

Canola Oil Reduces Breast Cancer Risk



Progress Report
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INTRODUCTION

Cancer in the U.S.

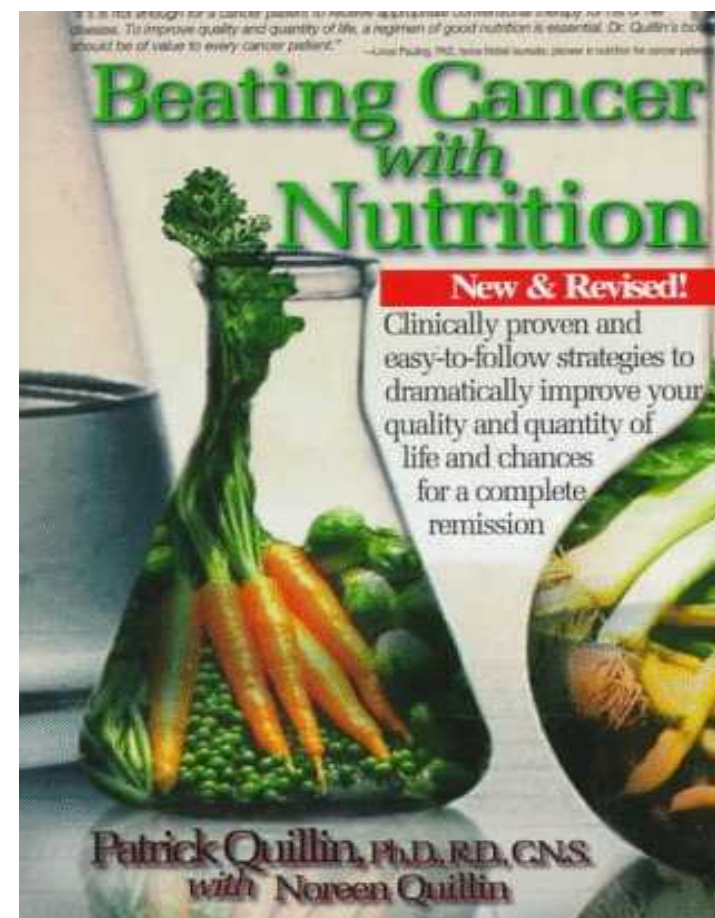
- ❖ Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells
- ❖ Cancer is a second leading cause of death in the U.S.
- ❖ The American Cancer Society estimates that about 1,437,180 new cancer cases are expected to be diagnosed in 2008

Breast Cancer

- ❖ Accounts for nearly 1 in 3 cancers diagnosed in US women; highest in the world
- ❖ A second leading cause of cancer death in women, exceeded only by lung cancer
- ❖ Studies suggest 70-80% of breast cancer cases could be prevented

Nutrition for Prevention

- ❖ The scientific literature is rich with information on breast cancer preventive strategies
- ❖ Many of the recommendations fall into the nutritional domain



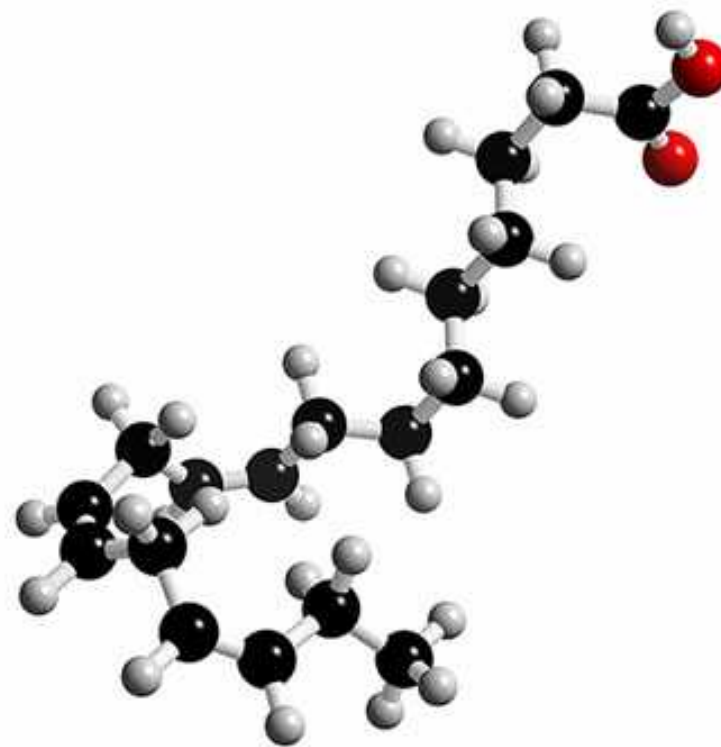
Dietary Fat and Breast Cancer

- ❖ Diets high in omega-3 fatty acids and oleic acid reduces breast cancer risk (Pala et al., 2001; Menendez et al., 2004)
- ❖ Omega-6 fatty acids increase the risk of breast cancer (Norman et al, 2004)



Omega-6:Omega-3 Fatty Acid Ratio and Cancer Risk

- ❖ The optimal ratio is thought to be 4 to 1 or lower
- ❖ Diets of Western societies have a high omega-6 to omega-3 fatty acids ratio (10-20:1) (American Cancer Society, 2006)



Canola Oil



Canola Oil

- ❖ Our study used canola oil
- ❖ 1.9:1 omega-6 to omega-3 fatty acids ratio
- ❖ High in oleic acid (61%)
- ❖ Lowest saturated fatty acid concentration (7%) of all vegetable oils



Canola Oil

❖ Canola oil increases compliance with dietary recommendations for saturated fatty acid, monounsaturated fatty acid, and alpha-linolenic acid



Canola Oil and Breast Cancer Risk



Hypothesis

- ❖ Canola oil, due to its omega-6 to omega-3 fatty acids ratio and oleic acid composition, may reduce breast tumor incidence in association to enhanced immune status

Specific Objectives

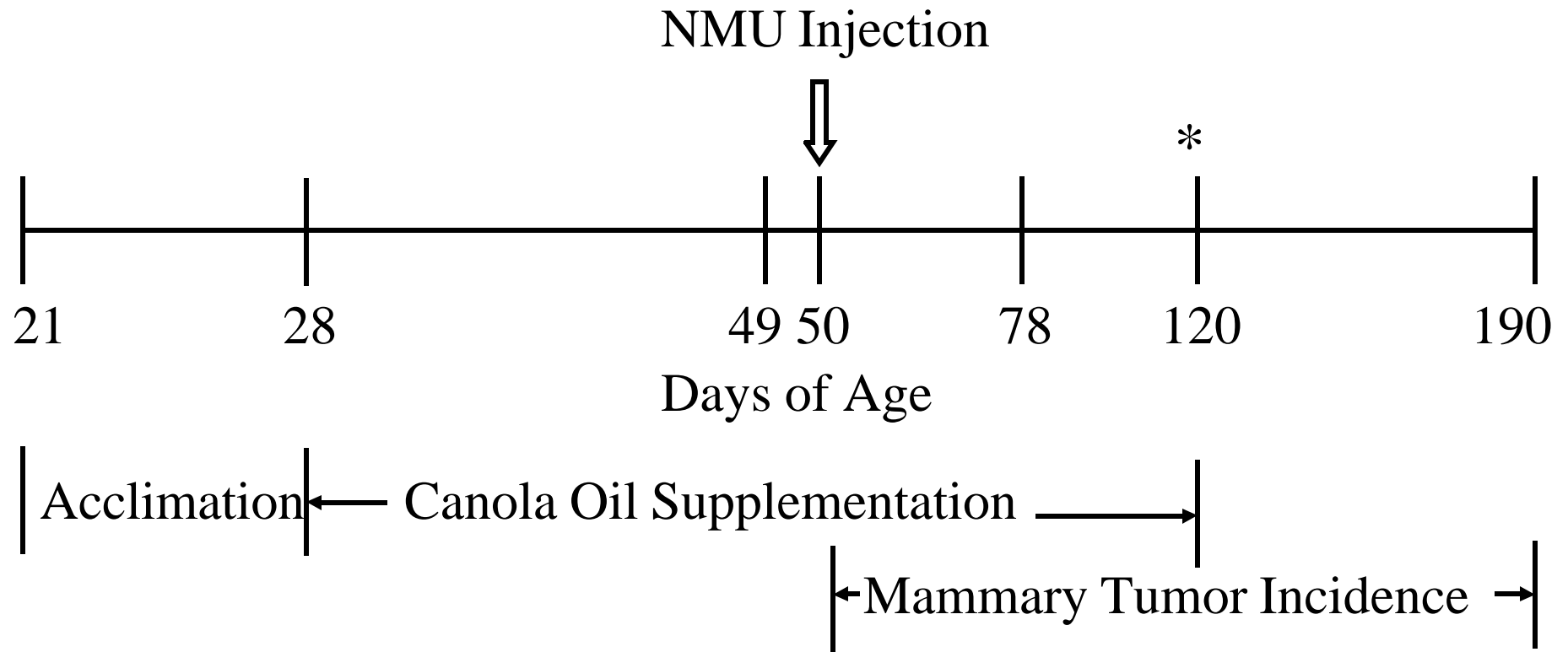
- ❖ Determine the extent to which dietary canola oil supplementation affects:
 - Susceptibility to mammary carcinogenesis
 - Immune cell proliferation

Materials and Methods

- ❖ Forty-two female Sprague-Dawley rats from Harlan
- ❖ Assigned randomly to either the control diet, or diet supplemented with canola oil (10.7%)



Experimental Model



*Randomly selected rats from each dietary treatment sacrificed for the immune cell proliferation assay

Tumor Measurement

- ❖ Rats observed daily for tumor detection
- ❖ Latency period was determined
- ❖ Tumor size measured twice a week
- ❖ Tumor volume calculated
- ❖ Survival also analyzed

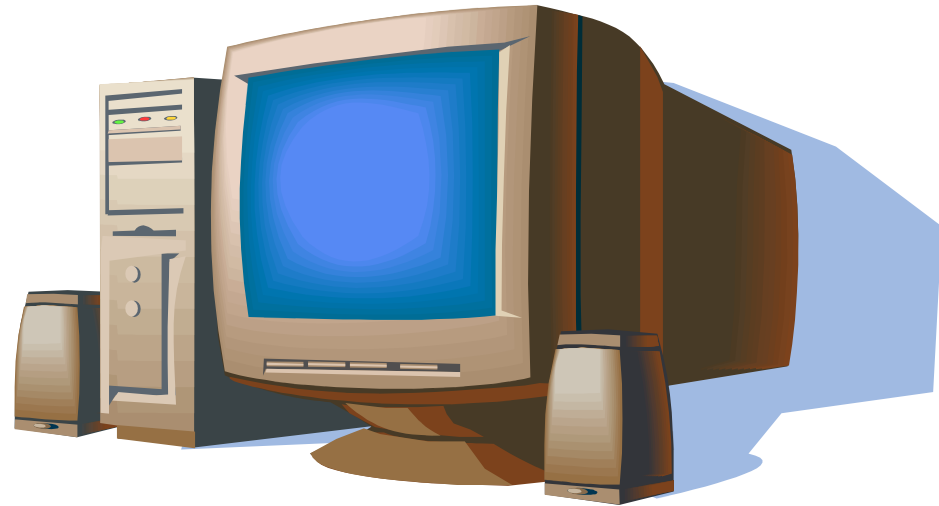
Immune Cell Proliferation

- ❖ Spleen collected and splenocytes cultured in a complete media
- ❖ Supplemented with either concanavalin A or lipopolysaccharide mitogens
- ❖ Immune cell proliferation determined using a colorimetric MTS assay



Statistical Analyses

❖ Data were analyzed using a one-way ANOVA



RESULTS



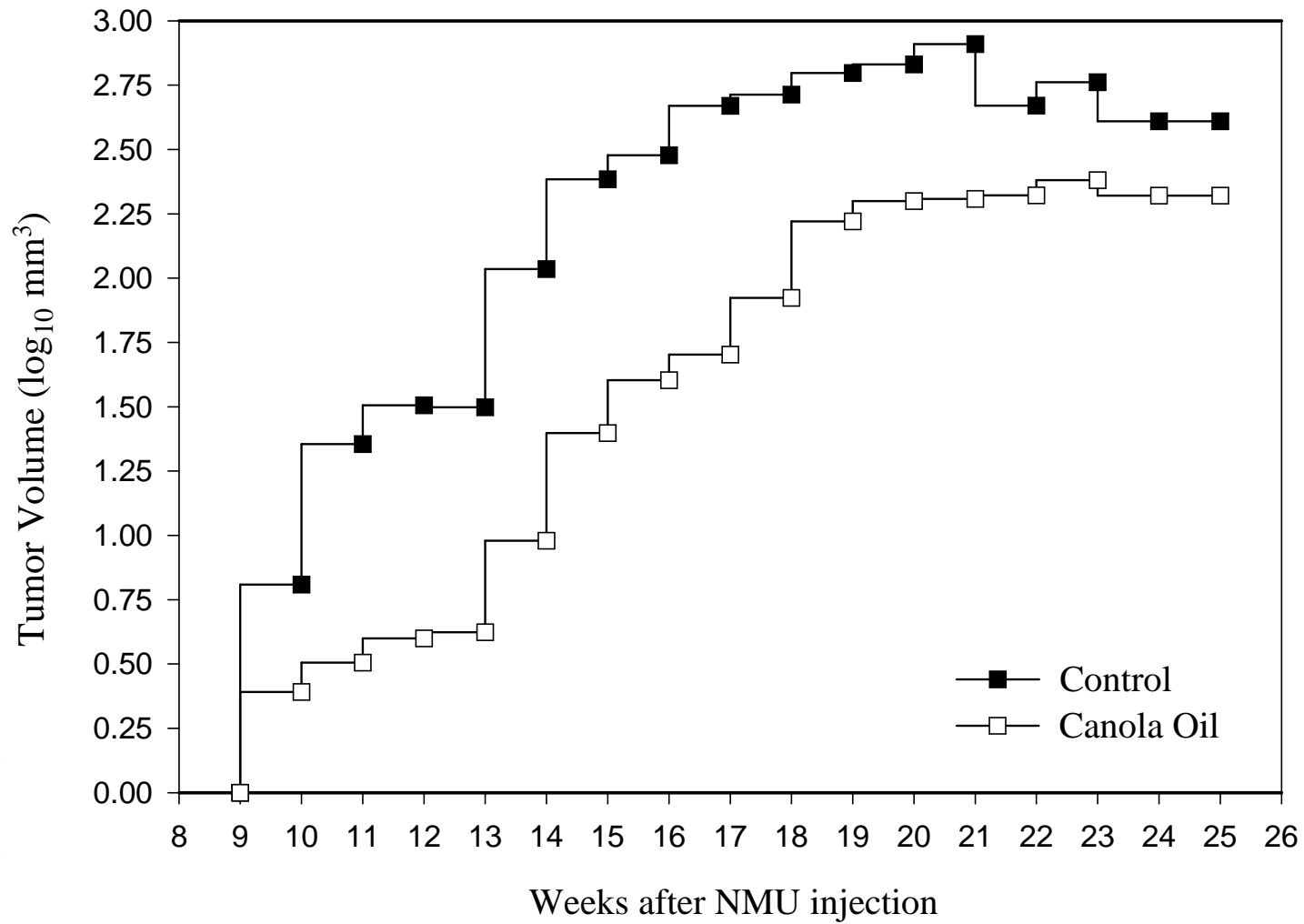
Tumor Measurements

Treatment

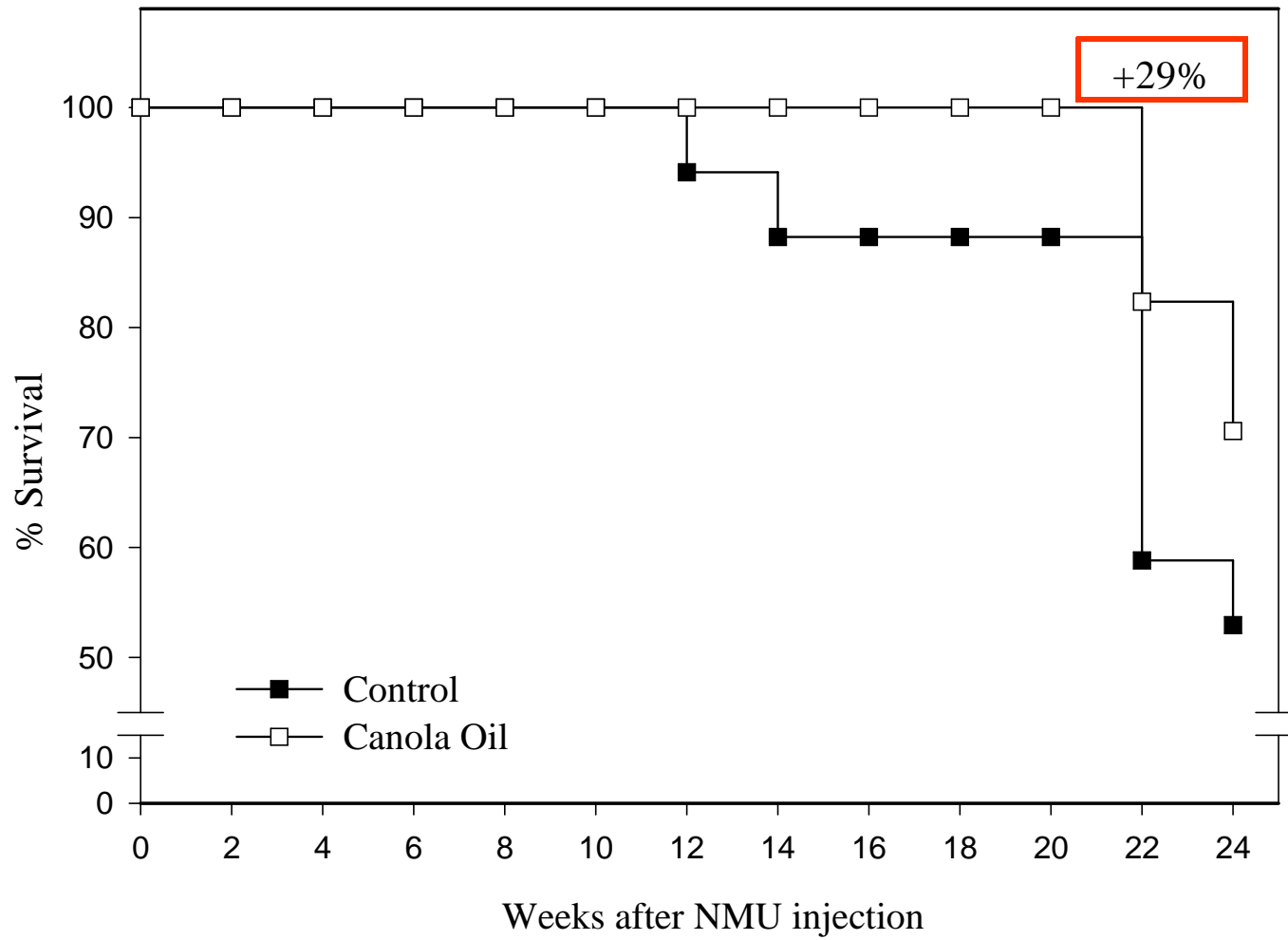
	Control	Canola	<i>P</i>
Tumor Incidence (%)	71	57	
Latency Period (days)	93.0 ± 6.9	103.4 ± 7.7	0.34
No. Tumor (tumors/rat)	1.93 ± 0.30	1.50 ± 0.33	0.33
Tumor Volume (mm ³ /rat)	2.32 ± 0.06	1.61 ± 0.06	0.01

*Values are means ± SEM, n = 15.

Tumor Volume

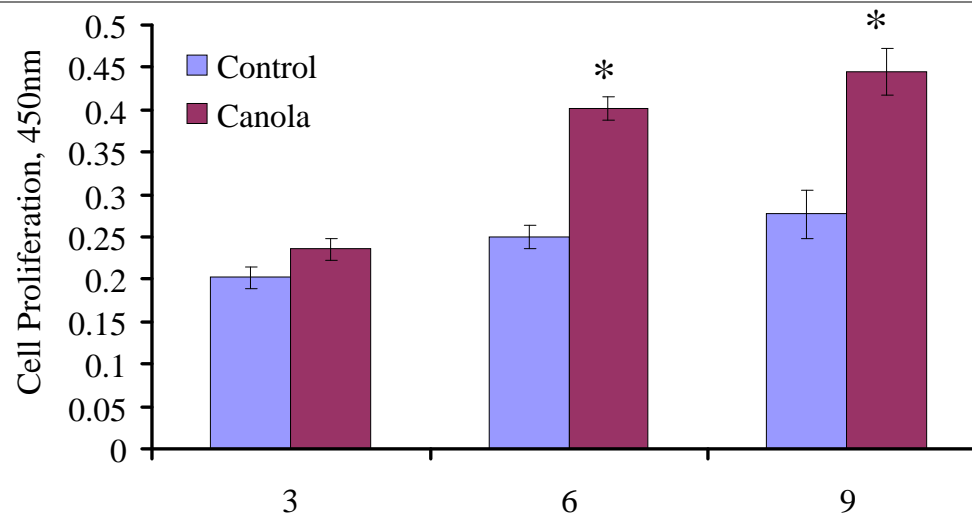


Survival

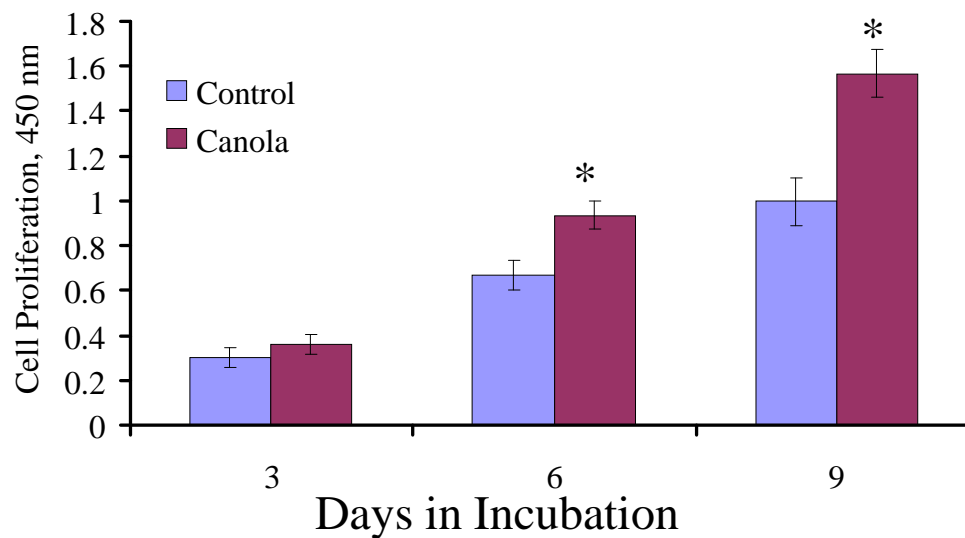


Immune Cell Proliferation

Con A



LPS



* $P < 0.01$

Current Study

- ❖ Studying effect of canola oil on the proliferation of human breast cancer cells (MCF-7 and T47D) and normal cells (MCF-10A)
- ❖ Canola oil may reduce human breast cancer cells proliferation



Summary

- ❖ Dietary canola oil supplementation reduces tumor growth
- ❖ Improves immune response
- ❖ Data to be presented at the 2008 Annual American Society for Cell Biology meeting in December
- ❖ Manuscript submitted to the Nutrition and Cancer Journal.

Future Study

- ❖ Study the mechanism (how) through which canola oil reduces cancer risk
- ❖ To study the effect of canola oil on tumor cell membrane fluidity (a target for cancer drugs)
- ❖ Mice inoculated with MCF-7 human breast cancer cells
- ❖ Lysis of tumor cells by immune cells determined.

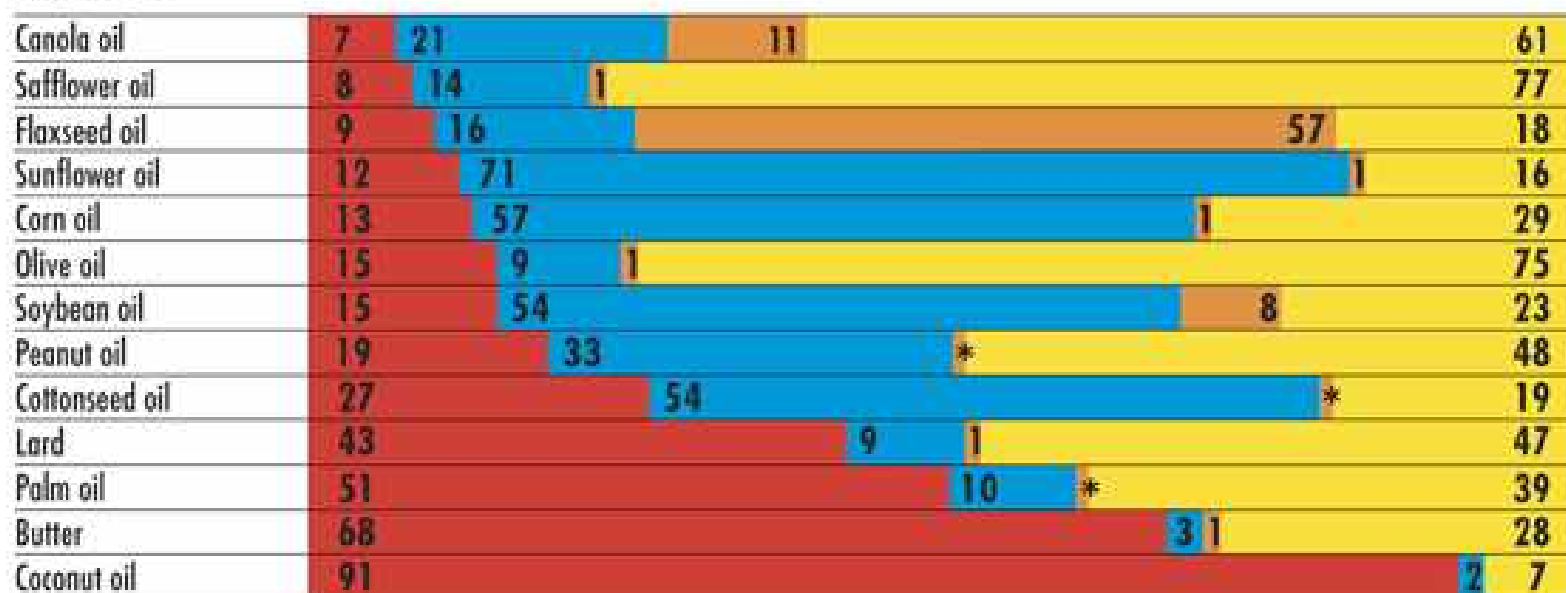
Implications

- ❖ Information may be useful in the development of improved nutritional strategies for cancer prevention and therapy
- ❖ Generate interests from Pharmaceutical companies
- ❖ We also hope that this and similar studies will improve the market for canola oil

THANK
YOU

Comparison of Dietary Fats

DIETARY FAT



SATURATED FAT

POLYUNSATURATED FAT

MONOUNSATURATED FAT



linoleic acid
(an omega-6 fatty acid)

alpha-linolenic acid
(an omega-3 fatty acid)

oleic acid
(an omega-9 fatty acid)

*Trace

Fatty acid content normalized to 100%

SOURCE: FOOD PLAN CORPORATION