Nutrition & Cancer

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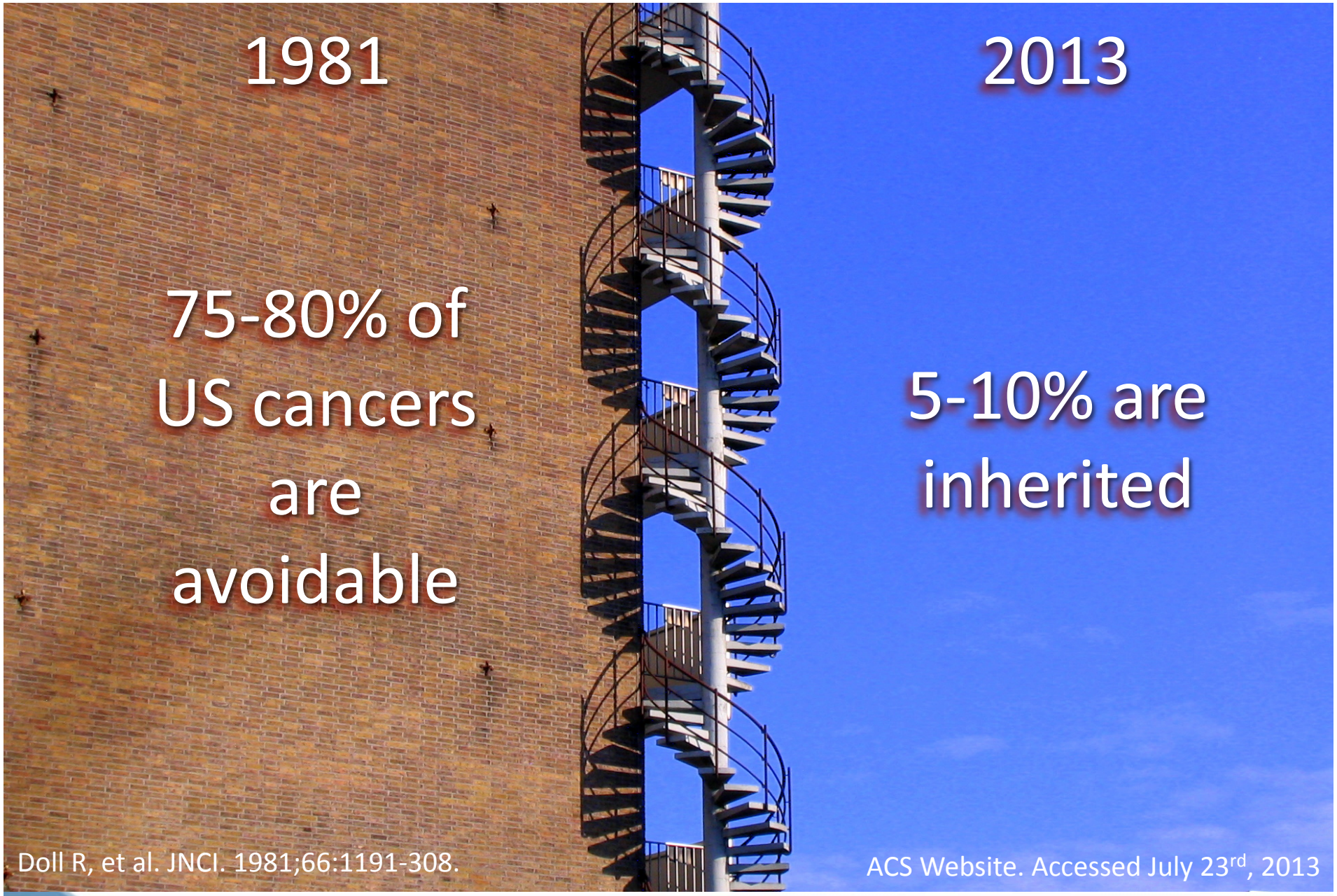
Highland Weight Management &
Lifestyle Center



Doll R, et al. JNCI. 1981;66:1191-308.

ACS Website. Accessed July 23rd, 2013

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Causes of Cancer (1981)

Factor	Percent of all cancer deaths	
	Best estimate	Range of acceptable estimates
Tobacco		
Diet		
Alcohol		
Infection		
Reproductive Factors		
Pollution, Additives, Medicines/imaging, Occupation, Geophysical factors		

Doll R, Peto R. The causes of cancer: quantitative estimates of avoidable risks of cancer in the United States today. Journal of the National Cancer Institute 1981;66:1191-308

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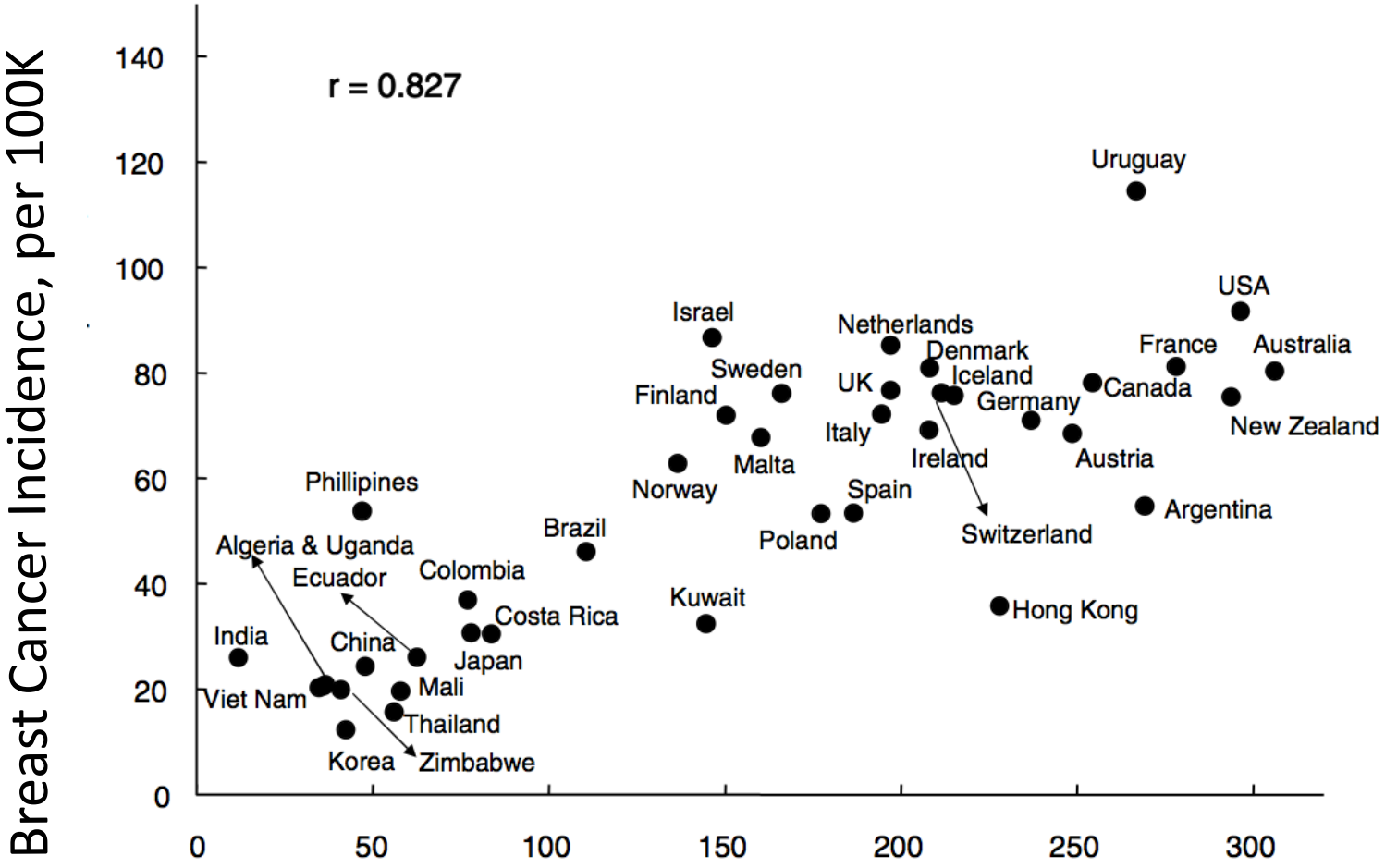
Background and Justification

- **Observational Research**
- Mechanistic Research
- Intervention Research

Breast Cancer (1993-1997) and Meat Intake (1961-97)

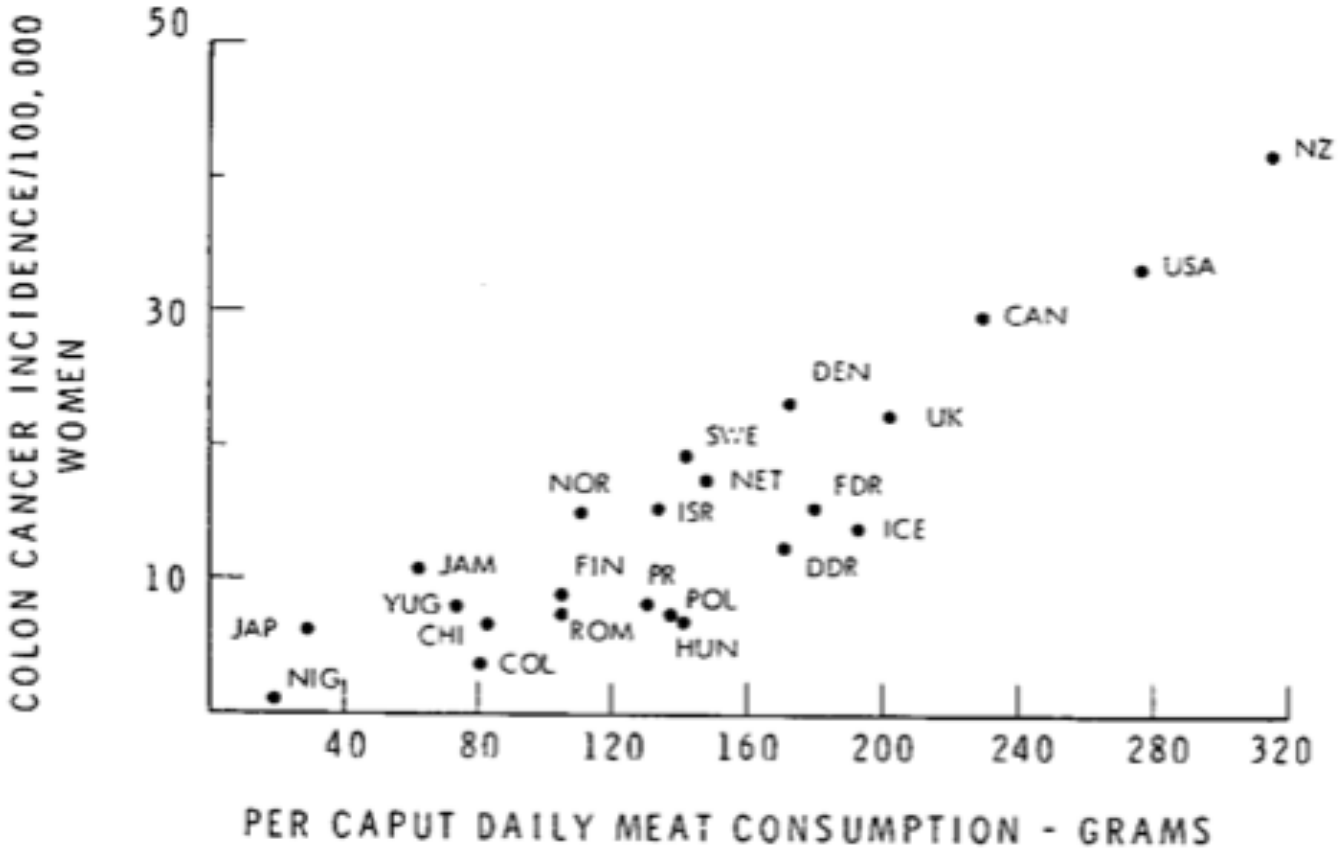


Meat Consumption, g/day

Ganmaa D, Sato A. The possible role of female sex hormones in milk from pregnant cows in the development of breast, ovarian and corpus uteri cancers. Medical hypotheses 2005;65:1028-37.

Colon Cancer (1964-5) and Meat Intake (1963-65)

35-64 year old women, age-standardized



Armstrong B, Doll R. Environmental factors and cancer incidence and mortality in different countries, with special reference to dietary practices. Int J Cancer 1975;15:617-31.

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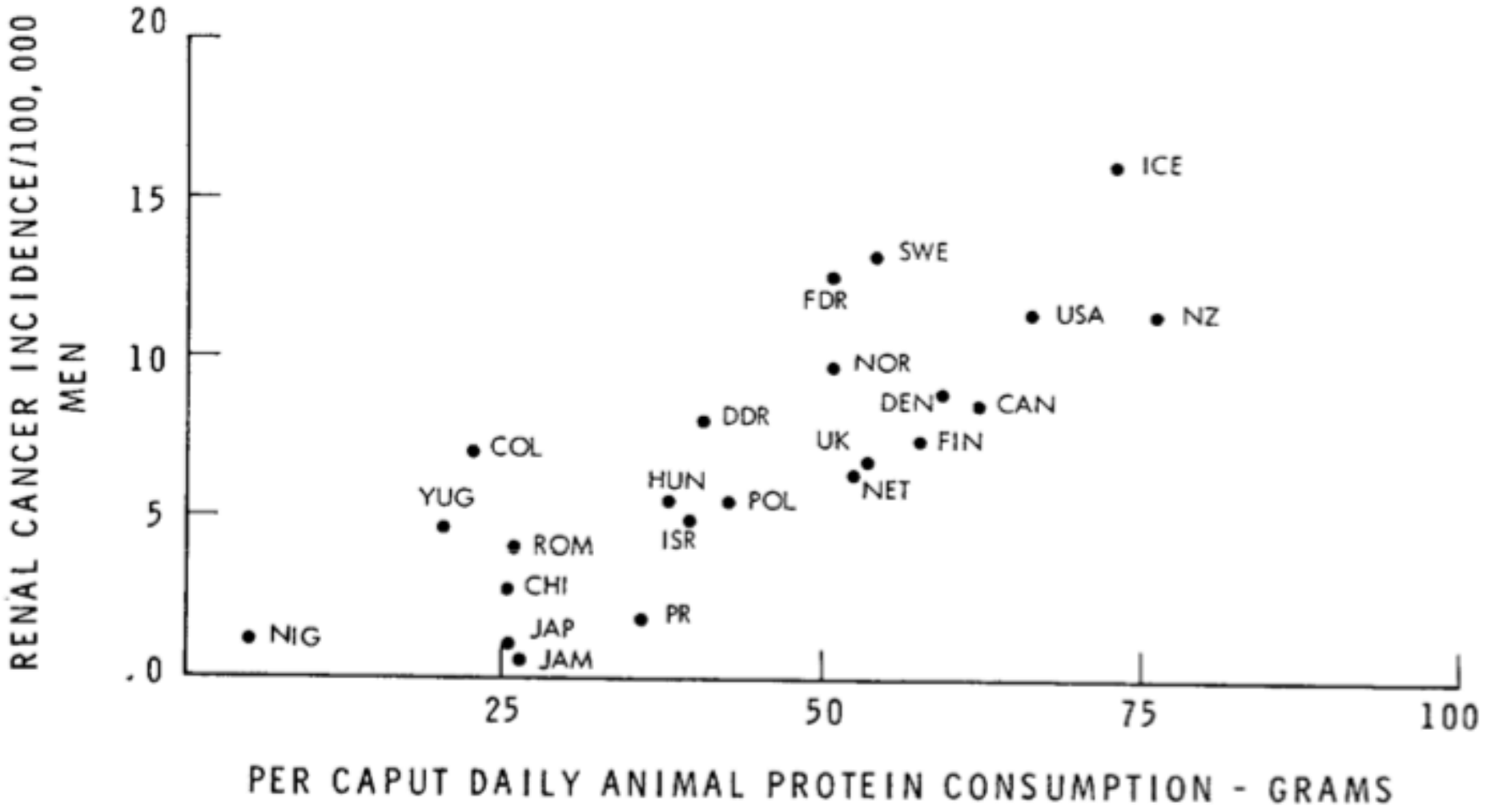
Kidney Cancer (1964-5) and Animal Protein Intake (1963-65)

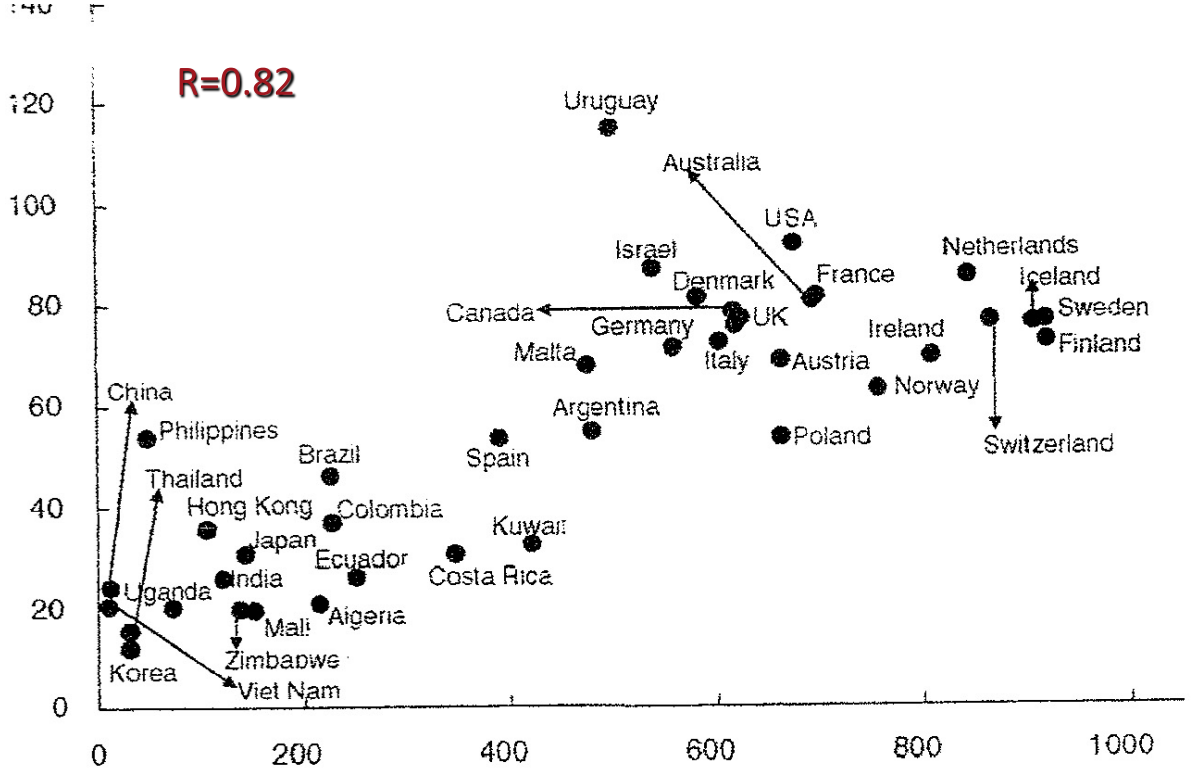
35-64 year old men, age-standardized



Armstrong B, Doll R. Environmental factors and cancer incidence and mortality in different countries, with special reference to dietary practices. Int J Cancer 1975;15:617-31.

Breast Cancer (1993-1997) and Milk Intake (1961-97)

Breast Cancer Incidence, per 100K

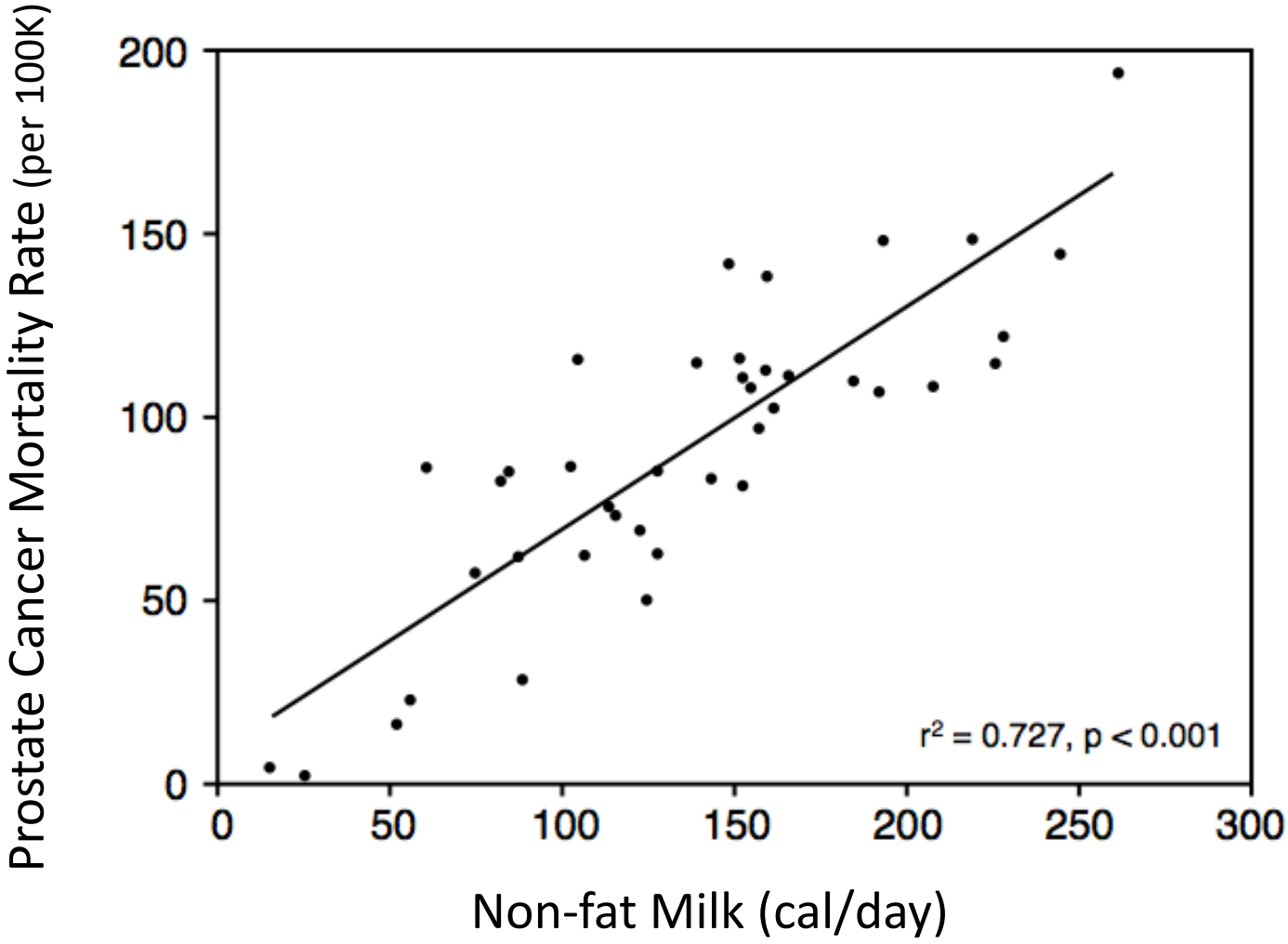


Milk Consumption, g/day

Ganmaa D, Sato A. The possible role of female sex hormones in milk from pregnant cows in the development of breast, ovarian and corpus uteri cancers. Medical hypotheses 2005;65:1028-37.

Skim Milk and Prostate Cancer in 41 countries

(Mortality and Diet from Mid-1980s)



Grant WB. An ecologic study of dietary links to prostate cancer. Altern Med Rev 1999;4:162-9.

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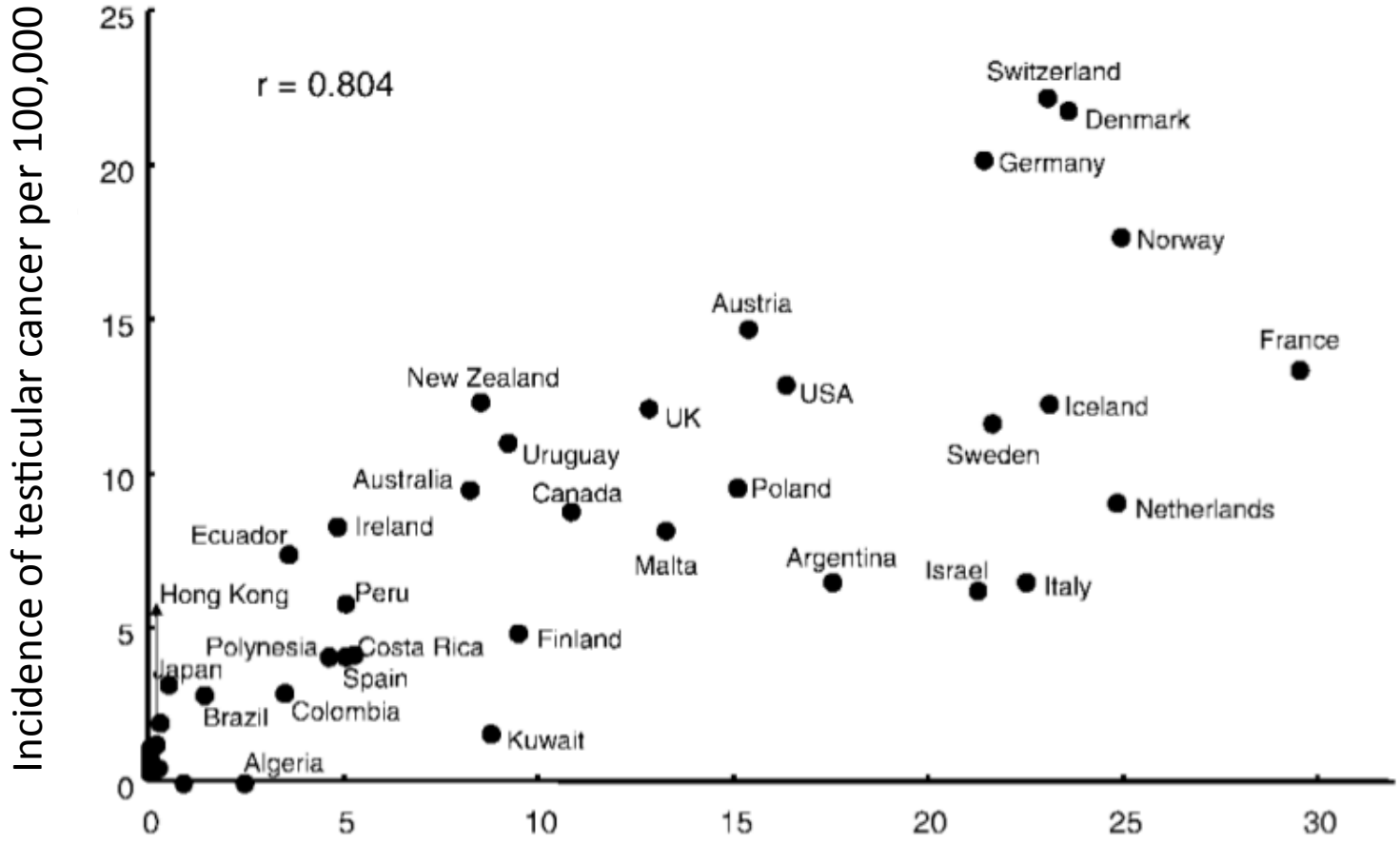
Testicular Cancer (Men Aged 20-39) and Cheese Consumption (1961-1965)



Ganmaa D, Li XM, Wang J, Qin LQ, Wang PY, Sato A. Incidence and mortality of testicular and prostatic cancers in relation to world dietary practices. Int J Cancer 2002;98:262-7.

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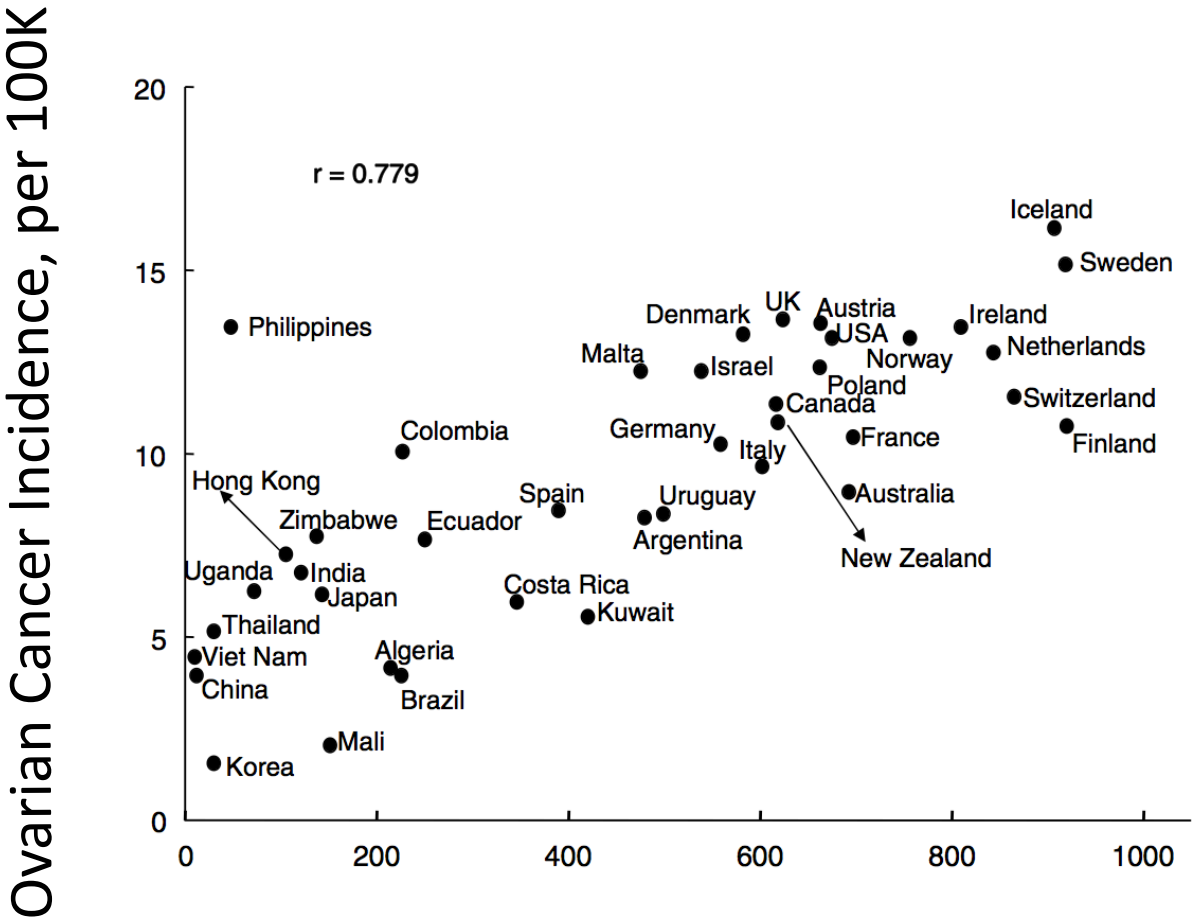
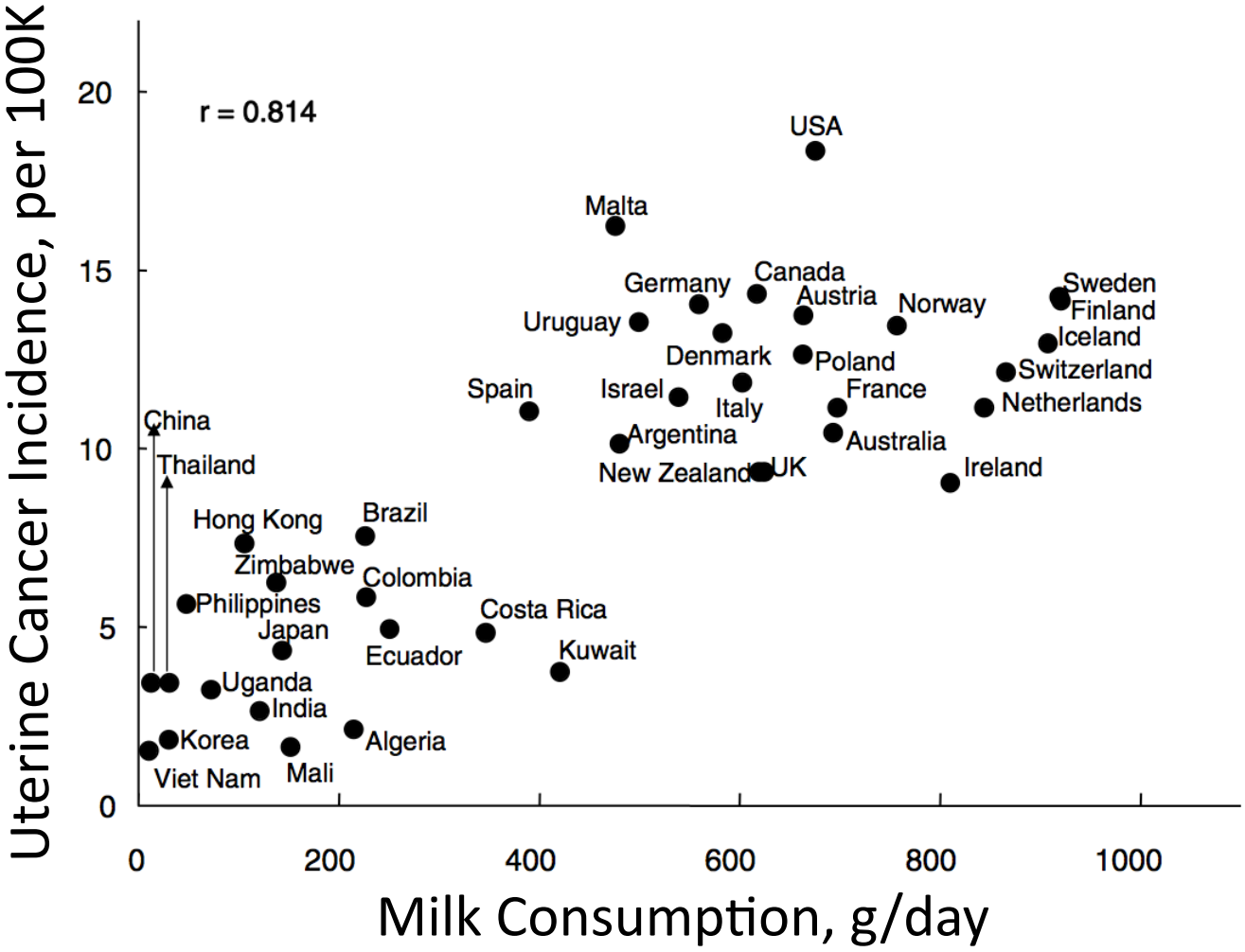
Ovarian Cancer (1993-1997) and Milk Intake (1961-97)



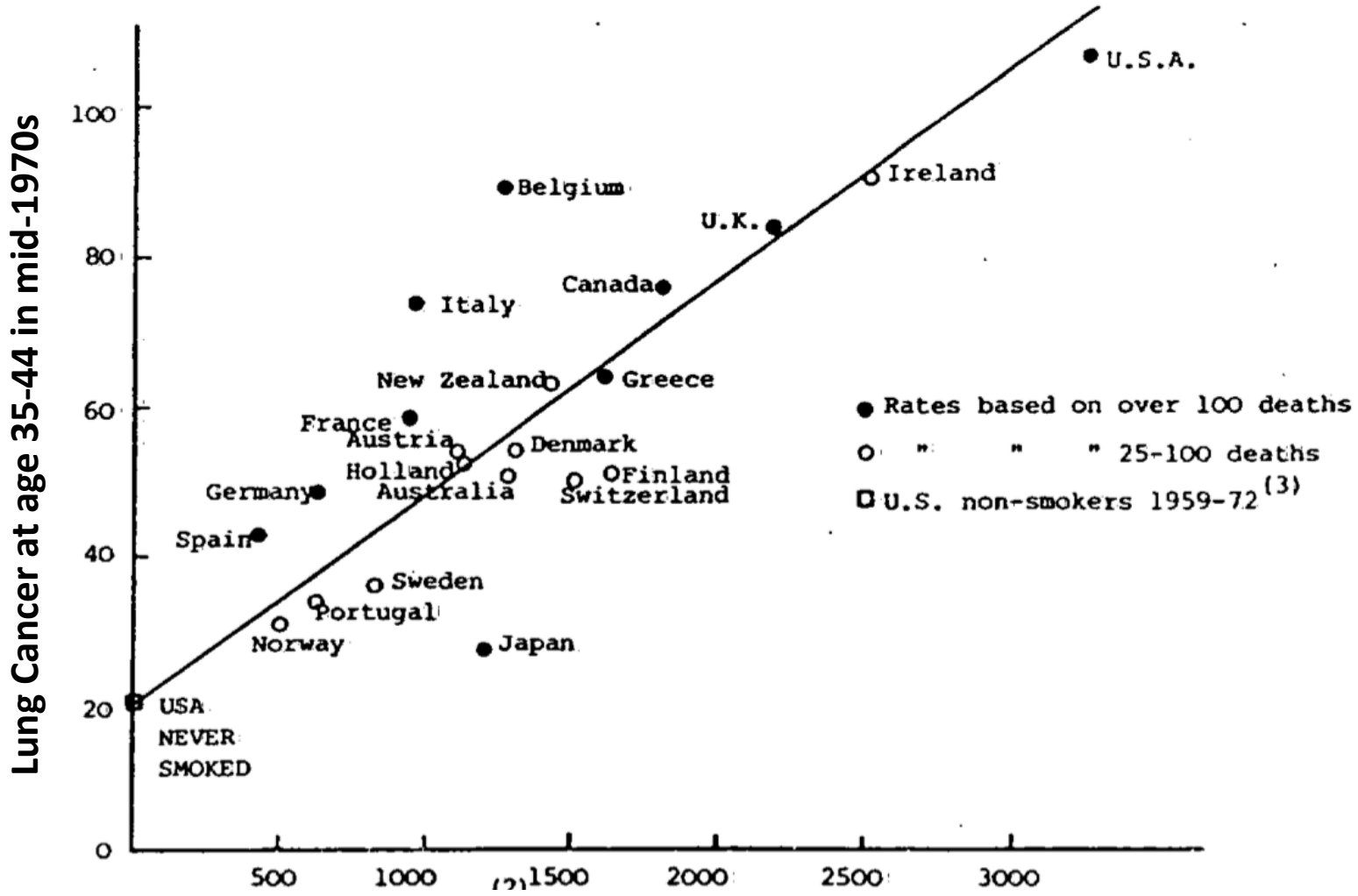
Ganmaa D, Sato A. The possible role of female sex hormones in milk from pregnant cows in the development of breast, ovarian and corpus uteri cancers. Medical hypotheses 2005;65:1028-37.

Uterine Cancer (1993-1997) and Milk Intake (1961-97)



Ganmaa D, Sato A. The possible role of female sex hormones in milk from pregnant cows in the development of breast, ovarian and corpus uteri cancers. Medical hypotheses 2005;65:1028-37.

Lung Cancer and Tobacco Consumption



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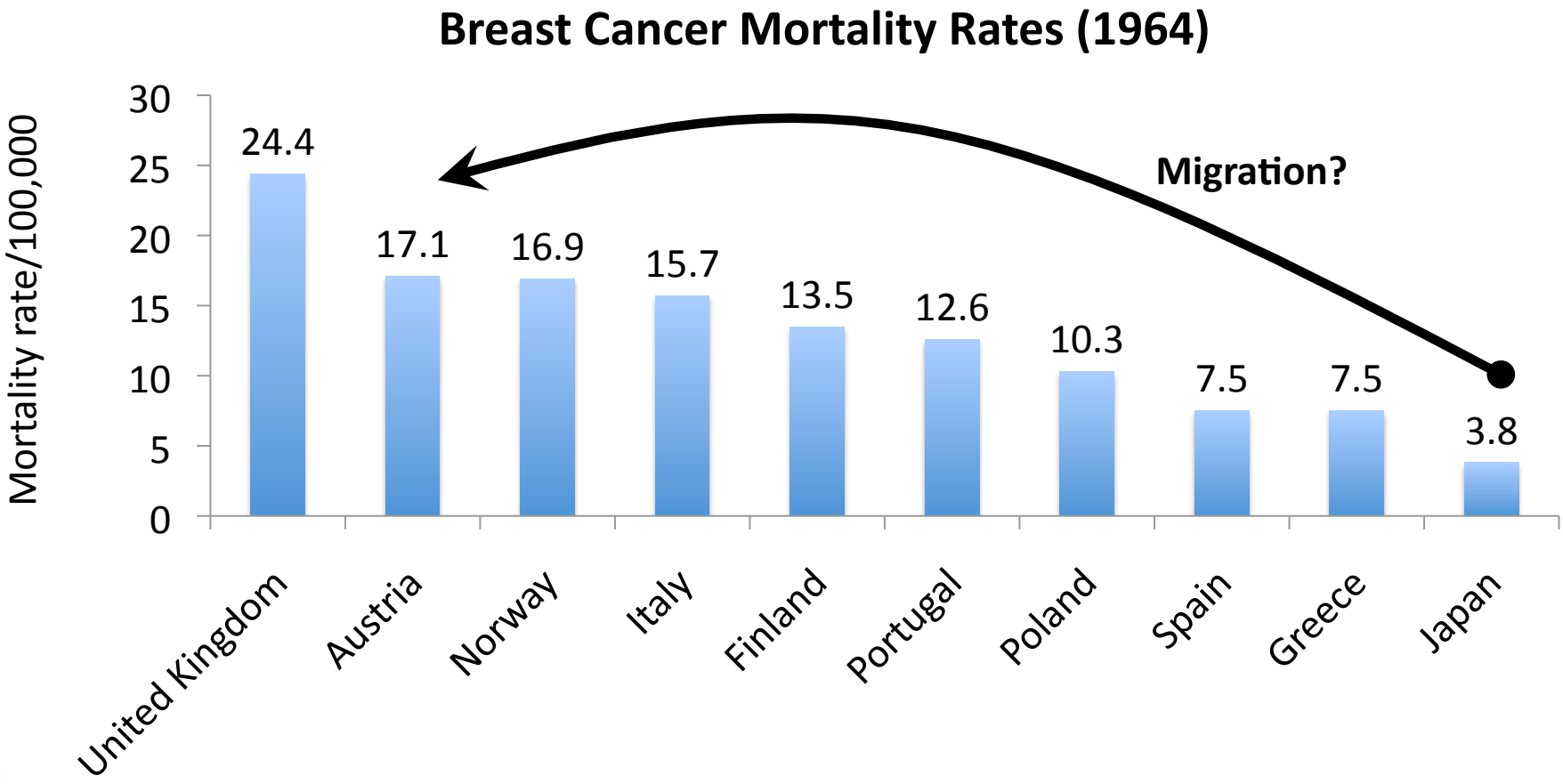
Cancer Is Localized



Rose DP, Boyar AP, Wynder EL. International comparisons of mortality rates for cancer of the breast, ovary, prostate, and colon, and per capita food consumption. Cancer 1986;58:2363-71.

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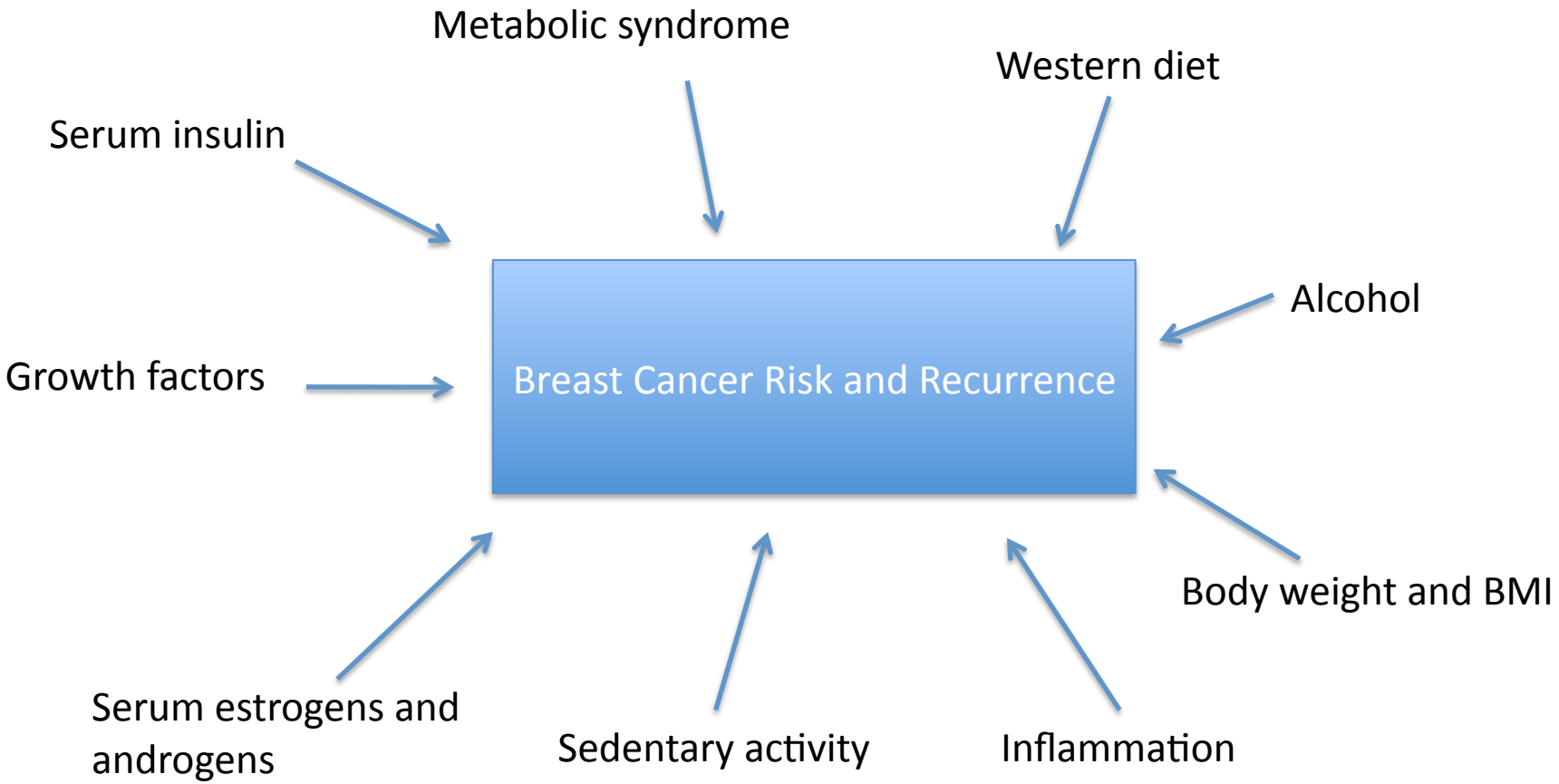
Background and Justification

- Observational Research
- **Mechanistic Research**
- Intervention Research

Mediators of Risk



Chlebowski RT, Blackburn GL, Thomson CA, et al. Dietary fat reduction and breast cancer outcome: interim efficacy results from the Women's Intervention Nutrition Study. J Natl Cancer Inst 2006;98:1767-76.
Villarini A, Pasanisi P, Traina A, et al. Lifestyle and breast cancer recurrences: the DIANA-5 trial. Tumori 2012;98:1-18.

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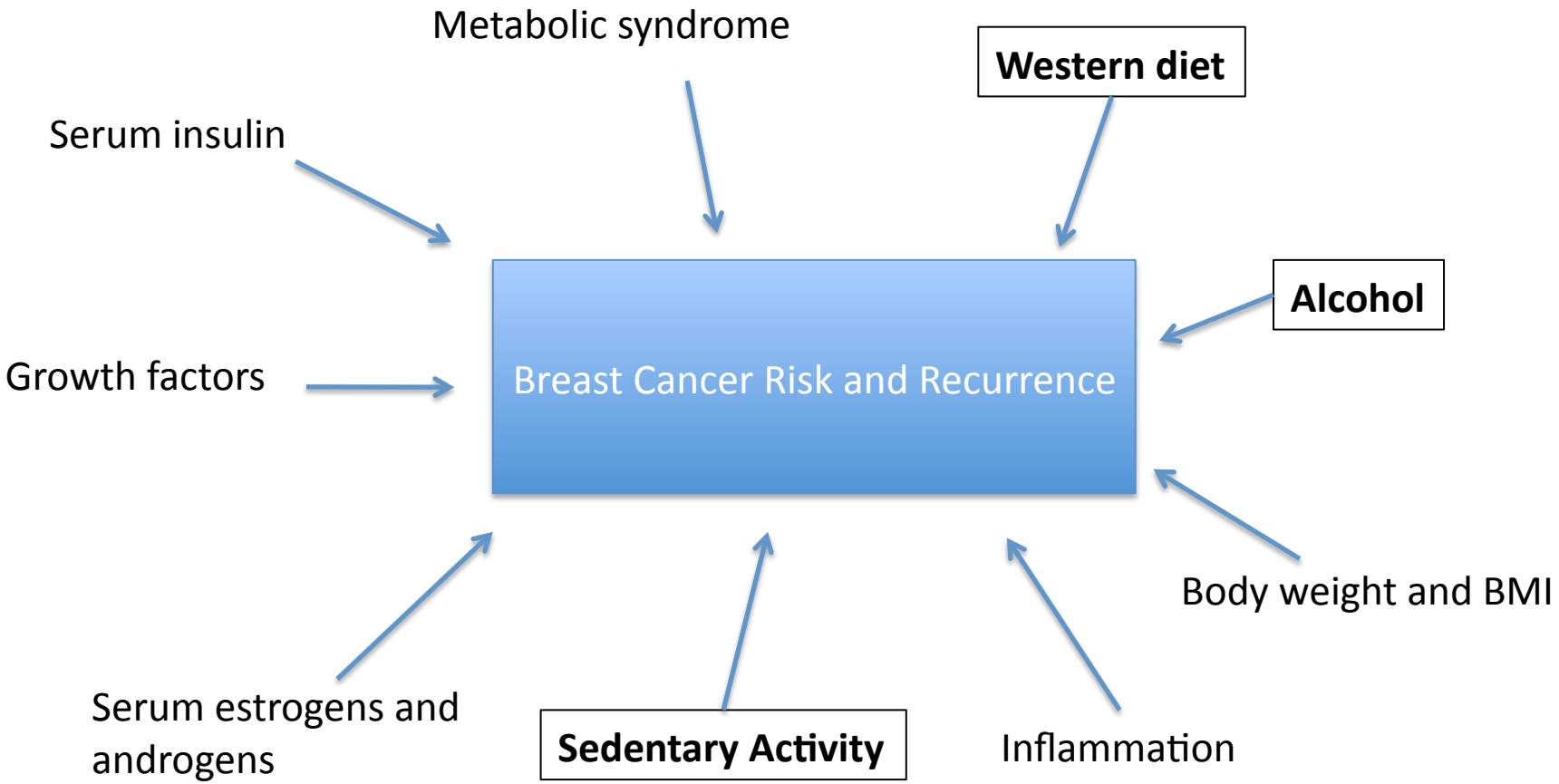
Mediators of Risk



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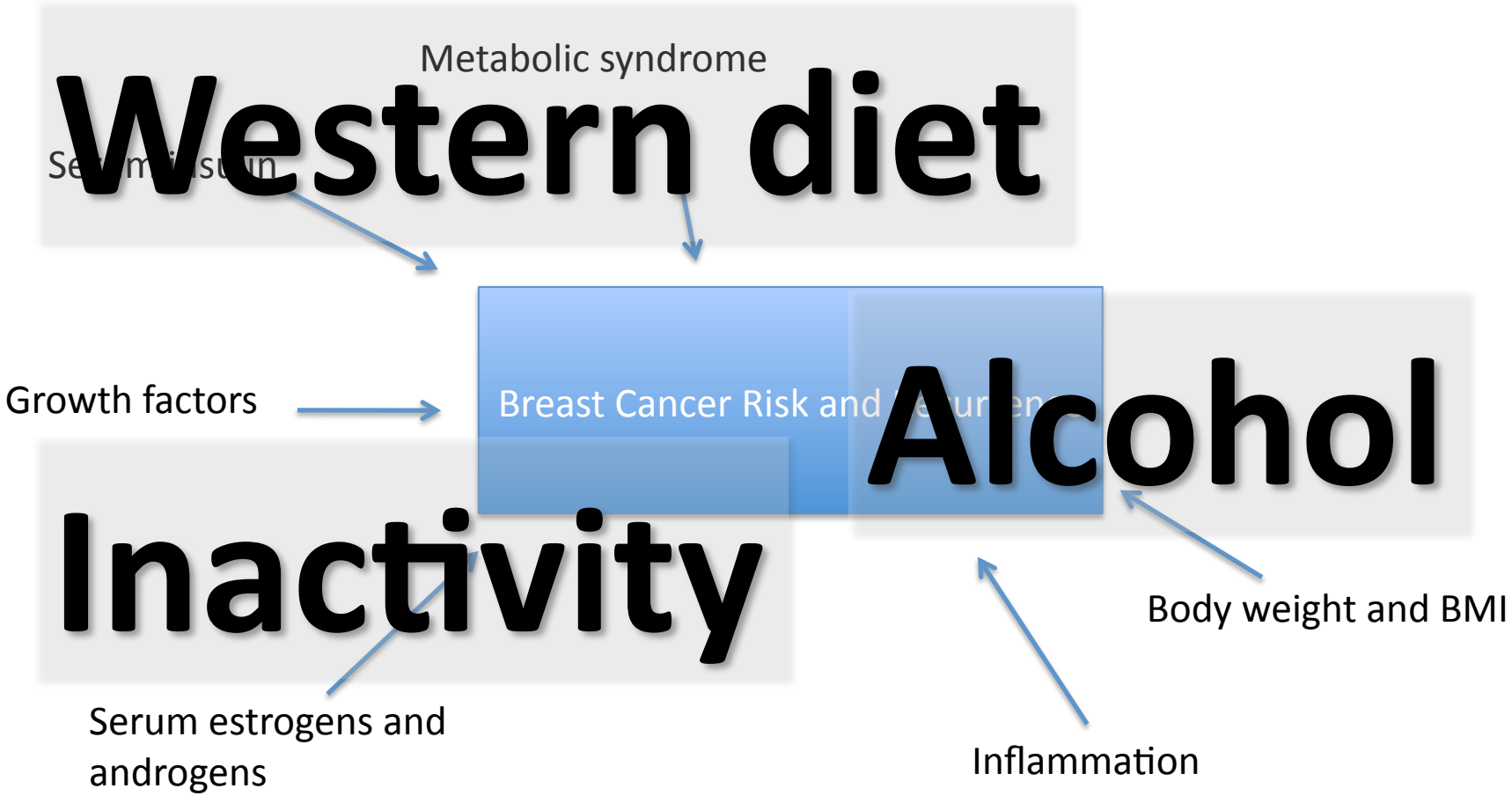

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Background and Justification

- Observational Research
- Mechanistic Research
- **Intervention Research**

Dietary Protein and AFB_1 Induced Liver Cancer (Rats)

Dietary Protein, %	Animals with tumors and hyperplastic nodules
20	(100%)
5%	

Getting Enough Protein

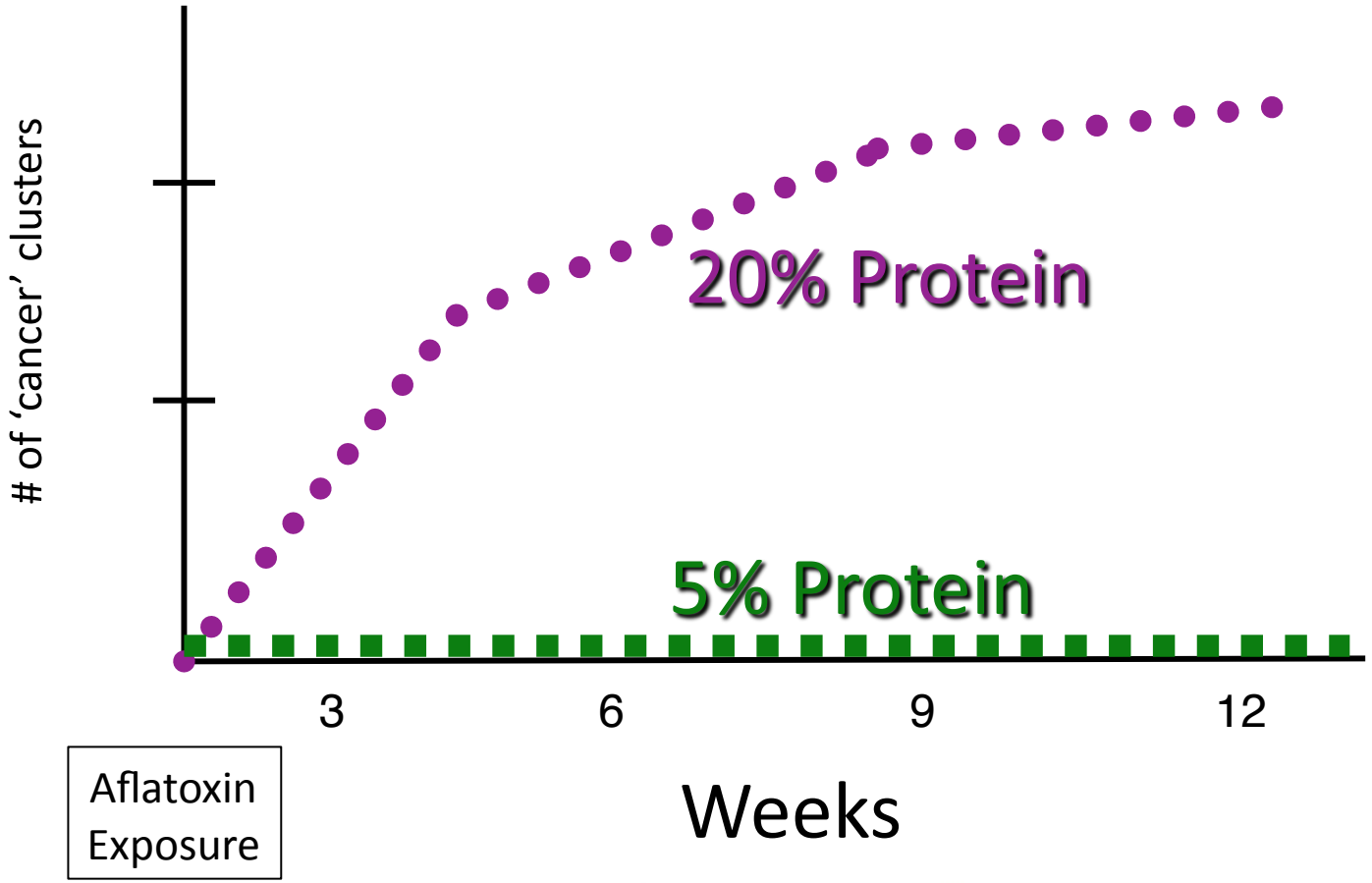
Getting More Cancer?

Madhavan and Gopalan, 1968.

Confirmed by Wells et al, 1974.

Dietary Protein and EARLY Cancer

(Youngman and Campbell, J. Nutr., 1991, Nutr. Cancer, 1992)



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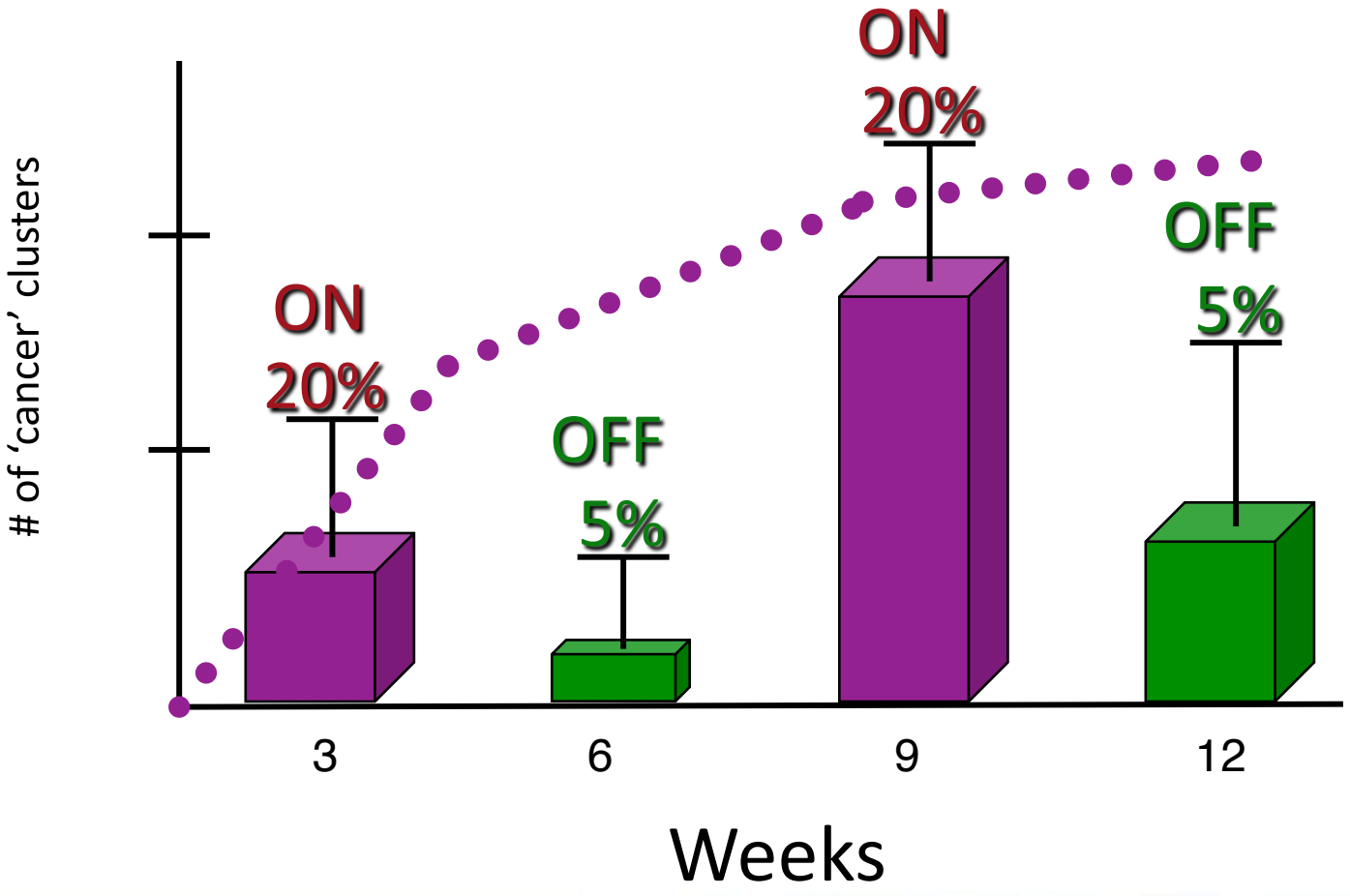

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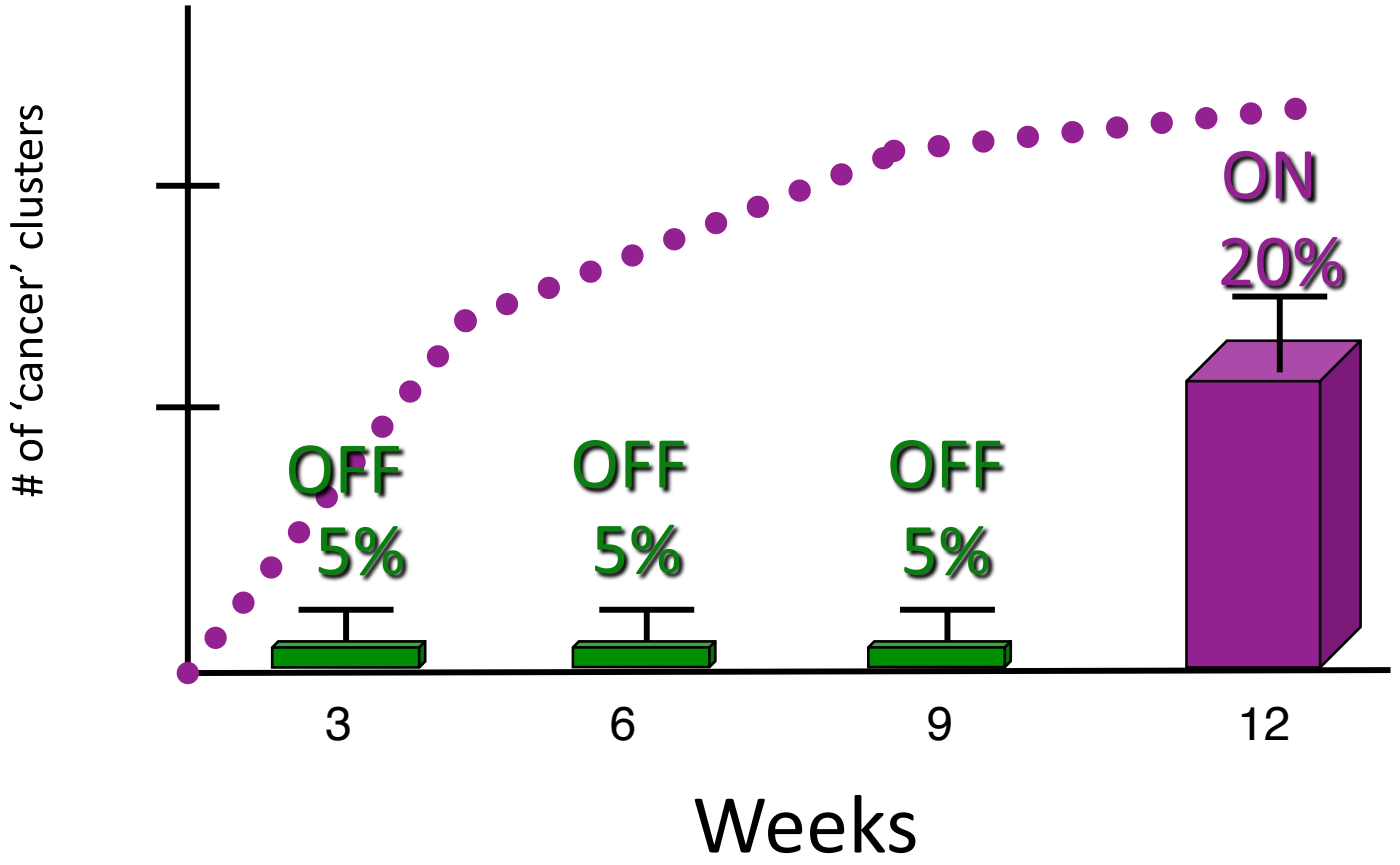
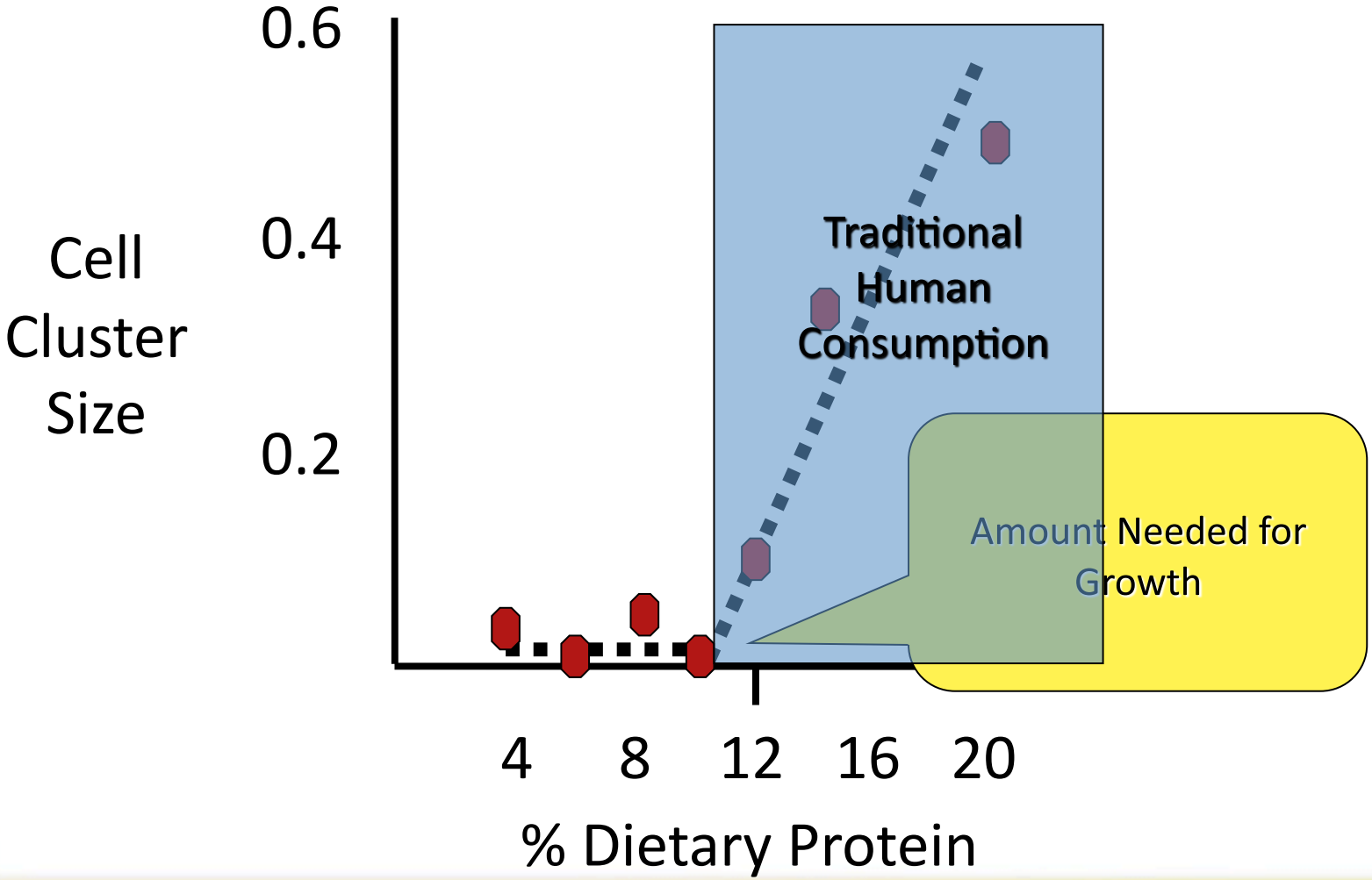


Dietary Protein and EARLY Cancer

(Dunaif and Campbell, J. Nutr. 1987)



Dietary Protein and LATE Cancer

(Youngman and Campbell, Carcinogenesis, 1992)

Chemical effect = cancer **INITIATION**

Protein effect = cancer **GROWTH**

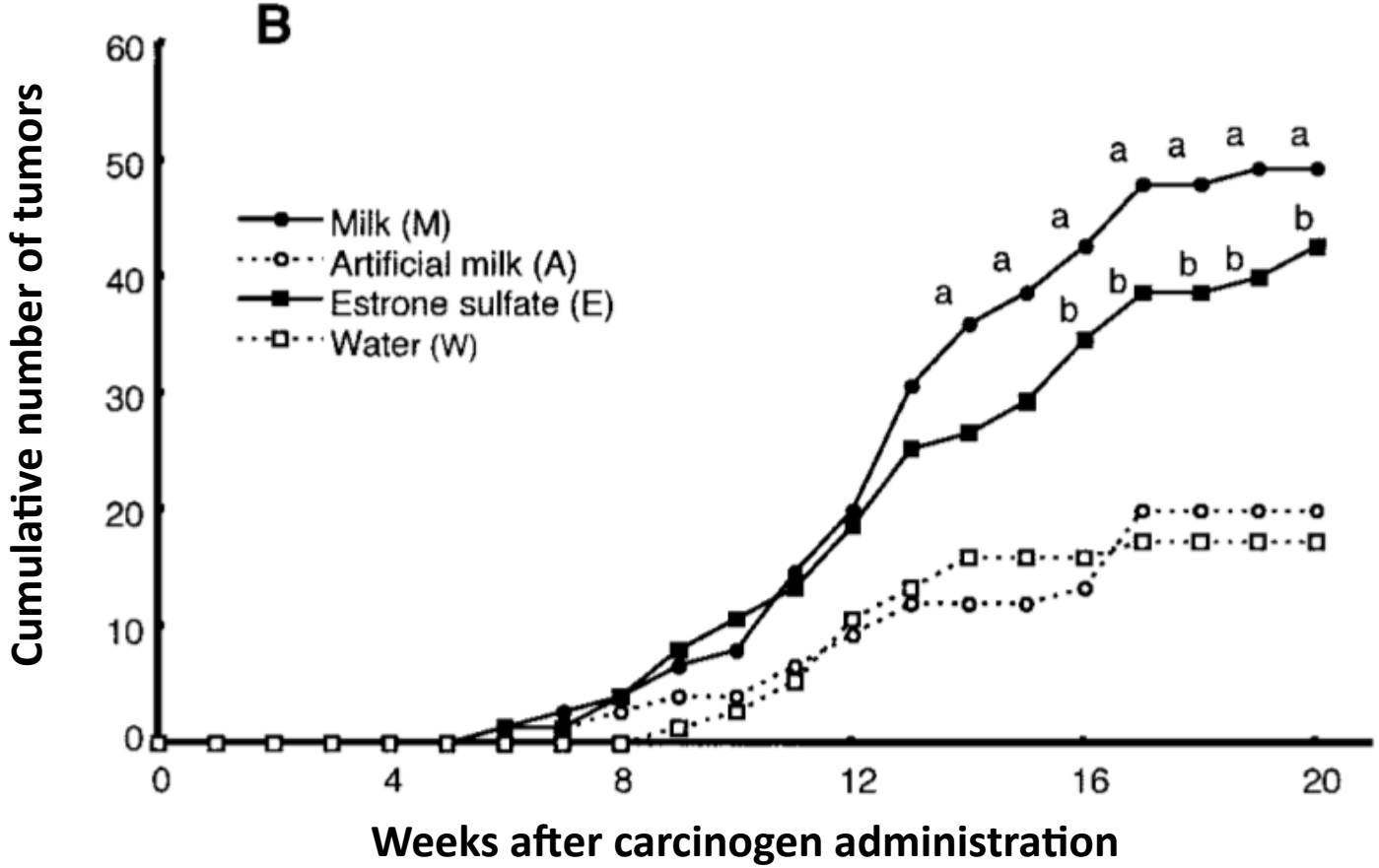
Protein, %		No. Animals	Tumor Severity*
5	all **living** at 100 wks.	60	248[a]
20	all **dead** at 100 wks.	58	**3321**[c]

** % incidence x tumor weight.*

Protein was casein, cow's milk protein.

Plant-protein (soy and wheat) did not have the same effect even at higher levels of intake.

Tumor development in rats dosed with DMBA and fed different fluids



$p < 0.05$
Milk compared to Art. Milk

(Milk is 1% fat milk.
Artificial milk is gluten, amino acids, oil, sugar, minerals)

Qin LQ, Xu JY, Wang PY, et al. Low-fat milk promotes the development of 7,12-dimethylbenz(A)anthracene (DMBA)-induced mammary tumors in rats. Int J Cancer 2004;110:491-6.

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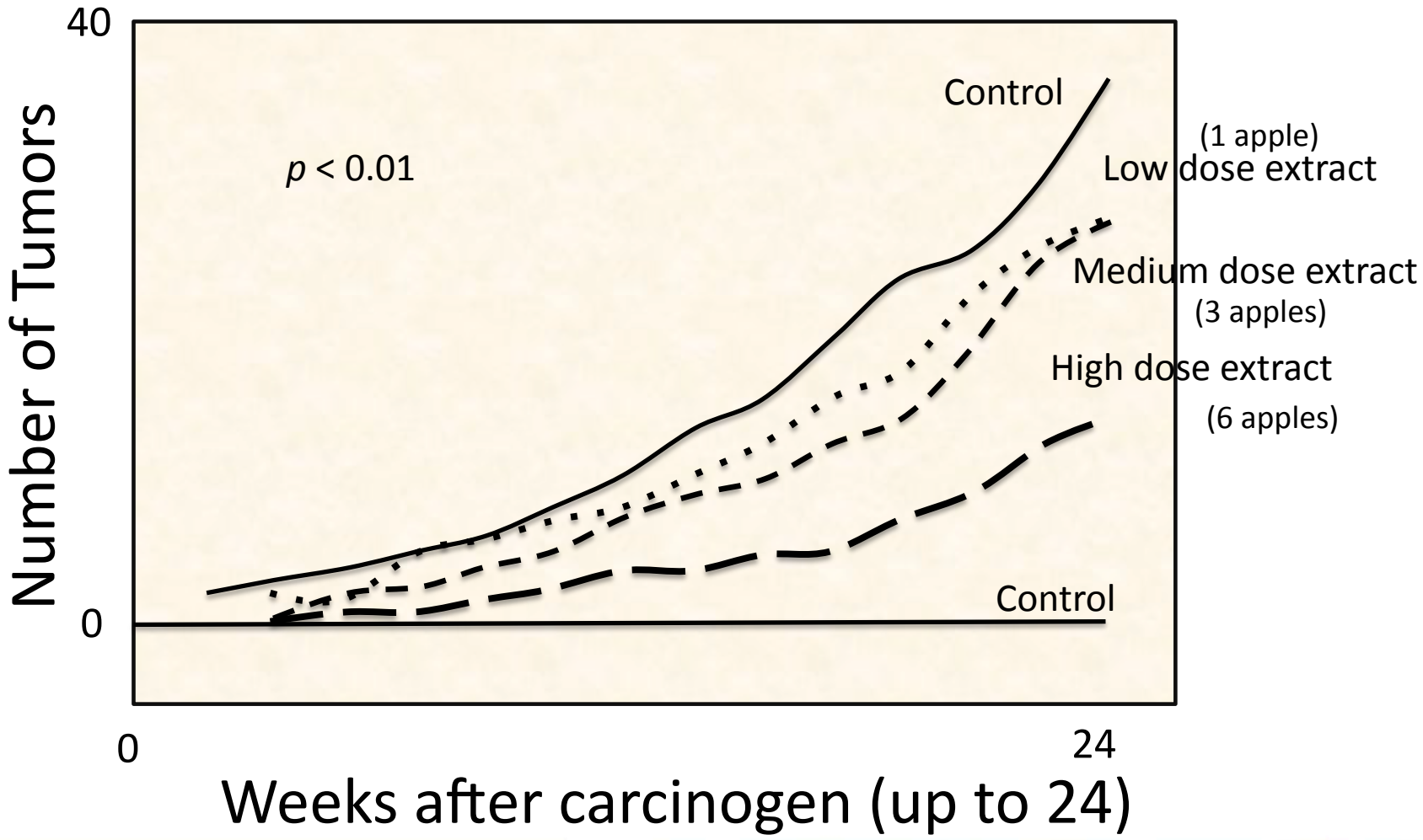
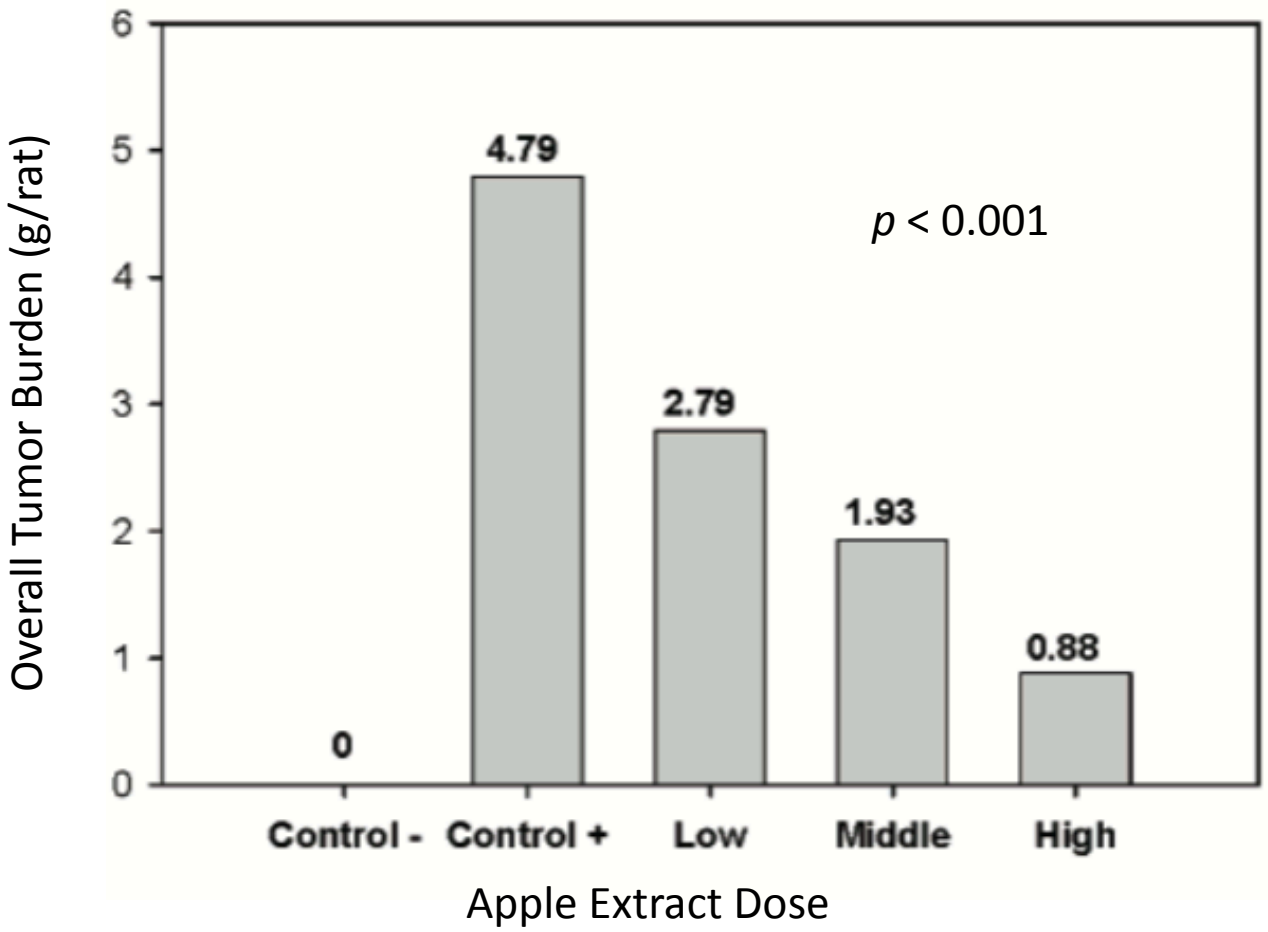
Apple Extract and Breast Cancer



Liu RH, Liu J, Chen B. Apples prevent mammary tumors in rats. J Agric Food Chem 2005;53:2341-3.

Apple Extract and Breast Cancer



Liu RH, Liu J, Chen B. Apples prevent mammary tumors in rats. J Agric Food Chem 2005;53:2341-3.

2 Weeks to Breast Health?

38 Postmenopausal overweight/obese women

2 weeks

Plant-Based Diet
- 10-15% fat
- 15-20% protein (plant)
- 70-75% carbohydrate
- 30-40g fiber/1000cal/d
- Ad libitum

Exercise

Estradiol
- Decreased 35-40%

IGF-1
- Decreased 19%

IGFBP-1
- Increased 32%

Insulin
- Decreased 29%

Barnard RJ, Gonzalez JH, Liva ME, Ngo TH. Effects of a low-fat, high-fiber diet and exercise program on breast cancer risk factors in vivo and tumor cell growth and apoptosis in vitro. Nutr Cancer 2006;55:28-34.

2 Weeks to Breast Health?

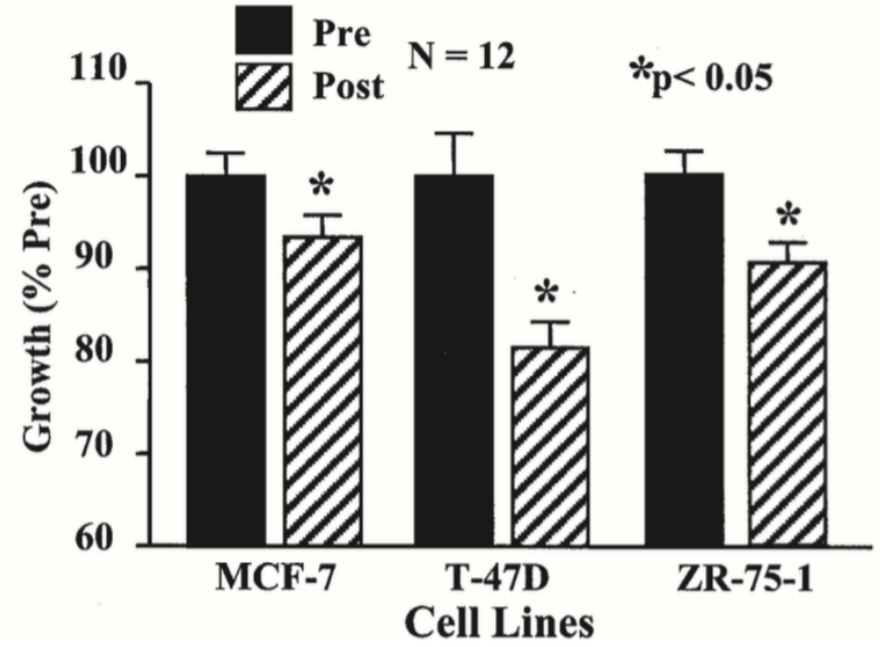


Figure 1. Effects of diet and exercise intervention on growth of breast cancer (BCa) cell lines. BCa cells were plated overnight in 10% fetal bovine serum, and the following day the media was removed and replaced with fresh media and 10% human serum pre- and postintervention. The cells were allowed to grow for 2 days, and growth was determined by the CellTiter Proliferation Assay (Promega, Madison, WI).

Barnard RJ, Gonzalez JH, Liva ME, Ngo TH. Effects of a low-fat, high-fiber diet and exercise program on breast cancer risk factors in vivo and tumor cell growth and apoptosis in vitro. Nutr Cancer 2006;55:28-34.

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2 Weeks to Breast Health?

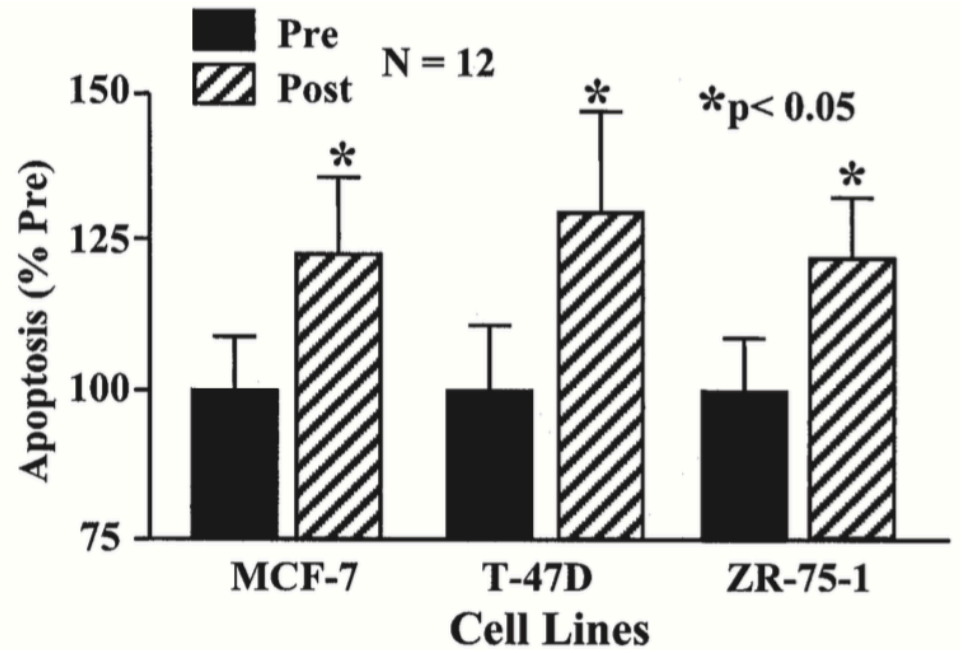
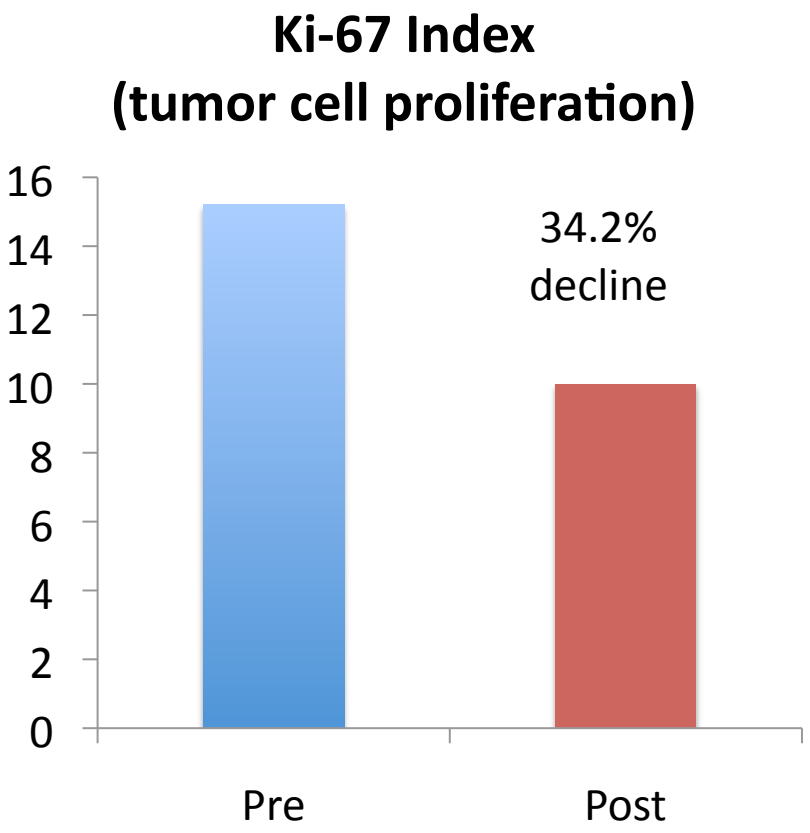


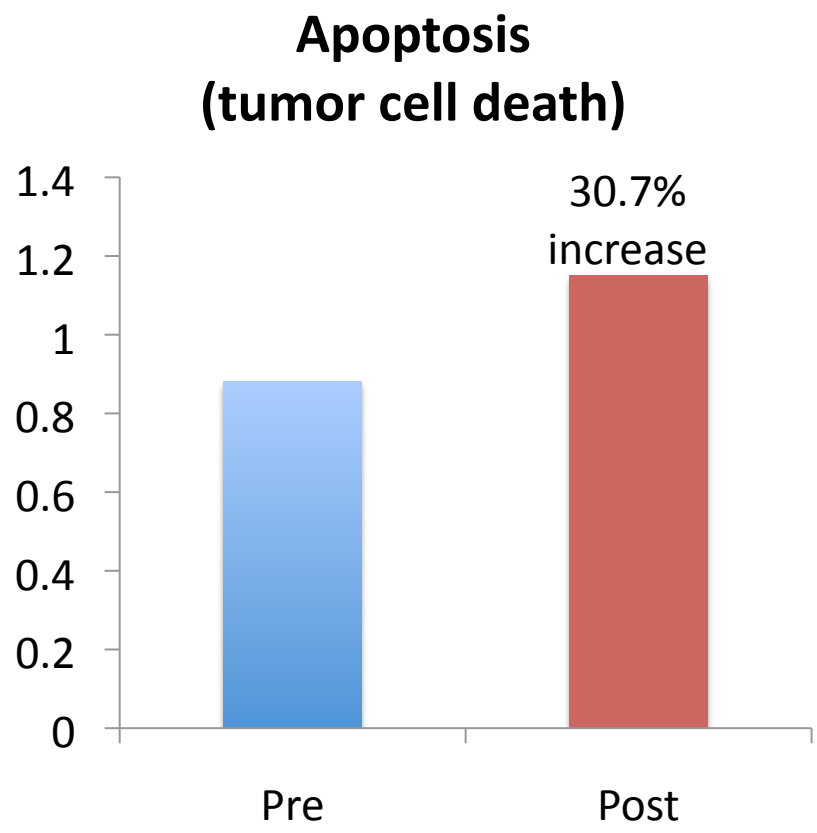
Figure 2. Effects of diet and exercise intervention on apoptosis in breast cancer (BCa) cell lines. BCa cells were plated overnight in 10% fetal bovine serum, and the following day the media was removed and replaced with fresh media and 10% human serum pre- and postintervention. The cells were allowed to grow for 2 days, and apoptosis was determined by the Cell Death Detection enzyme-linked immunosorbent assay (Roche, Indianapolis, IN).

Barnard RJ, Gonzalez JH, Liva ME, Ngo TH. Effects of a low-fat, high-fiber diet and exercise program on breast cancer risk factors in vivo and tumor cell growth and apoptosis in vitro. Nutr Cancer 2006;55:28-34.

Flaxseed Muffins (25g muffin)

Postmenopausal women, between biopsy and surgery, 32 days





P < 0.01 for both

Thompson LU, Chen JM, Li T, Strasser-Weippl K, Goss PE. Dietary flaxseed alters tumor biological markers in postmenopausal breast cancer. Clin Cancer Res 2005;11:3828-35.

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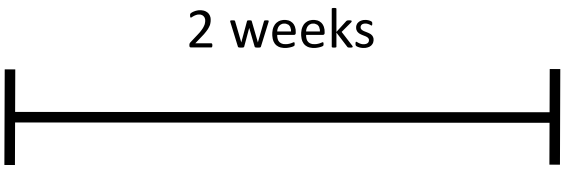
2 Weeks to Colon Health?



Results:

Rural Africans

High fiber (66g), low-fat (16%)	High protein (27%), high-fat (52% total cal), low fiber	Increased cell proliferation Increased inflammation Butyrate decreased Bile acid increased

African Americans

High Protein (15%), high-fat (35%)	High fiber (55), low-fat (16%)	Decreased cell proliferation Decreased inflammation Butyrate increased Bile Acid decreased

O'Keefe SJ, Li JV, Lahti L, et al. Fat, fibre and cancer risk in African Americans and rural Africans. Nature communications 2015;6:6342.

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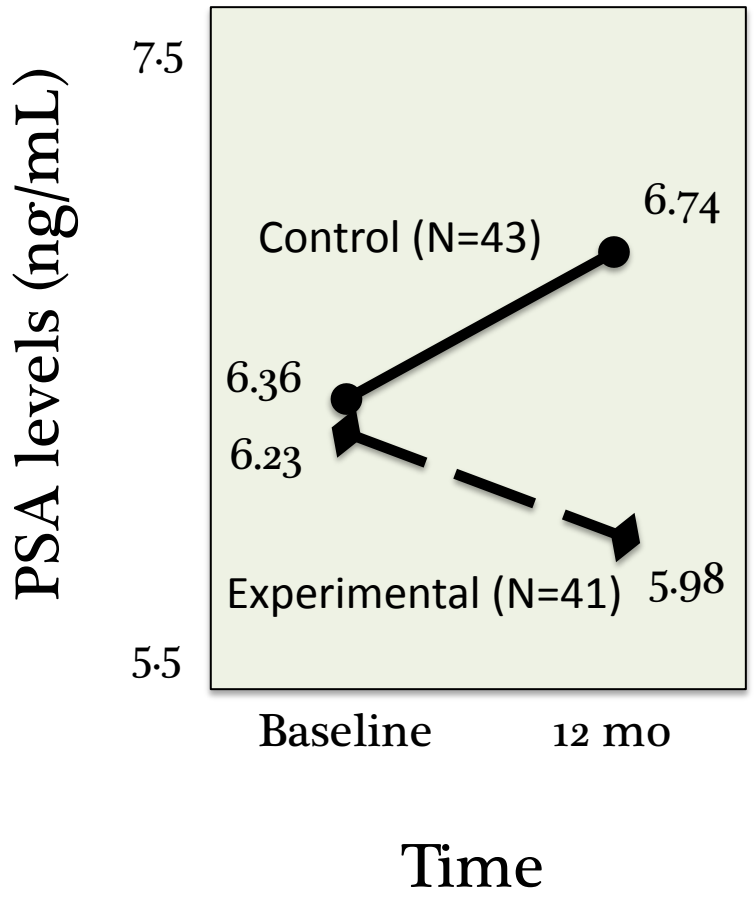
Cancer: Changes in Serum PSA



After 2 years, 27% of control patients required traditional treatment (surgery, radiation, drug therapy).

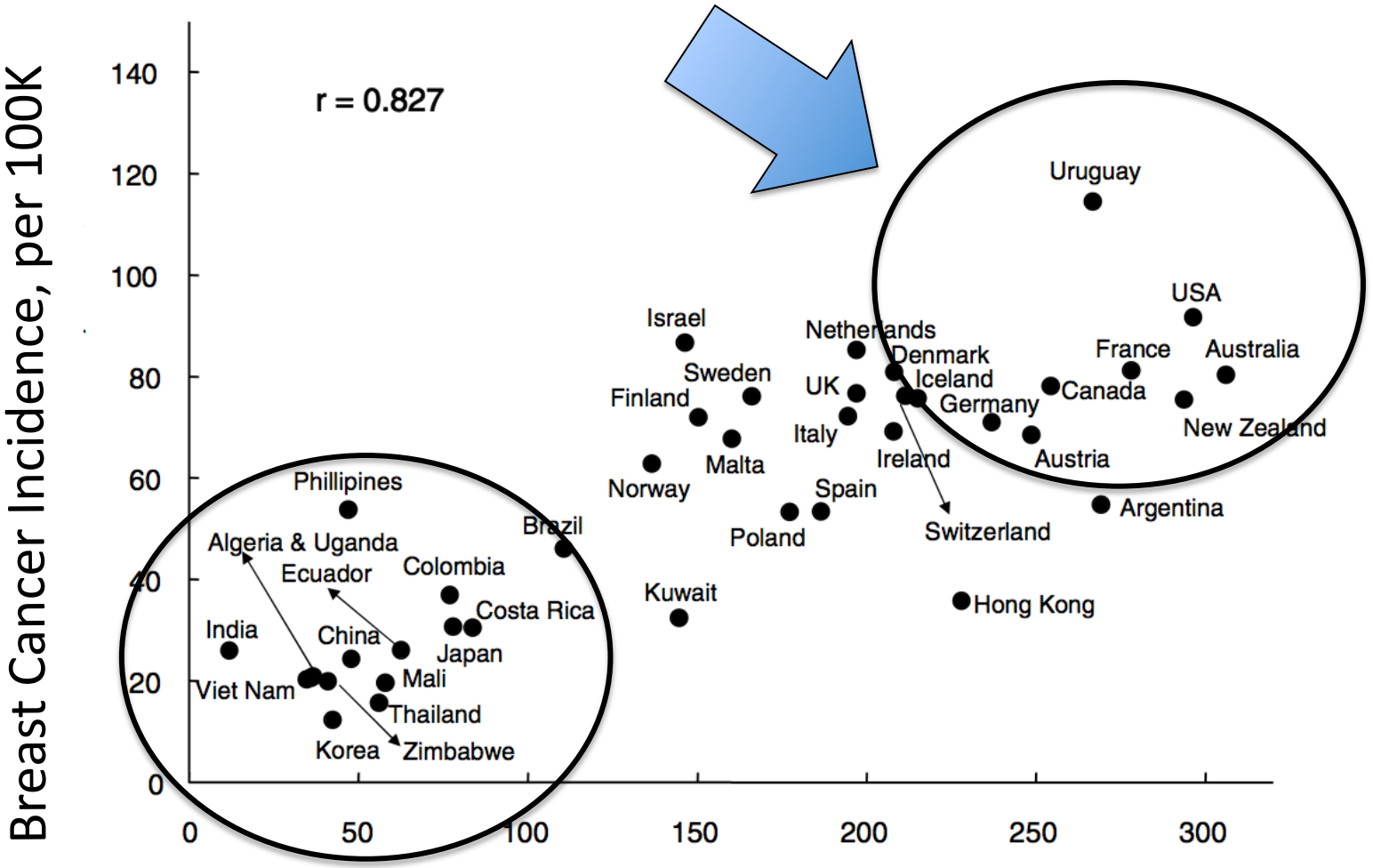
5% of the experimental patients required traditional treatment.

Ornish D, et al. J. Urology 2005;174:1065-9; discussion 9-70.
Frattaroli J, et al. Urology 2008;72:1319-23.

Multiple Mechanisms

- Lower Cholesterol
- Favorable hormonal changes
- Lower IGF-1
- Change in gut bacteria
- Lower inflammation in the gut (and elsewhere)
- Less uncontrolled angiogenesis
- Multiple antioxidant effects
- Change in genetic expression

Breast Cancer (1993-1997) and Meat Intake (1961-97)



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Summary Points

- Highly controlled animal experiments show that nutrition can decisively influence cancer initiation and promotion.

- In animal experiments dairy protein is strongly cancer promoting. Plant proteins do not promote cancer, or prevent cancer.

- Milk and meat and western diets have been strongly correlated to certain cancers, including reproductive cancers and colorectal cancers.

- Intervention studies are limited, but some small studies show improvements in cancer outcomes, even after diagnosis.

- Other large intervention studies show that small dietary changes, or short-term changes, in the context of a western diet and lifestyle do not impact cancer survival.