium supplements harm your heart. Still, it's best to get calcium from food, not pills.

Published: January, 2017



The New York Times

Are Calcium Supplements Safe?

Kidney stones are a known risk, but studies have investigated other potential safety concerns, including an increased risk of death, cancer and heart disease.



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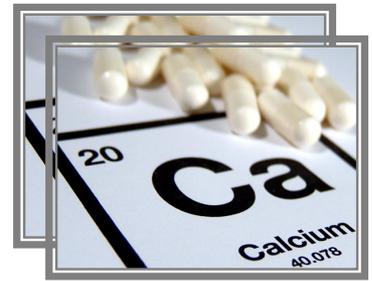
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Get health information and advice from the experts at Harvard Medical School.

meta-Analysis

Asemi et al. 2015



- No significant association between total and dietary calcium intake and mortality
 - Mortality from all-causes, CVD, and cancer.
- A significant positive association between total calcium intake and CVD mortality for cohort studies with a mean follow-up duration of >10 years yet an inverse (protective) effect if < 10 years.

Use foods to achieve RDA for calcium where possible
Supplements can “fill the intake gap”: ≤ 500 mg

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- Who is most at risk for inadequacy

Summary of Calcium Intakes

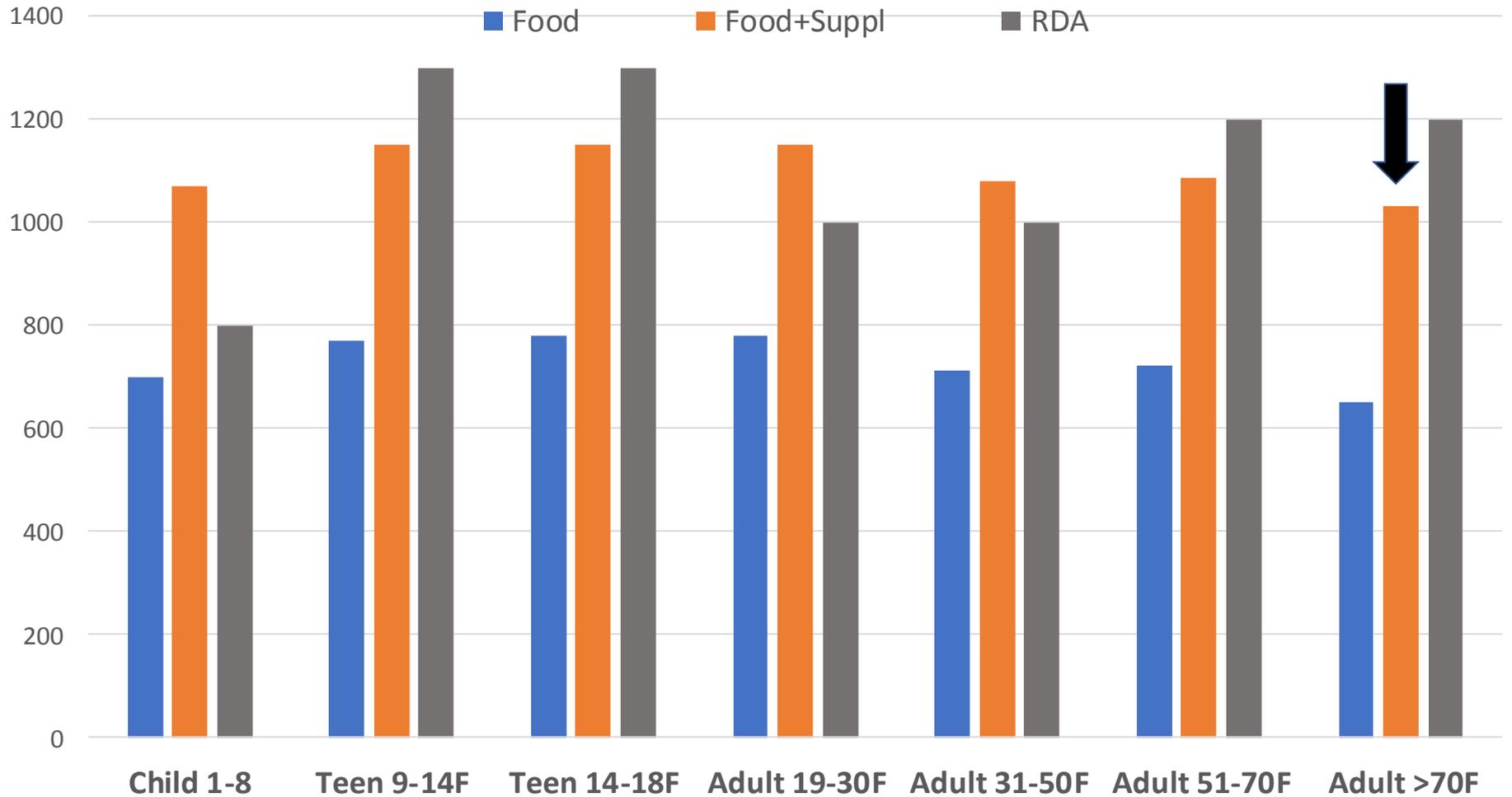
(All CANADIANS \geq 1y)

INTAKE	2004	2015
Food alone	875 mg	840 mg
Food + Supplements	1220 mg	1160 mg

CALCIUM FROM FOOD, SUPPLEMENTS - FEMALES

In **2015** compared to 2011 recommendations

VATANPARAST et al., 2019



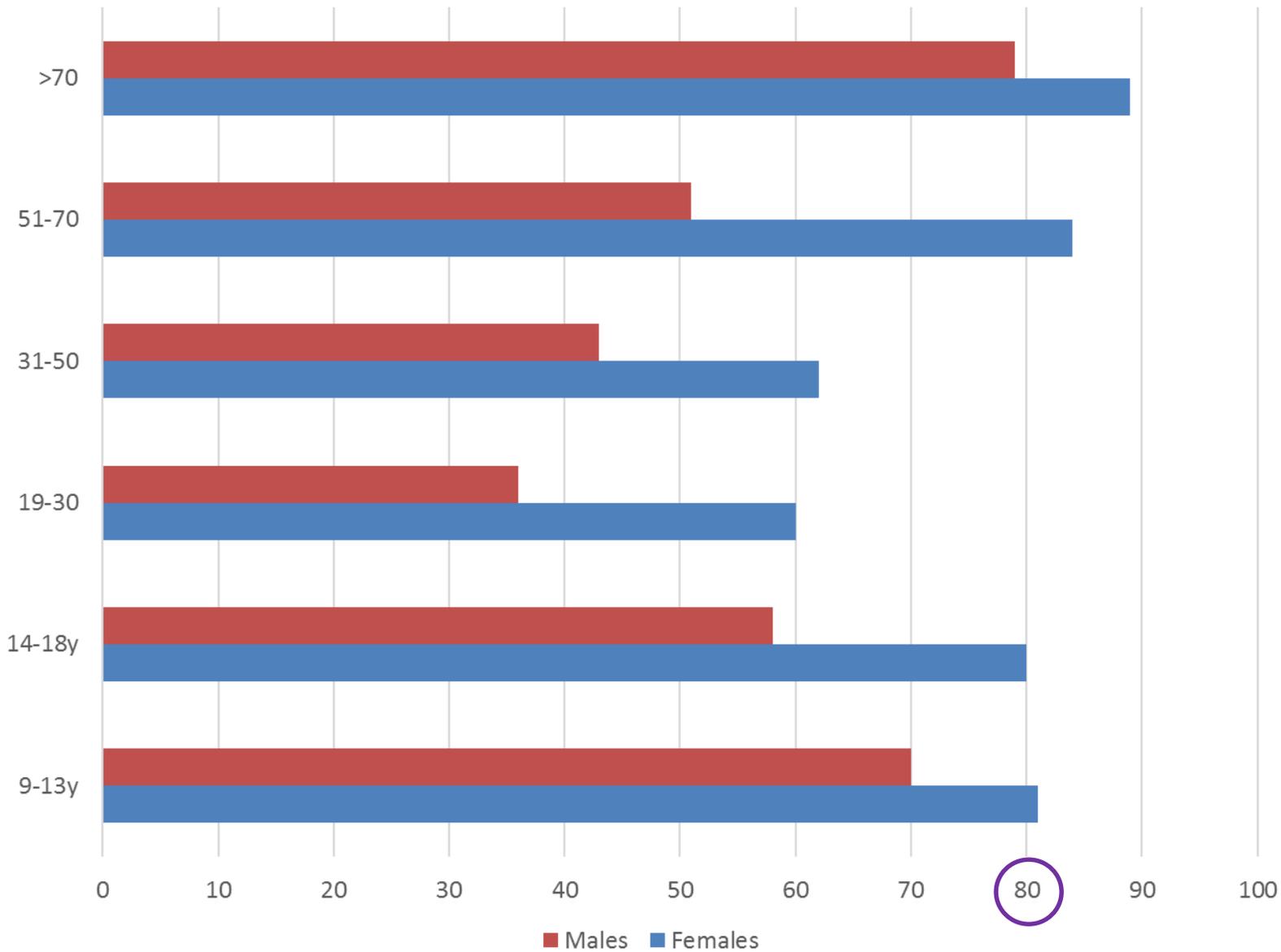
Summary of Calcium Intakes

(All CANADIANS \geq 1y)

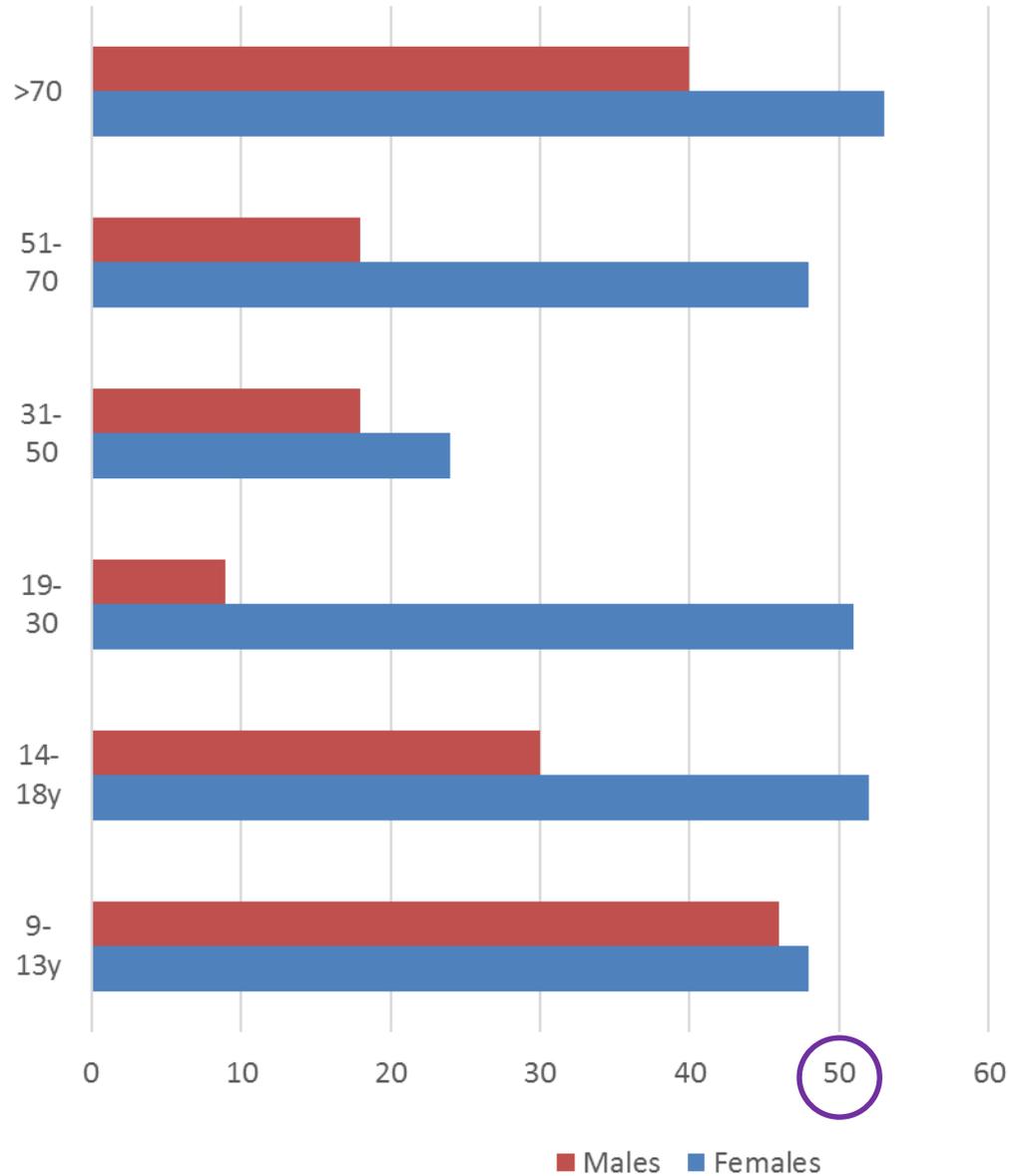
INTAKE	2004	2015
Food alone	875 mg	840 mg
Food + Supplements	1220 mg	1160 mg

PREVALENCE OF INADEQUACY	2004	2015
Food alone	58 %	69 % 
Food + Supplements	32 %	33 %

PREVALENCE OF INADEQUACY IN 2015 FROM FOOD: Males and Females



PREVALENCE OF INADEQUACY IN 2015 FROM FOOD & SUPPLEMENTS: Males and Females (22%)



Summary

1. Requirement for Calcium

- Food sources of calcium are in the new Food Guide
- Need to select **higher calcium foods** from each group

2. Concern about Excess

- No risk in consuming supplements to *“fill the intake gap”* to the RDA

3. What are Canadians currently getting from foods and supplements?

- Those most at risk for inadequacy: **Women and girls**
 - **80% Prevalence of Inadequacy** → a calcium strategy is warranted for women
- Supplements improve % adequacy yet use has fallen since CVD story appeared

Canada's food guide



International Osteoporosis Federation (IOF) 2017

- **Dietary protein intake of 1.0–1.2 g/kg/day**
> 20-25g of high-quality protein at each main meal.
- **Vitamin D 800 IU/day**
25(OH)D levels >50 nmol/L.
- **Calcium intake of 1,000 mg/day**

2014 European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO)



IOF COMPENDIUM OF OSTEOPOROSIS



Our vision is a world without fragility fractures, in which healthy mobility is a reality for all.