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Integrative Health Centre

PRESENTS…

Firefighter Health and Wellness

Dr. Michael Long ND BSc & Dr. Katie McKeown ND BSc

Firefighter Health and Wellness - Outline

1. Unique health risks for firefighters
2. Maximizing dietary nutrition
3. Altering behavioural and lifestyle factors
4. Improving physical fitness
5. Detoxifying from workplace exposure

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Section I

UNIQUE HEALTH RISKS FOR FIREFIGHTERS

On the Job Deaths in Firefighters

TABLE. Number and percentage of fatalities among career and volunteer firefighters, by cause/contributing cause — United States, 1994–2004

Cause/Contributing cause	Career No.	Career (%)	Volunteer No.	Volunteer (%)
Heart attack*	**142**	**(39)**	**306**	**(50)**
Stress/Overexertion	138	(97)	301	(98)
Other	4	(3)	5	(2)
Motor vehicle–related trauma	**44**	**(12)**	**160**	**(26)**
Vehicle collision/crash	30	(68)	116	(73)
Struck by vehicle	12	(27)	33	(20)
Other vehicle-related (e.g., crushed by or fell from a vehicle)	2	(5)	11	(7)
Asphyxiation	**74**	**(20)**	**45**	**(7)**
Caught/Trapped	56	(76)	31	(69)
Other (e.g., lost inside a structure or exposed to smoke)	18	(24)	14	(31)
All other†	**108**	**(29)**	**99**	**(16)**
Caught/Trapped	32	(30)	19	(19)
Fall	8	(7)	15	(15)
Exposure (e.g., to smoke)	9	(8)	14	(14)
Stress/Overexertion	16	(15)	14	(14)
Structure collapse	8	(7)	3	(3)
Other	35	(32)	34	(34)
Total	**368**		**610**	

* For example, myocardial infarction or arrhythmia.
† Includes deaths caused by burns, cerebral vascular accidents, drownings, electrocution, heat exhaustion, and trauma.

T Hales, MD, et. Al. Fatalities among volunteer and career firefighters 1994-2004. Div of Safety Research, National Institute for Occupational Safety and Health; ML Ridenour, MPH, RS Noe, MPH, EIS officers, Centres for Disease Control.

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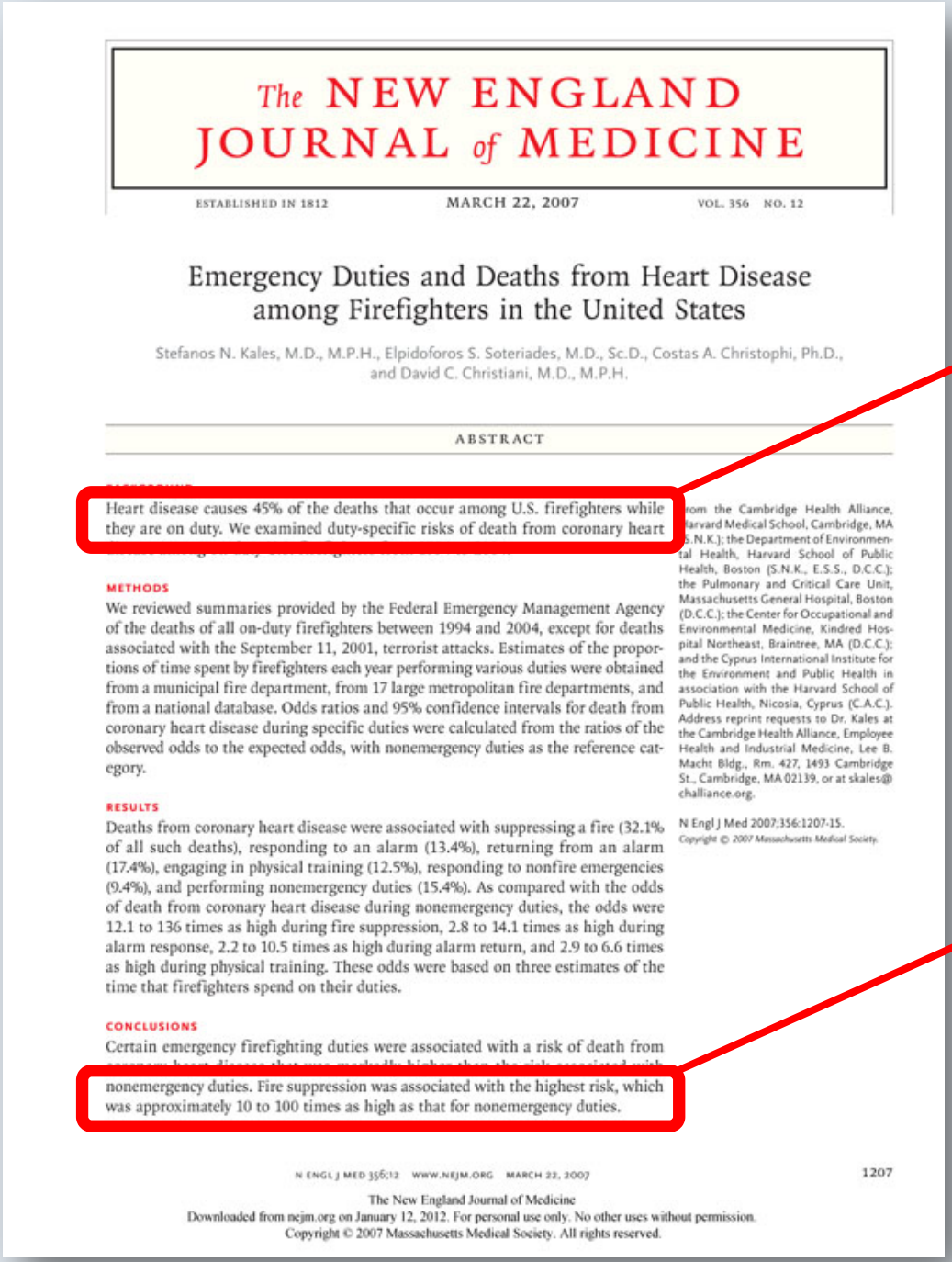

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Emergency Duties and Deaths from Heart Disease among Firefighters in the United States

Stefanos N. Kales, M.D., M.P.H., Elpidoforos S. Soteriades, M.D., Sc.D., Costas A. Christophi, Ph.D., and David C. Christiani, M.D., M.P.H.

ABSTRACT

Heart disease causes 45% of the deaths that occur among U.S. firefighters while they are on duty. We examined duty-specific risks of death from coronary heart

METHODS

We reviewed summaries provided by the Federal Emergency Management Agency of the deaths of all on-duty firefighters between 1994 and 2004, except for deaths associated with the September 11, 2001, terrorist attacks. Estimates of the proportions of time spent by firefighters each year performing various duties were obtained from a municipal fire department, from 17 large metropolitan fire departments, and from a national database. Odds ratios and 95% confidence intervals for death from coronary heart disease during specific duties were calculated from the ratios of the observed odds to the expected odds, with nonemergency duties as the reference category.

RESULTS

Deaths from coronary heart disease were associated with suppressing a fire (32.1% of all such deaths), responding to an alarm (13.4%), returning from an alarm (17.4%), engaging in physical training (12.5%), responding to nonfire emergencies (9.4%), and performing nonemergency duties (15.4%). As compared with the odds of death from coronary heart disease during nonemergency duties, the odds were 12.1 to 136 times as high during fire suppression, 2.8 to 14.1 times as high during alarm response, 2.2 to 10.5 times as high during alarm return, and 2.9 to 6.6 times as high during physical training. These odds were based on three estimates of the time that firefighters spend on their duties.

CONCLUSIONS

Certain emergency firefighting duties were associated with a risk of death from

nonemergency duties. Fire suppression was associated with the highest risk, which was approximately 10 to 100 times as high as that for nonemergency duties.

rom the Cambridge Health Alliance, Harvard Medical School, Cambridge, MA (S.N.K.); the Department of Environmental Health, Harvard School of Public Health, Boston (S.N.K., E.S.S., D.C.C.); the Pulmonary and Critical Care Unit, Massachusetts General Hospital, Boston (D.C.C.); the Center for Occupational and Environmental Medicine, Kindred Hospital Northeast, Braintree, MA (D.C.C.); and the Cyprus International Institute for the Environment and Public Health in association with the Harvard School of Public Health, Nicosia, Cyprus (C.A.C.). Address reprint requests to Dr. Kales at the Cambridge Health Alliance, Employee Health and Industrial Medicine, Lee B. Macht Bldg., Rm. 427, 1493 Cambridge St., Cambridge, MA 02139, or at skales@challiance.org.

N Engl J Med 2007;356:1207-15.

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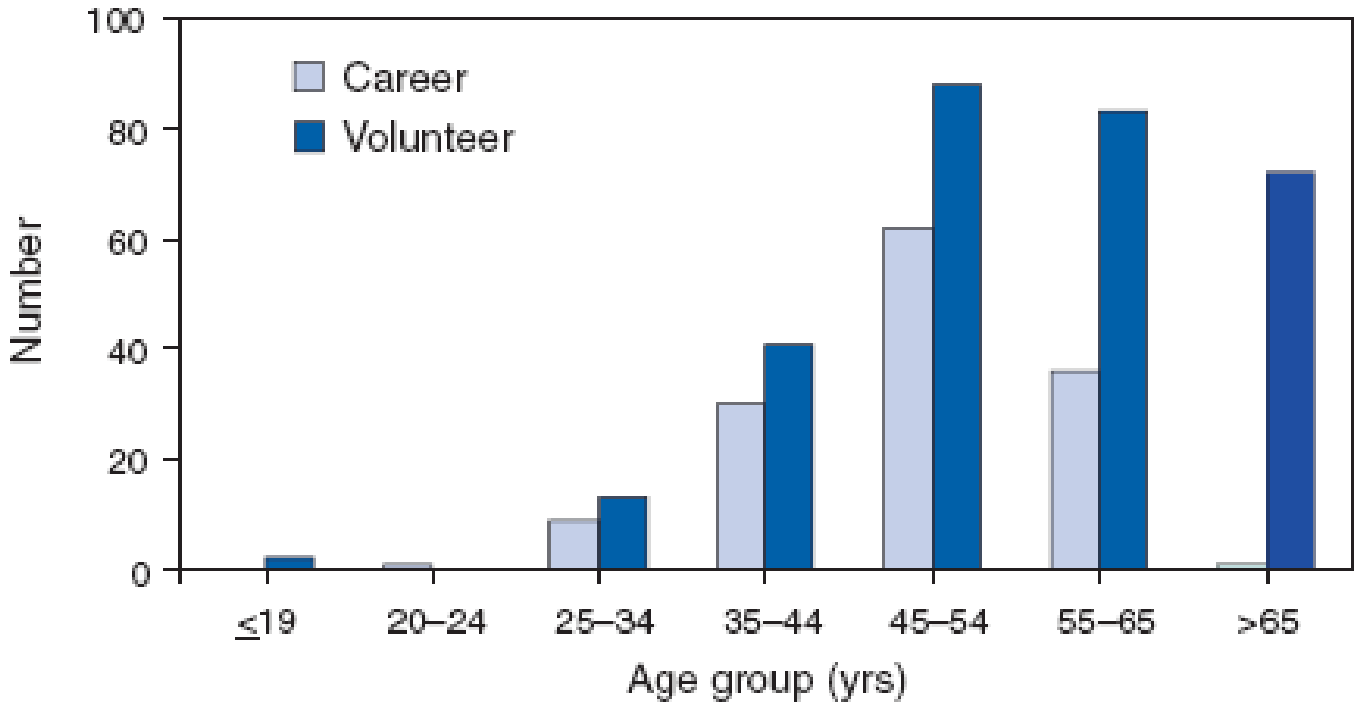
"Heart disease causes 45% of the deaths that occur among U.S. Firefighters while they are on duty."

"Fire suppression ...highest risk...10 to 100 times as high as non-emergency duties"

Cardiovascular Deaths By Age

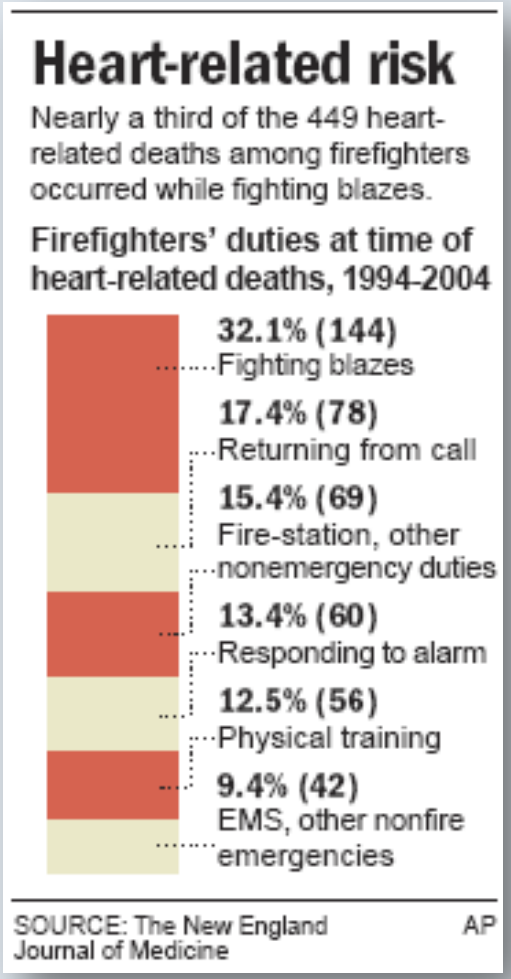
FIGURE 1. Number of fatalities caused by heart attacks* among career and volunteer firefighters, by age group — United States, 1994–2004



* For example, myocardial infarction or arrhythmia.

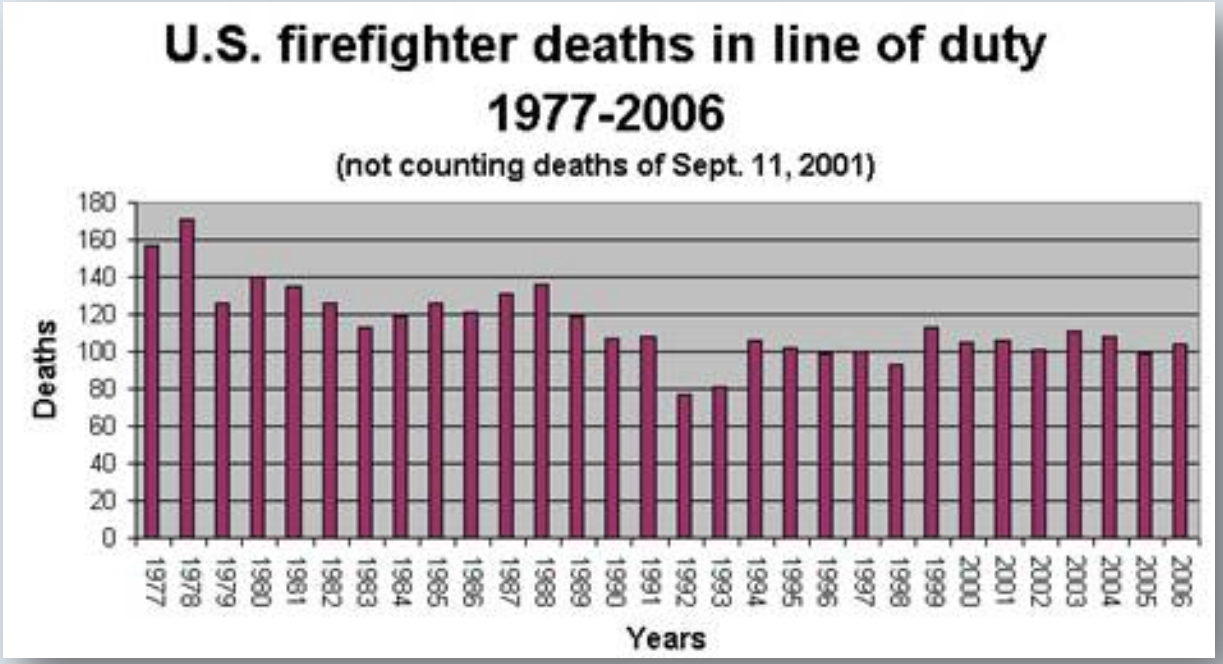
T Hales, MD, et. Al. Fatalities among volunteer and career firefighters 1994-2004. Div of Safety Research, National Institute for Occupational Safety and Health; ML Ridenour, MPH, RS Noe, MPH, EIS officers, Centres for Disease Control.

CV Risks of Firefighting



- 45% of all firefighter deaths are cardiovascular related, compared to:
  - 22% in Police Officers
  - 11% in EMT's
  - 15% on job national average
- 32% of CV deaths occurred while fighting fires, despite <1% of time spent doing so.

Death Rates Not Improving



U.S. Fire Administration

Death Rates Not Improving

- Overall death rates stalled despite:
  - Fewer non-cardiovascular deaths
  - Better protective equipment
- Latest research shows cardiovascular deaths in firefighters are on the **RISE**!
  - WHY?

Why is CV Risk Increasing?

- Constants:
  - Extreme heat and exertion
  - Toxic exposure
  - Psychological stress
- Variables (cardiovascular risk factors):
  - Conditioning
  - General health (hypertension, obesity, diet)
  - Underlying coronary artery disease

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Increased CV Risk: Blood Pressure

Table 2 | Prevalence of prehypertension and hypertension in emergency responders

Population	Mean age (± s.d.)	Prevalence of prehypertension (%)	Prevalence of hypertension[a] (%)
Career firefighters[53]	39 (±7)	58	20–23
Volunteer firefighters[54]	Not available	47	30
Police[55]	37 (± 9)	—	21–23[c]
Police[56]	38	—	27[c]
Police[57]	47 (± 8)	—	24[b]
EMT and paramedic recruits (unpublished observations)	26 (± 4)	59	9

[a]≥140/90 mm Hg, diagnosis of hypertension, or antihypertensive medication use, unless otherwise noted. [b]≥160/95 mm Hg or antihypertensive medication use. [c]Self-reported hypertension.

Kales, S. et. Al.. Blood pressure in firefighters, police officers, and other emergency responders. American Journal of Hypertension. 22(1). 11-20. 2009.

- Hypertension is a major risk factor for cardiovascular mortality and morbidity

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Descriptive Epidemiology

Obesity and Cardiovascular Disease Risk Factors in Firefighters: A Prospective Cohort Study

Elpidoforos S. Soteriades,† Russ Hauser,† Ichiro Kawachi,‡§ Dimitrios Liarokapis,¶ David C. Christiani,†‖ and Stefanos N. Kales*†*

Abstract

SOTERIADES, ELPIDOFOROS S., RUSS HAUSER, ICHIRO KAWACHI, DIMITRIOS LIAROKAPIS, DAVID C. CHRISTIANI, AND STEFANOS N. KALES. Obesity and cardiovascular disease risk factors in firefighters: a prospective cohort study. *Obes Res.* 2005;13:1756–1763.

Objective: Obesity, despite being a significant determinant of fitness for duty, is reaching epidemic levels in the workplace. Firefighters' fitness is important to their health and to public safety.

Research Methods and Procedures: We examined the distribution of BMI and its association with major cardiovascular disease (CVD) risk factors in Massachusetts firefighters who underwent baseline (1996) and annual medical examinations through a statewide medical surveillance program over 5 years of follow-up. We also evaluated firefighters' weight change over time.

Results: The mean BMI among 332 firefighters increased from 29 at baseline to 30 at the follow-up examination (2001), and the prevalence of obesity increased from 35% to 40%, respectively ($p < 0.0001$). In addition, the proportion of firefighters with extreme obesity increased 4-fold at follow-up (from 0.6% to 2.4%, $p < 0.0001$). Obese firefighters were more likely to have hypertension ($p = 0.03$) and low high-density lipoprotein-cholesterol ($p = 0.01$) at follow-up. Firefighters with extreme obesity had an average of 2.1 CVD risk factors (excluding obesity) in contrast to 1.5 CVD risk factors for normal-weight firefighters ($p = 0.02$). Finally, on average, normal-weight firefighters gained 1.1 pounds, whereas firefighters with BMI ≥ 35 gained 1.9 pounds per year of active duty over 5 years of

Discussion: Obesity is a major concern among firefighters and shows worsening trends over time. Periodic medical evaluations coupled with exercise and dietary guidelines are needed to address this problem, which threatens firefighters' health and may jeopardize public safety.

Key words: BMI, fitness, clustering, weight, cardiovascular disease

Introduction

Obesity has reached epidemic levels in our society and has been associated with numerous adverse health and employment outcomes in the general population, including lower productivity and job performance (1–6). Obesity can have a significant impact on work capacity and fitness for duty. When obesity affects first responders, it may jeopardize their own safety and well-being, as well as public safety (7). Hence, fitness for work is of paramount importance for the over 1 million U.S. professional and volunteer firefighters and the public they serve. Therefore, the National Fire Protection Association (NFPA)[1] has published recommendations for baseline and periodic fitness for duty evaluations to ensure that firefighters can safely perform essential job functions under emergency conditions (8).

The NFPA divides its recommendations into category A

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[1] Nonstandard abbreviations: NFPA, National Fire Protection Association; CVD, cardiovascular disease; HDL, high-density lipoprotein; LDL, low-density lipoprotein.

"Obesity…shows worsening trends over time…evaluations with exercise and dietary guidelines are needed to address this problem."

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Comparison of Coronary Calcium in Firefighters With Abnormal Stress Test Findings and in Asymptomatic Nonfirefighters With Abnormal Stress Test Findings

Priya Pillutla, MD, Dong Li, MD, PhD, Naser Ahmadi, MD, and Matthew J. Budoff, MD*

Firefighters are known to have an elevated rate of sudden cardiac death compared to the general population. It is unclear whether this finding is related to underlying cardiovascular risk factors or whether firefighting inherently carries additional risk. Our objective was to determine whether Los Angeles county firefighters have higher coronary artery calcium (CAC) scores and increased atherosclerosis as determined using 64-slice cardiac, multidetector computed tomography. A total of 647 asymptomatic firefighters evaluated as a part of a wellness protocol were referred for cardiac multidetector computed tomography to evaluate abnormal exercise treadmill test findings. They were matched by age and cardiovascular risk factors, with 2,533 asymptomatic subjects undergoing cardiac computed tomography because of abnormal electrocardiographic or exercise treadmill test findings. CAC and the prevalence of obstructive coronary artery disease by vessel were derived. Finally, the predictors of CAC were analyzed using regression analysis. Of the firefighters, 49% had detectable CAC compared to 43% of controls ($p = 0.015$). Although the lesions were most prevalent in the left anterior descending artery in both groups, more firefighters had any left anterior descending artery stenosis compared to the controls ($p < 0.0001$). The firefighters also had more left main coronary artery lesions than did the controls ($p < 0.0001$). The firefighters had significantly greater CAC scores than did with the controls ($p < 0.001$). Furthermore, the firefighters had significantly greater mean CAC [illegible] independently associated with a 41-point increase in the CAC score ($p < 0.001$). In conclusion, asymptomatic firefighters had more atherosclerosis and CAC than the matched controls. © 2012 Elsevier Inc. All rights reserved. (Am J Cardiol 2012;xx:xxx)

Gated cardiac imaging, using 64-slice multidetector computed tomography (MDCT), has begun to gain acceptance as a coronary artery disease (CAD) risk stratification tool among asymptomatic patients. The County of Los Angeles Fire Department has initiated a comprehensive protocol designed, in part, to detect asymptomatic CAD. Prospective firefighters undergo a maximal effort treadmill exercise stress test before training. Employed firefighters undergo an annual medical examination, including a treadmill test as a "fitness for duty" examination. Cardiology follow-up is arranged for abnormal or equivocal treadmill test findings. Participation is encouraged although not mandatory. We hypothesized that firefighters would have more CAD, as determined by cardiac MDCT, than the general population, even after adjustment for conventional risk factors.

Methods

A total of 647 asymptomatic firefighters with abnormal treadmill test findings were referred for follow-up evaluation at a single facility (St. John's Cardiovascular Research Center, Harbor-UCLA Medical Center, Torrance, California). All 647 firefighters underwent coronary artery calcium (CAC) and MDCT evaluation. This population has been previously described,[1] although the present study included more subjects. The control sample was obtained from 2,533 asymptomatic subjects referred by their primary physician for CAC and MDCT after abnormal electrocardiographic or exercise treadmill test findings. The CAC scans were largely (78%) performed the same day as the exercise treadmill test, and 99% were done within 1 week. A stress test was considered abnormal (demonstrative of ischemia) in the presence of a 1-mm flat or downsloping ST depression, lasting 0.08 seconds for 3 consecutive beats.

All subjects were given a risk factor questionnaire to determine the ethnicity and presence of CAD risk factors according to the National Cholesterol Education Program guidelines.[2] The risk factors included current cigarette smoking, diabetes, a history of premature CAD in a first-degree relative (men <45 years and women <55 years), hyperlipidemia, and hypertension. Hypertension was defined by the current use of antihypertension medicine or known, but untreated, hypertension. Current cigarette smoking was defined as cigarette use within the past month. Hyperlipidemia was defined as the current use of lipid-lowering agents or diagnosed, but untreated, hyperlipidemia (total serum cholesterol >200 mg/dl).

A risk factor composite score was computed for each

Division of Cardiology, Harbor-UCLA Medical Center, Torrance, California. Manuscript received May 3, 2011; revised manuscript received and accepted September 29, 2011.
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doi:10.1016/j.amjcard.2011.09.044

"Asymptomatic firefighters had more atherosclerosis and coronary artery calcium than the… controls."

Increased CV Risk: Exercise and Diet

Table 1 | Occupational risk factors for blood pressure elevation among emergency responders

Risk factor	Comments
Irregular physical exertion[10,11,13–15]	Relative inactivity between emergencies, long sedentary periods, lack of formal exercise programs and fitness requirements at work. High prevalence of overweight and obesity.
Unhealthy diet and shift work[22–24,29–40]	Expediency, convenience of "fast food" as a choice during work-time. Tradition of communal meals at fire stations rich in saturated fats and simple, refined carbohydrates. Sleep disruption and sleep deprivation, alarms and dispatches during on-duty sleep, overtime work and second jobs, which can promote insulin resistance and the metabolic syndrome.

Kales, S. et. Al.. Blood pressure in firefighters, police officers, and other emergency responders. American Journal of Hypertension. 22(1). 11-20. 2009.

Beyond Cardiovascular: Cancer Risk

- Firefighting comes with increased exposure to toxic and carcinogenic substances:
  - Gases and particulates
  - Heavy metals
  - Various organic/inorganic chemicals
- This causes and increased prevalence of various types of cancers.

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Cancer Risk Among Firefighters: A Review and Meta-analysis of 32 Studies

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Paul Succop, PhD
James Deddens, PhD
Tarek Sobeih, MD, PhD
Heriberto Barriera-Viruet, PhD
Kari Dunning, PhD
James Lockey, MD, MS

Objective: *The objective of this study was to review 32 studies on firefighters and to quantitatively and qualitatively determine the cancer risk using a meta-analysis.* ***Methods:*** *A comprehensive search of computerized databases and bibliographies from identified articles was performed. Three criteria used to assess the probable, possible, or unlikely risk for 21 cancers included pattern of meta-relative risks, study type, and heterogeneity testing.* ***Results:*** *The findings indicated that firefighters had a probable cancer risk for multiple myeloma with a summary risk estimate (SRE) of 1.53 and 95% confidence interval (CI) of 1.21–1.94, non-Hodgkin lymphoma (SRE = 1.51, 95% CI = 1.31–1.73), and prostate (SRE = 1.28; 95% CI = 1.15–1.43). Testicular cancer was upgraded to probable because it had the highest summary risk estimate (SRE = 2.02; 95% CI = 1.50–3.13). Eight additional cancers were rated as having a possible association with firefighting.* ***Conclusions:*** *Our results confirm previous findings of an elevated metarelative risk for multiple myeloma among firefighters. In addition, a probable association with non-Hodgkin lymphoma, prostate, and testicular cancer was demonstrated.* (J Occup Environ Med. *2006;48: 1189–1202*)

During the course of their work, firefighters are exposed to harmful substances at the fire scene as well as at the firehouse. At the fire scene, firefighters are potentially exposed to various mixtures of particulates, gases, mists, fumes of an organic and/or inorganic nature, and the resultant pyrolysis products.[1,2] Specific potential exposures include metals such as lead, antimony, cadmium, uranium, chemical substances, including acrolein, benzene, methylene chloride, polyaromatic hydrocarbons, perchlorethylene, toluene, trichloroethylene, trichlorophenol, xylene, formaldehydes, minerals such as asbestos, crystalline, and noncrystalline silica, silicates, and various gases that may have acute, toxic effects.[1,2] In some situations, respiratory protection equipment may be inadequate or not felt to be needed resulting in unrecognized exposure.[3] At the firehouse where firefighters spend long hours, exposures may occur to complex mixtures that comprise diesel exhaust, particularly if trucks are run in closed houses without adequate outside venting. In light of the World Trade Center disaster, concerns have reemerged and heightened related to building debris particle exposures from pulverized cement and glass, fiberglass, asbestos, silica, heavy metals, soot, and/or organic products of combustion.[3]

To date, only one meta-analysis conducted by Howe and Burch in 1990 examined the extent of cancer risk among firefighters in 11 mortality studies.[4] They reported that there was an increased association with the occurrence of brain tumors, malignant melanoma, and multiple myeloma with the evidence in favor of

From Epidemiology and Biostatistics, University of Cincinnati College of Medicine (Dr LeMasters, Dr Succop), Cincinnati, Ohio; Industrial and Manufacturing Engineering and Epidemiology and Biostatistics, University of Cincinnati College of Engineering and College of Medicine (Dr Genaidy), Cincinnati, Ohio; the Department of Mathematical Sciences, University of Cincinnati College of Arts & Sciences (Dr Deddens), Cincinnati, Ohio; the Department of Industrial Medicine and Occupational Diseases, Cairo University Faculty of Medicine (Dr Sobeih), Cairo, Egypt; the Department of Industrial Engineering, Interamerican University of Puerto Rico (Dr Barriera-Viruet), Bayamon, Puerto Rico; the Department of Rehabilitation Sciences, University of Cincinnati Medical Center (Dr Dunning), Cincinnati, Ohio; and Occupational and Environmental Medicine and Pulmonary Medicine, University of Cincinnati College of Medicine (Dr Lockey), Cincinnati, Ohio.

This study was supported in part by a grant from the Ohio Bureau of Workers Compensation.

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"Elevated…risk for multiple myeloma…non-Hodgkin's lymphoma, prostate, and testicular cancer(s)."

Needed: Preventative Approach

- Decrease cardiovascular and cancer risk:
  - Maximize dietary nutrition
  - Alter behavioural and lifestyle factors
  - Improve physical fitness
  - Detoxify from workplace exposure

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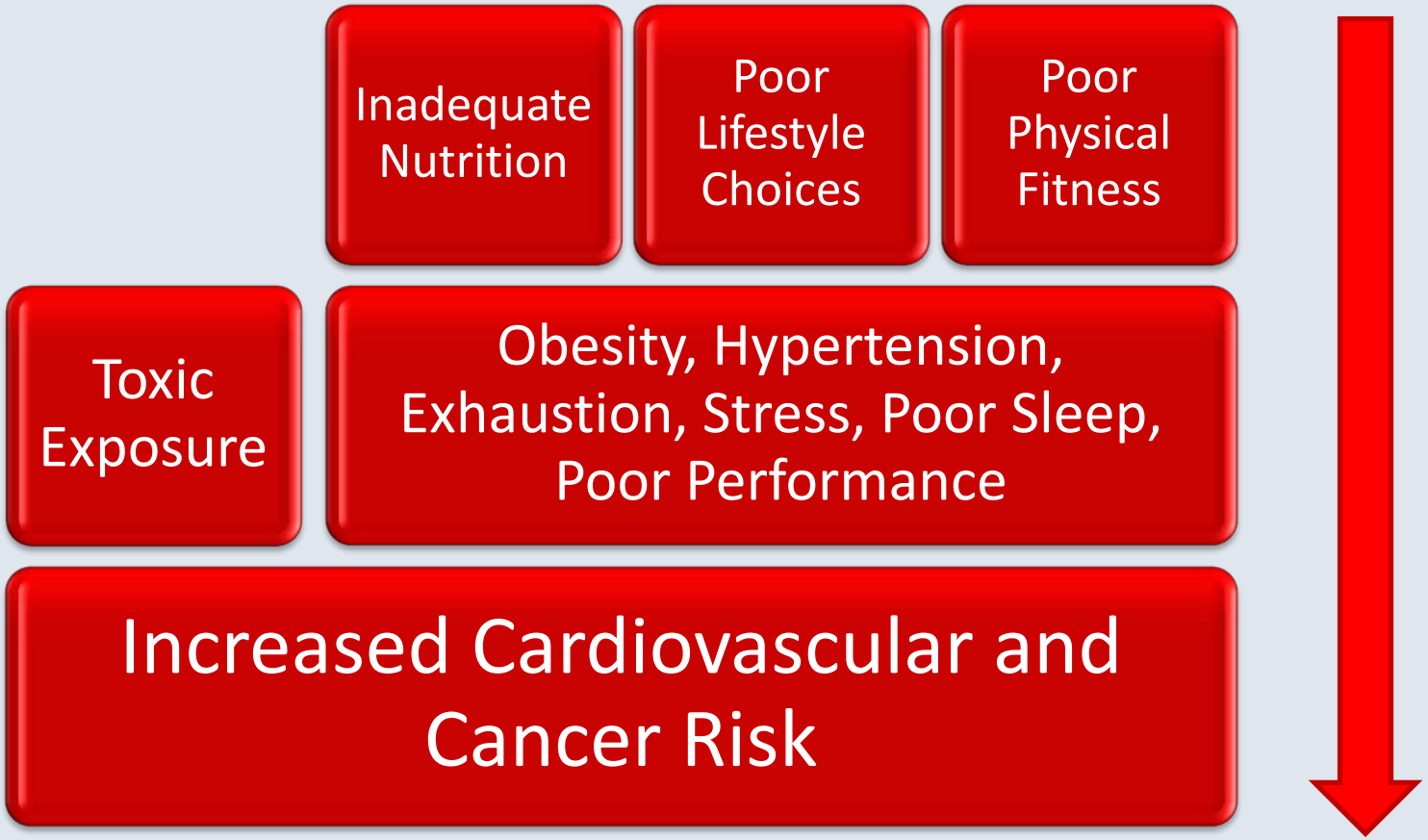
Areas to Address



Changing the Paradigm

Section II

MAXIMIZING DIETARY NUTRITION

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Diseases *Caused Primarily* by Poor Nutrition and Lifestyle

- Obesity
- Coronary Artery Disease
- Hypertension
- Hypercholesterolemia
- Type II Diabetes
- Cancer (large contributor)

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Whole Foods Nutrition

- Eating food in its most natural, **unaltered** form:
  - Picked from a tree, plucked from the ground, shot in the field
- Virtually all poor nutritional components come from pre-packaged and processed foods:
  - Salt, trans-fat, refined sugar

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Why Whole Foods?

- Nutritious: contains all daily requirements for vitamins and minerals
- Highly Antioxidant: protects your cells by neutralizing oxidative damage
- Low Glycemic Load: no spikes in blood sugar → prevents diabetes and stabilizes energy levels
- Low in saturated and trans-fats
- High in '*good fats*' (HDL)

Whole Foods Decrease Obesity

- Whole foods are nutrient dense and full of fibre
  - It is far more difficult to overeat since feelings of fullness occur faster than with nutrient poor, refined foods
- Allows your body to reach peak metabolic rate so that calories are burned most efficiently

Implementing Whole Foods

Before	After
-Diet focused heavily on red meat	-Chicken, turkey, fish, and free range eggs
-Bleached white flour bread and pasta	-Whole grain bread and pasta
-Processed white rice	-Brown or wild rice
-Eating potatoes as the primary vegetable	-Larger quantities and varieties of vegetables
-Pastries, sweets, fruit juice, and pop	-Fresh fruit and water

Vegetarian Protein Sources

- Legumes
  - Lentils
  - Kidney Beans
  - Split Peas
  - Pinto Beans
- Nuts and Seeds
- Soy (Tofu)

Sugar Epidemic

- Canadians eat 26 tsp sugar/day on average
  - 88 pounds/year
- General recommendation is less than 40g/day (we *average* 110g)
- **Major** obesity and cardiovascular risk

http://www.statcan.gc.ca/pub/82-003-x/2011003/article/11540-eng.htm

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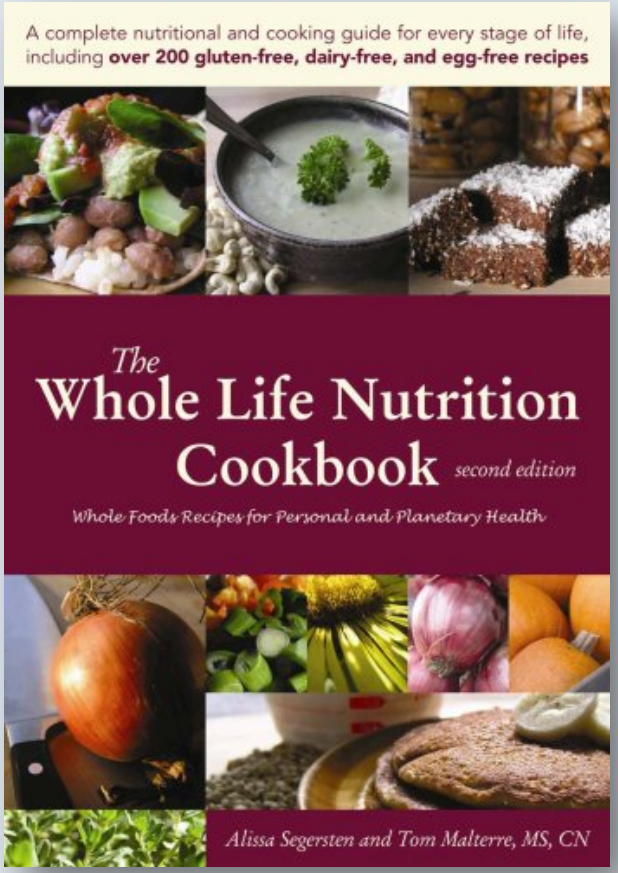
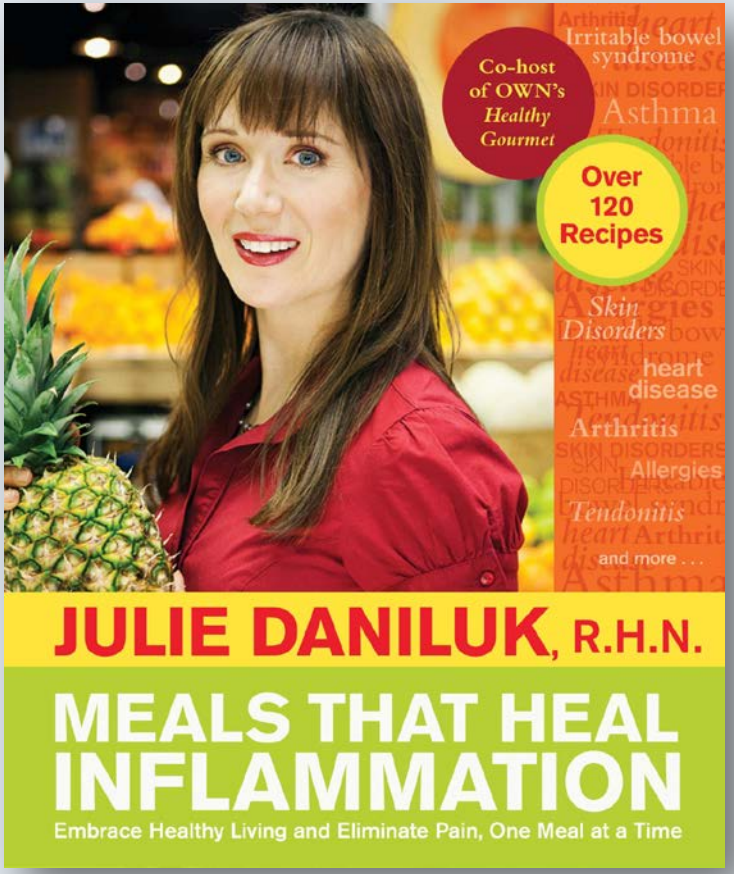
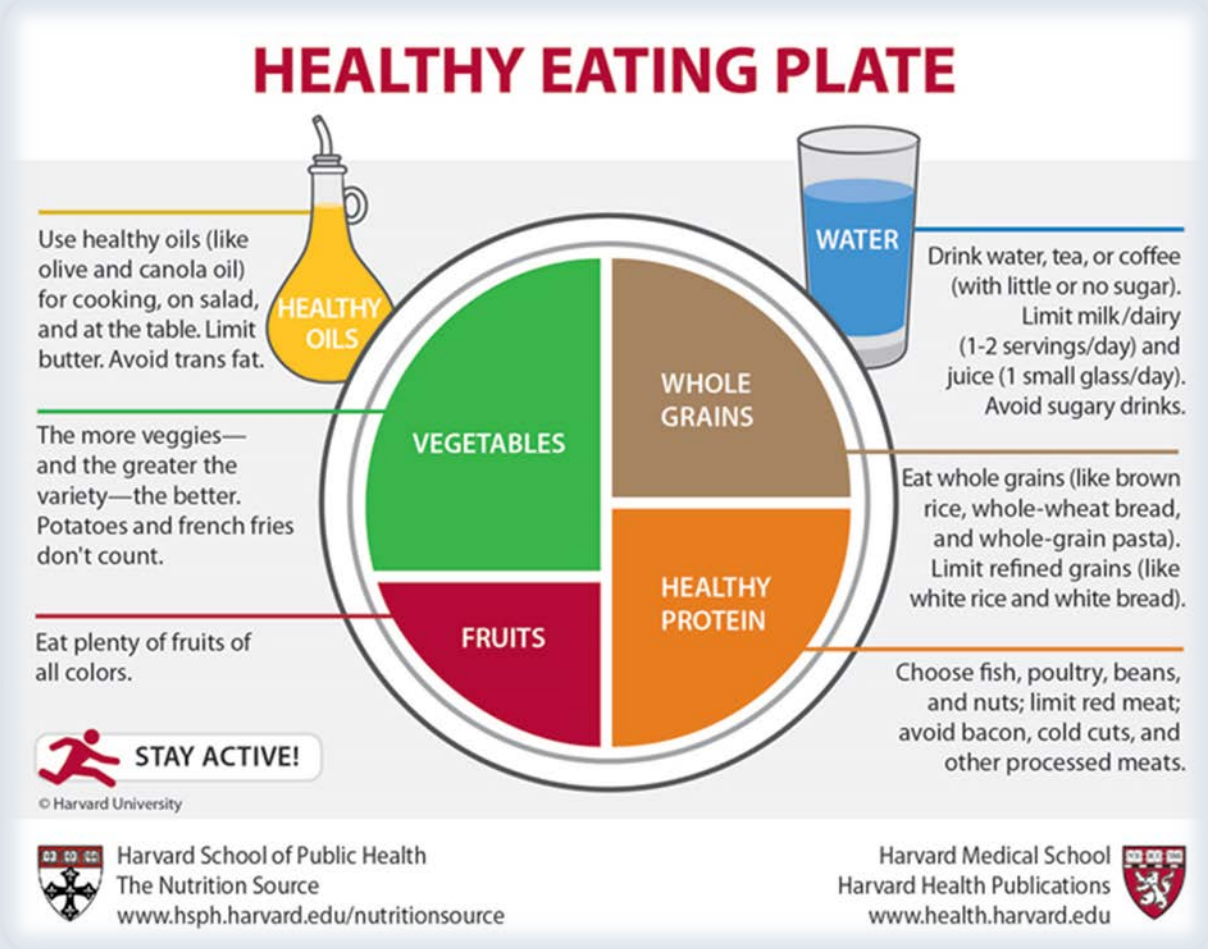

A complete nutritional and cooking guide for every stage of life, including **over 200 gluten-free, dairy-free, and egg-free recipes**
The Whole Life Nutrition Cookbook second edition
Whole Foods Recipes for Personal and Planetary Health
Alissa Segersten and Tom Malterre, MS, CN


Co-host of OWN's Healthy Gourmet
Over 120 Recipes
Irritable bowel syndrome
Asthma
Skin Disorders
heart disease
Arthritis
Allergies
Tendonitis
and more . . .
JULIE DANILUK, R.H.N.
MEALS THAT HEAL INFLAMMATION
Embrace Healthy Living and Eliminate Pain, One Meal at a Time

What Does Harvard Think?



The Dairy Conundrum

- Increasing evidence that dairy *is not* part of a healthy diet
- Nearly all adults are lactose intolerant, to some degree
- Linked to increased prevalence of disease through an inflammatory process
- My Experience: people feel better without it

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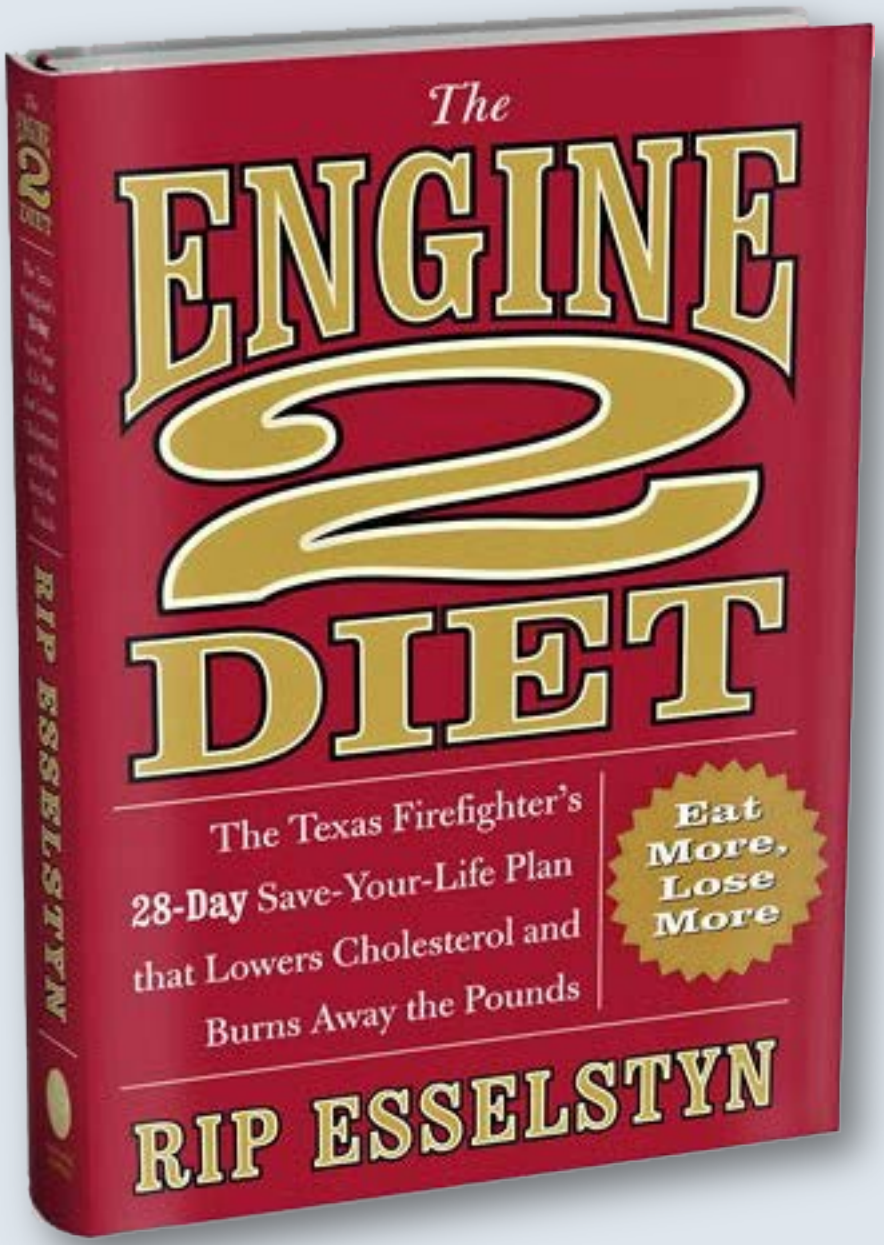
The
ENGINE 2 DIET
The Texas Firefighter's 28-Day Save-Your-Life Plan that Lowers Cholesterol and Burns Away the Pounds
Eat More, Lose More
RIP ESSELSTYN

Specific Therapeutic Diets

- Many structured eating regimes exist to deal with individualized problems:
  - Dietary Approaches to Stopping Hypertension (DASH)
  - Cholesterol Lowering Diet
  - Low Glycemic Index Diet (diabetes)
  - Anti-Inflammatory Diet (chronic pain)
  - Gluten Free Diet (digestive disturbance)
  - Weight Loss Diet according to Basal Energy Expenditure

Disease Prevention Strategy

- Eat your vegetables! **10-12 Servings/day!**
  - DAILY dark green vegetables: extremely nutritional
  - Variety of brightly coloured vegetables
  - Eat lots of **garlic**: lowers blood pressure, stabilizes insulin levels, reduces cholesterol
- *At least* 3 servings of fruit/day (especially berries)
- Eliminate fruit juices, drink **water** instead
- Limit salt to 2000mg/day or less
- Ensure 35g Fibre/day (oatmeal, psyllium, fruit, beans): eliminates bad cholesterol and prevents sugar spikes
- Eat more cold water fish and avoid red meat
- Dairy elimination?

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Trouble Getting 10-12 Vegetable Servings?

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Section III

ALTERING BEHAVIOURAL AND LIFESTYLE FACTORS

Modifiable Lifestyle Factors

- Ingestion of toxic substances: smoking, alcohol, drugs
- Sleep-Wake cycles
- Stress Management

Excessive Smoking and Alcohol Intake is Bad, Duh

- Diseases associated with smoking:
  - Lung cancer, Cancer of the mouth, Cancer of the throat, Cancer of the larynx, Cancer of the oesophagus, Stomach cancer, Kidney cancer, Cancer of the bladder, Cancer of the pancreas, Liver cancer, Cancer of the penis, Cancer of the anus, Cervical cancer, Prostate cancer, Heart attack, Coronary heart disease, Cardiovascular disease, Congestive heart failure, Stroke, Atherosclerosis, Abdominal aortic aneurysm, Peripheral artery disease, Ischaemic heart disease, Angina, Leukaemia, Emphysema, Chronic bronchitis, Pneumonia, Asthma, Diabetes, Stomach ulcers, Cataracts, Gum disease, High blood pressure, Crohn's disease, Premature aging of the skin, Loss of smell and taste, Osteoporosis (women), Gangrene, Impotence, Reduced fertility
- Diseases associated with alcohol use:
  - Cancer of the tongue, Lip cancer, Larynx cancer, Stomach cancer, Colon cancer, Breast cancer, Liver cancer, Cancer of the bile duct, Esophagus cancer, Impotence, Sexual dysfunction, Infertility, Gynecomastia, Testicular atrophy, Osteophenia, Diabetes, Ketoacidosis, Gout, High blood pressure, Heart disease, Artery disease, Sudden heart failure, Heart attack, Fatty liver, Alcoholic hepatitis, Cirrhosis, Anemia(s), Marrow toxicity, Iron or folate deficiency, Leucopenia, Meningitis, Pneumonia, Pancreatitis, Gastritis, Diarrhea (chronic) Esophagatitis, Colitis, Acid reflux, Parotid enlargement, Seizure, Korsakof's syndrome, Wernicke's Syndrome, Dementia, Brain shrinkage, Stroke, Subdural hematoma, Hemorrhage, Neuropathy, Malnutrition, Vitamin and mineral deficiencies
- Take home message: these are massive barriers to health → quitting is essential to prolonged life!

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Importance of Sleep

- 75% of people have sleep disturbance 2x/week or more
- Physiologic changes from poor sleep:
  - Poor learning and memory
  - Altered metabolism and weight gain
  - Irritability and mood disturbance
  - Immune dysfunction
  - Cardiovascular problems (hypertension, irregular heartbeats)
  - Inability to make good decisions

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Stages of Sleepiness

- Stage 1: Irritability and moodiness
- Stage 2: Apathy, slowed speech, flattened emotions, impaired memory
- Stage 3: Lapses in attention, nodding off when trying to stay awake
- Stage 4: Hallucinations (beginning of REM during wakefulness)

Dinges, *Sleep, Sleepiness and Performance*, 1991

How Much Sleep?

- Variable
- Most adults function optimally with 16 hours wakefulness and 8 hours of sleep

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Sleep Hygiene

- Develop a regular sleep-wake cycle
- Avoid caffeine 6 hours before bed
- Make sleeping environment as **dark** and **silent** as possible
- Regular exercise is vitally important (avoid vigorous exercise 6 hours before bed)
- How to tell your body is adjusted to your sleep-wake pattern?
  - You will wake up at the same time each morning without need for an alarm clock

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Melatonin

- Increasing use to help with sleep onset problems
- **DANGEROUS** to use if you cannot guarantee a full nights sleep
  - Minimum 5 consecutive hours
  - i.e. do not use if there is a chance you will be called out

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Physiologic Effect of Stress

- Stress causes a sympathetic ('*fight or flight*') nervous system response:
  - 'Feeling on edge'
  - Increased heart rate and blood pressure
  - Dilated pupils
  - Slowed digestion
  - Poor sleep

Stress: Negative Health Burden

- Chronic stress associated with numerous health problems including:
  - Hypertension
  - Headaches
  - Anxiety/Depression
  - Mood swings
  - Haemorrhoids
  - Many Others

Stress Management

- Stress is subjective, and everyone is affected differently. These are strategies that some people find effective:
  - Mindfulness Exercises: meditation, yoga, journaling
  - Physical activity
  - Stop trying to control the uncontrollable
  - Avoid people who stress you out
  - Learn to say no
  - Set time for yourself, doing what you like to do
- If you are finding it difficult to cope, ask for help!

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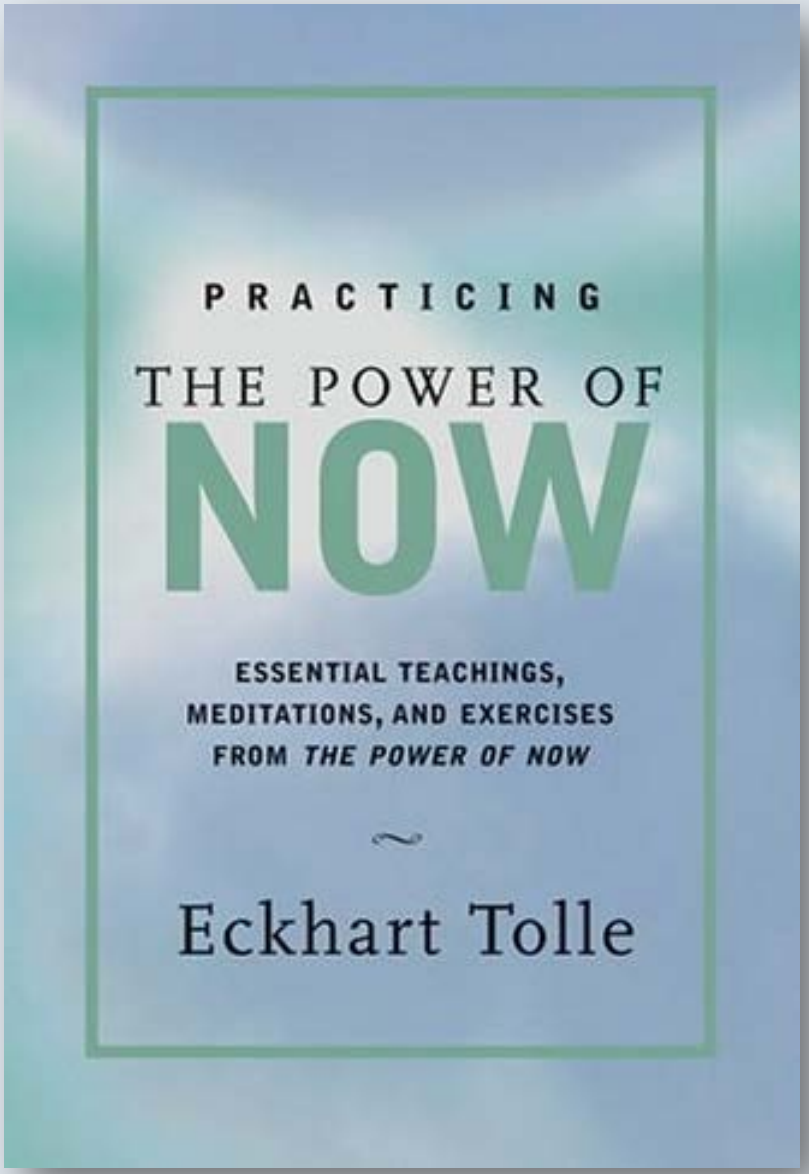

Learning to live in the *present*, because we spend all of our time trying to understand our past and control our future, when we can *only* control what is happening here and now.

Section IV

IMPROVING PHYSICAL FITNESS

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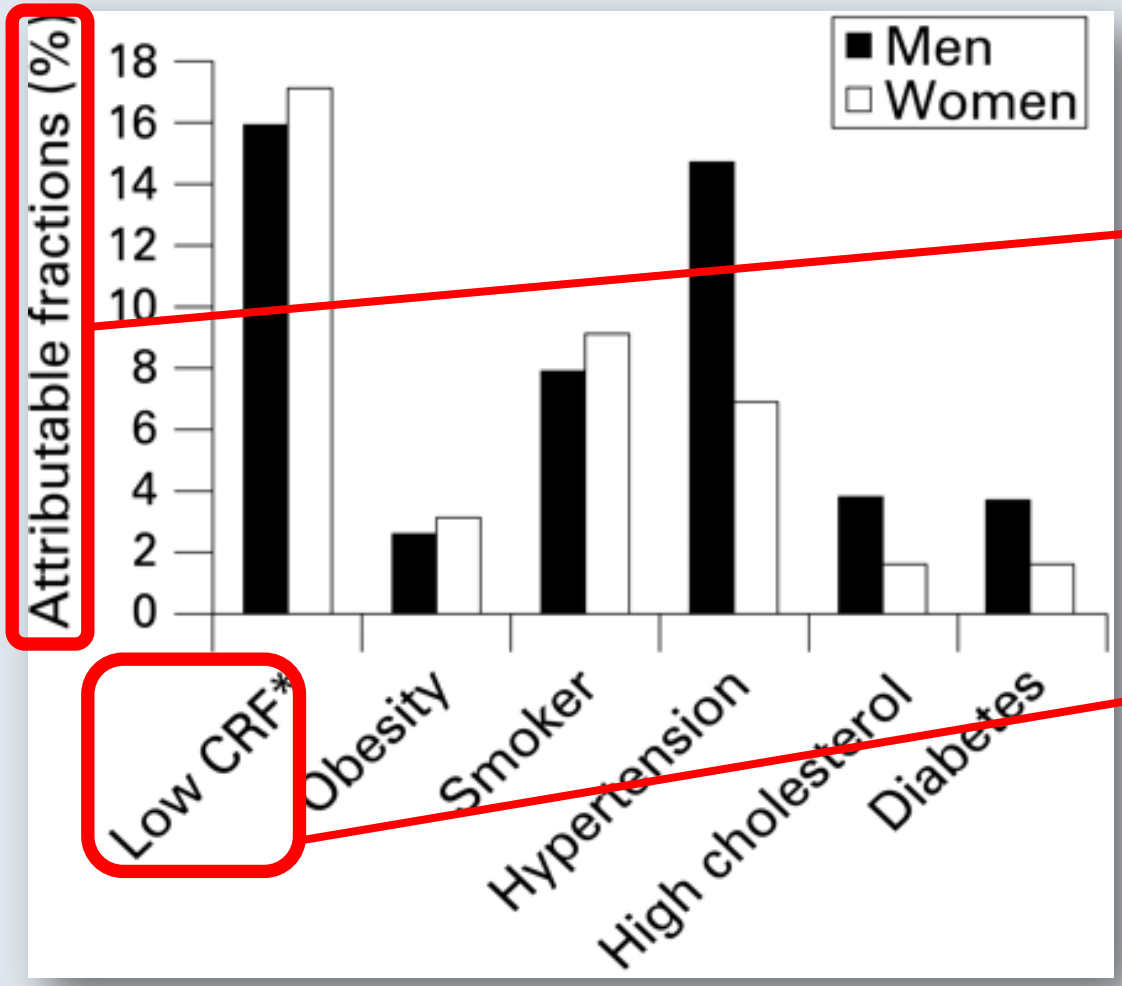
What is the single most important thing you can do for your health?

EXERCISE!

Aerobic Centre Longitudinal Study



% of deaths prevented by erasing a specific risk factor

CRF = Cardiorespiratory Fitness

*Blair, S.. Physical inactivity: the biggest public health problem of the 21st century. Br J Sports Med 2009;**43**:1-2*

Importance of Exercise

- Exercise alone decreases the risk of developing hundreds of named diseases
  - No drug or surgery can compare
- Studies show that daily exercise increases the life span anywhere from 3-10 years, depending on the variables measured
  - Nothing else does this

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Cardiorespiratory Fitness

- Strongest predictor of death!
- One hour of exercise/week cuts occurrence of heart disease by **50%**!

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Obesity and Exercise

Obesity w/o Exercise

- *Very poor* long-term health outcomes

Obesity + Exercise

- Even without weight loss, health outcomes drastically improve

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Exercise vs. Surgery

- Rainer Hambrecht took a group of patients with coronary artery disease:
  - ½ given exercise routine (30 mins/day)
  - ½ given corrective stent surgery
- After one year:
  - Exercise: 88% w/o CV accident
  - Stent: 70% w/o CV accident

Rainer, H. et. Al.. Percutaneous Coronary Angioplasty Compared With Exercise Training in Patients With Stable Coronary Artery Disease: A Randomized Trial. Circulation. 2004. 1371-1378.

How Much Exercise?

- Complicated and individualized
  - Depends on age, pre-existing health conditions, and fitness level
- In general, more is better, to a frequency and intensity that does not cause extreme fatigue or injury
  - Could I be more vague?

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Exercise Duration

- Most experts agree that the best '*return on investment*' is on the first **30 minutes** of low-impact exercise/day
  - i.e. walking
  - Additional exercise is still highly valuable, but the rate of health benefit falls off after 30 minutes

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Exercise Programs

- Best way to achieve fitness goals:
  - Formal, and specifically tailored exercise programs that focus on disease prevention
  - Great way to build camaraderie

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The Real Question...

"Can you limit your sitting and sleeping to *just* 23.5 hours per day?"

~ Dr. Mike Evans, Associate Professor, U of T

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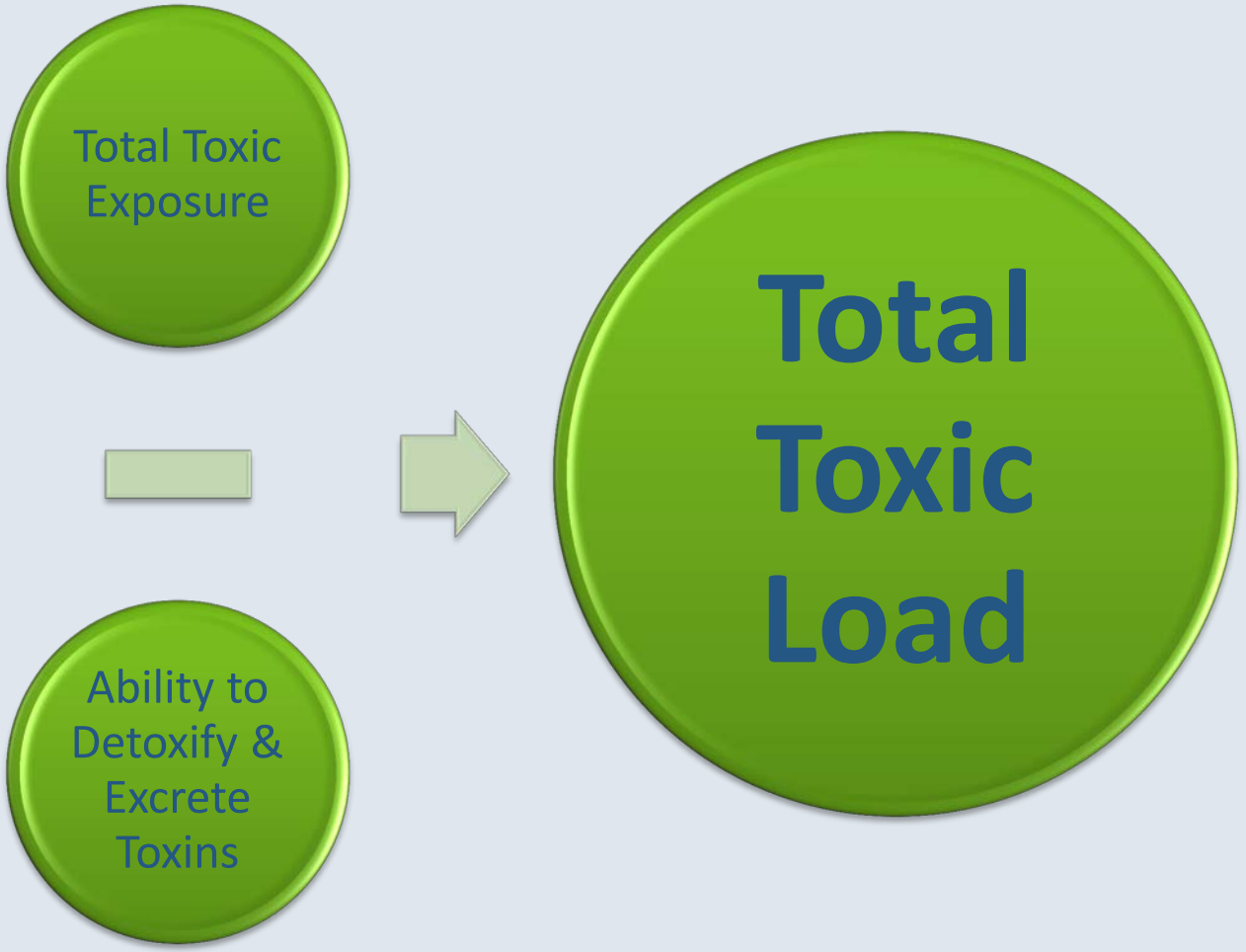
Section V

DETOXIFYING FROM WORKPLACE EXPOSURE

Toxic Load


Total Toxic Exposure
–
Ability to Detoxify & Excrete Toxins
Total Toxic Load

Types of Toxins

- **Exogenous Toxins** – derived from environment
  - Food, water, fumes, vapour, dust
- **Endogenous Toxins** – created within body
  - Intestinal toxins produced by bacteria

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Toxins and Disease

- Many cause and effect relationships between toxic substances and disease processes:
  - Non-Specific Illnesses: headaches, fatigue, poor memory, muscle weakness, insomnia
  - Specific Illnesses: cancer, pneumonia, migraine, arthritis

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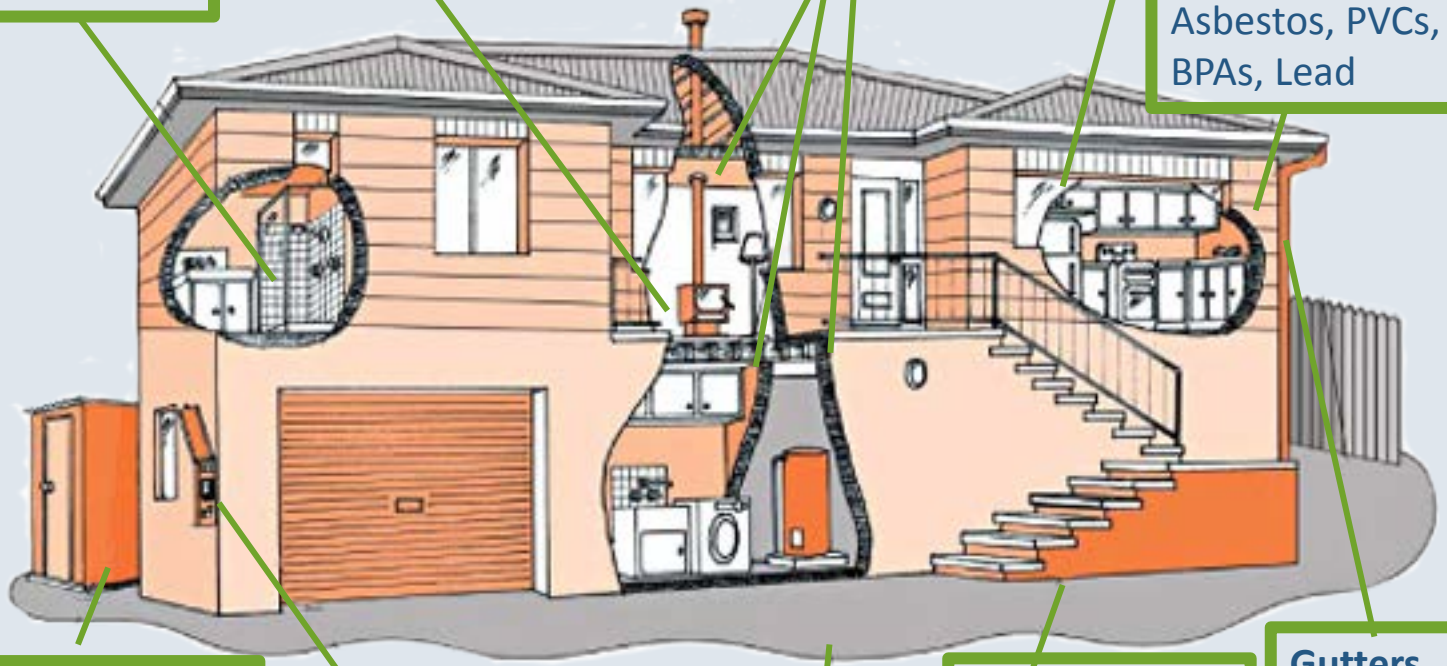
Common Toxins and Their Sources



Bath/Kitchen
Asbestos, PCBs, BPAs, Phthalates

Heat Insulation/Pipes
Asbestos, Lead

Cavities
Asbestos, Phthalates, Lead, Arsenic, Mercury

Roofing Asbestos, Lead, Arsenic, Cadmium and other heavy metals

Exterior Cladding
Asbestos, PVCs, BPAs, Lead

Sheds
Asbestos, PCBs, BPAs, VOCs, Cadmium, Mercury

Electrical Boxes
Asbestos, PCBs, BPAs, Lead

Soil
BCPs, Lead, Cadmium

Structures
Cadmium, Arsenic, Lead, Phthalates, BPAs

Gutters
Asbestos, PCBs, BPAs, Phthalates

Systemic Effects of Toxic Load

- Symptoms arise when the level of toxins present in the body is greater then the ability to detoxify and excrete toxins

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Chronic Toxic Exposure

Systemic Effects	Signs & Symptoms	Disorders

• Nervous system
• Endocrine system (hormones)
• Immune System
  • Allergies
  • Autoimmune
  • Chronic infections
	• Chemical Sensitivity
	• Chronic fatigue
	• Depression, Anxiety, Mood swings
	• Cognitive Dysfunction
	• Chronic Headaches
	• Muscle aches and weakness
	• Infertility
	• Recurrent infections
		• Various Cancers
		• Autoimmune Disease
		• Reproductive Disorders
		• Irritable Bowel Disease
		• Chronic Dermatitis
		• Neurodegenerative Disorders

Organs of Detoxification

- Majority of action is in the Liver
  - All toxins enter the liver via blood and lymph where they are chemically altered for excretion
- Gastrointestinal tract, kidneys and skin take the chemically-altered toxins and eliminate them from the body
  - Feces
  - Urine
  - Sweat
- Lungs are also involved to a lesser extent

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Mechanism of Detoxification

- Two step enzymatic process:
  - Phase I – P450 enzymes perform reduction/oxidation reactions which break toxic chemicals down
  - Phase II – water soluble constituents are added so the toxin can be excreted (conjugation)

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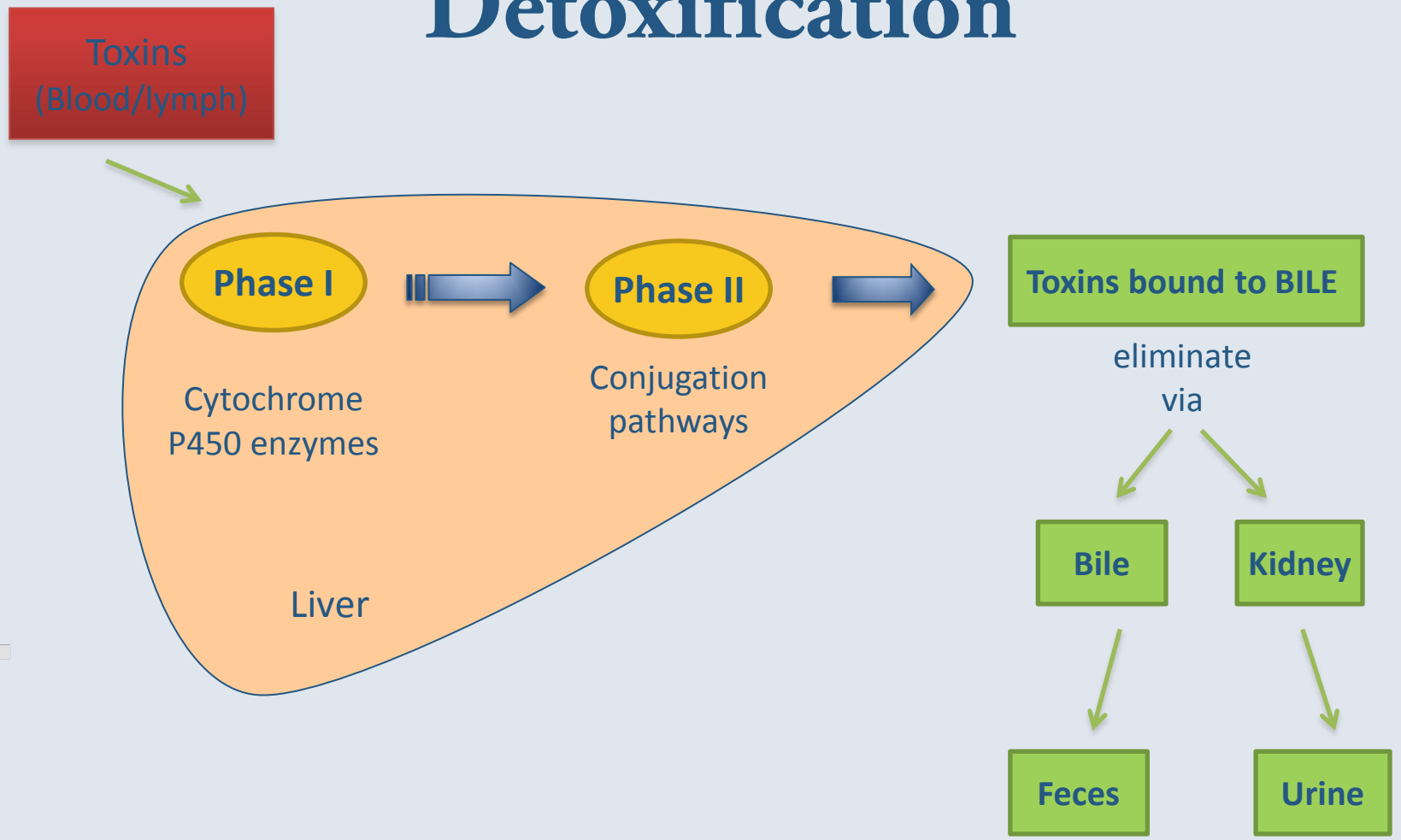
Detoxification



Detox Program

Liver 'Cleanse'

- Doing a 'detox' is becoming increasing prevalent
  - Increasing evidence that therapeutic detoxification plans can reduce bodily burden from toxic exposure
  - Recommend a specific plan once per year

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In Summary

1. Firefighters are at increased risk of death from cardiovascular disease and cancer.
2. Prevalence of both cancer and CVD are in large part controlled by modifiable lifestyle factors.
3. Decreasing health risk is done by maximizing a healthy life through improved: nutrition, stress, sleep, physical activity, and detoxification.

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Integrative Health Centre

Thank You!

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