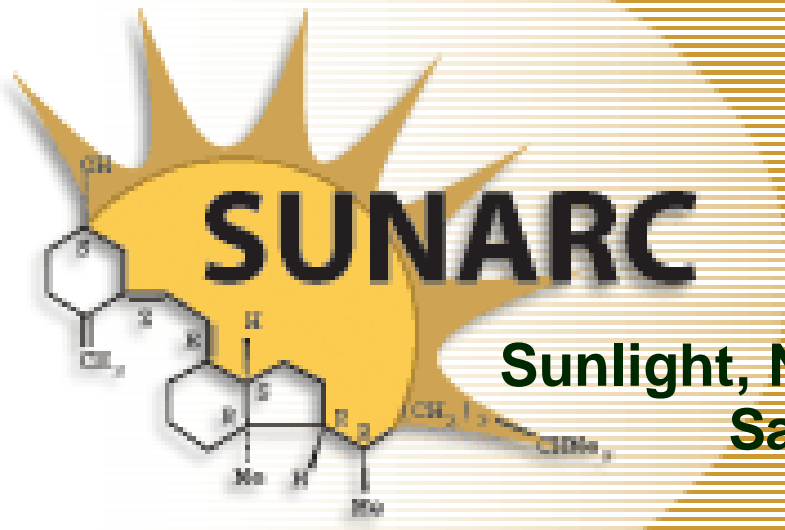


Role of Vitamin D in Reducing the Economic Burden of Disease in Canada and the United States

A presentation to the
**IOM Committee to Review
Reference Intakes for Vitamin D
and Calcium**

Washington, DC, August 4, 2009
by **William B. Grant, Ph.D.**



**Sunlight, Nutrition, and Health Research Center
San Francisco, California, 94164-1603**

www.sunarc.org

Scientific Evidence Used in This Study



- Ecological studies
 - Useful indices of solar UVB exist (e.g., July UVB in U.S.) and vitamin D production is sufficient to impact disease rates.
 - Indices for other factors are often used (alcohol, smoking, diet, air pollution, ethnic heritage, urban/rural, socioeconomic status).
- Observational studies – case-control and cohort
- Meta-analyses of observational studies
- Cross-sectional studies – e.g., NHANES
- Randomized controlled trials
- Laboratory studies of mechanisms

Estimated Reductions in Incidence Rates for Higher Serum 25(OH)D Levels*



- Based on increasing population mean value from 20-30 ng/mL to 40-50 ng/mL
- Cancer in general (E,O,M,R): 25%
- Cardiovascular and metabolic diseases (O): 20%
- Infectious diseases: from 20% for pneumonia to 30% for seasonal influenza (E,O,R)
- Autoimmune diseases (E,O): from 25% for asthma to 60% for multiple sclerosis
- Falls and hip fractures (E,O,M,R): 30%
- Adverse pregnancy outcomes (O): 20% to 40%
 - E-Ecological, O-Observational, M-Meta-analysis, R-Randomised controlled trial

Reduction in Economic Burden of Disease in Canada [Grant et al., submitted]

Disease	Total cost	Vitamin D	Savings
Cancers	\$17.9B	25%	\$4.5B
Cardiovascular	20.6	25	5.2
Diabetes	9.9	20	2.0
Depression	4.2	20	0.8
Multiple scler	1.0	60	0.6
Musculoskel	20.6	10	2.1
Back pain	5	30	1.5
Pregnancy	3.7	20	0.7
Miscellaneous	9.7	25	2.4
Totals	\$210B (all)		19.8 (9.4%)

Reduction in Economic Burden of Disease in the United States [Grant et al., in preparation]

Disease	Direct cost	Total Cost	Vitamin D	Reduction
Cancers	\$99B	\$219B	25%	\$55B
CHD		165	20	33
Stroke		69	20	14
Diabetes	116	172	15	26
CHF		37	20	7
Depression	26	83	10	8
Dementia		148	15	22
Multiple scl	5	10	30	3
Falls	20	20	30	6
Back pain	26	50	25	13

United States, continued



Disease	Direct cost	Total Cost	Vitamin D	Reduction
Asthma	\$37B	\$50B	25%	\$13B
COPD	22	39	15	6
Influ, pnue	10	36	30	8
Septicemia		17	25	4
Cesarean	1	3	20	1
Totals		\$1118B	19.6%	\$219B
All health	\$2400B		11.0%	\$219B

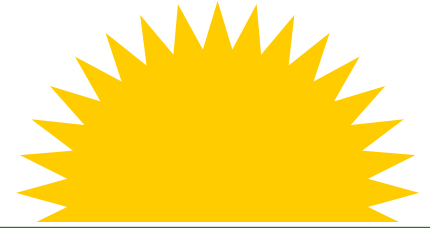
Premature Deaths Avoided Annually in the United States from Increased Vitamin D

Disease	Cases	Deaths	Vitamin D	Avoided
Cancers	1479k	562k	25%	140k
Heart	2200	600	20	120
Stroke	795	144	20	29
Diabetes	1600	75	15	11
CHF		292	20	58
Dementia		73	15	11
MS	10	4	30	1
Fractures	340	10	30	3
Influenza	220	36	30	11
Pneumon	1200	55	20	11

Premature Deaths Avoided Annually in the United States from Increased Vitamin D (cont)

Disease	Cases	Deaths	Vitamin D	Avoided
RSV	270k	11k	10%	1k
Asthma		3.6	25	1
COPD		125	10	13
Septicemia	660	145	25	36
Cesarean	370	37	40	15
Totals - all		2400k	19%	461k

Summary and Conclusion



- There is emerging scientific evidence that vitamin D reduces the risk of many types of disease.
- For increases in serum 25(OH)D from 20-30 ng/mL to 40-50 ng/mL, the economic burden of disease can be reduced by an amount equal to about 10% of the direct cost for health care.
- The mortality rate could drop as much as 20%, adding 2-3 years of healthy life expectancy.
- These values are consistent with other studies.