

# CLASP Lecture – Fall 2018

## **The Symbiotic Relationship Between Exercise and Nutrition for Health**

### ***Changing Paradigms in our Understanding of Nutrition and Exercise***

William E. Amonete, PhD  
Associate Professor, Exercise and Health Sciences  
Executive Director, Exercise and Nutritional Health Institute

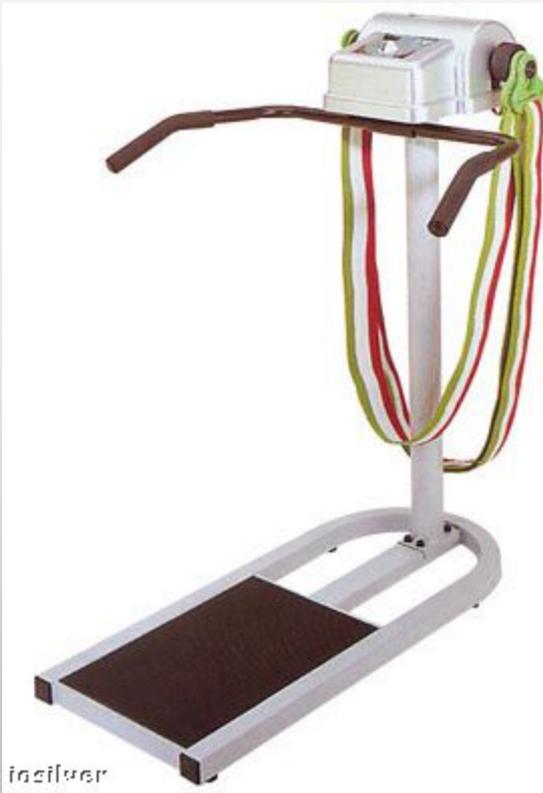
# Rene Descartes (1596 - 1650)

“Never accept anything as true unless recognized evidently as such. Carefully avoid prejudice, and include nothing in conclusions unless it presented itself so clearly and distinctly that there is no doubt.”

# Karl Popper (1902 – 1994)

“No theory ever solves all the puzzles with which it is confronted at a given time; nor are the solutions already achieved often perfect. On the contrary, it is just the incompleteness and imperfection of the existing data-theory fit that, at any given time, define many of the puzzles that characterize normal science.”

# Exercise Devices (1970-1980's)



“This device not only helps to develop muscles but also improves blood circulation. The high-frequency vibrating wave can efficiently target areas with excess fat. Two-way massaging belts can cover two body areas at once or allow two users to exercise at the same time. With a patented 5-speed system, it meets the requirements of all ages to choose either the massaging or body slimming effect.”

# More people are smoking CAMELS than ever before!



A different brand every day! Yes, that's the way it was during the war shortage. That's how millions learned the big difference in cigarette quality...and more people are smoking Camels than ever before.

With millions of smokers who have tried and compared, Camels are the "choice of experience"!

REMEMBER the cigarette shortage during the war? That was the biggest comparison test in cigarette history.

From day to day... pack to pack... people smoked whatever was available: more different brands than they would normally try in a lifetime.

The results speak for themselves. More people are smoking Camels than ever before! But, no matter how great the demand:

*We don't tamper with Camel quality. Only choice tobacco, properly aged, and blended in the time-honored Camel way, are used in Camels.*

According to a recent Nationwide survey:  
**MORE DOCTORS SMOKE CAMELS**  
than any other cigarette

When 115,597 doctors from coast to coast—in every field of medicine—were asked by three independent research organizations to name the cigarette they smoked, more doctors named Camel than any other brand!



YOUR "T-ZONE"  
WILL TELL YOU...

T for Taste...

T for Throat...

That's your proving ground for any cigarette. See if Camels don't suit your "T-Zone" to a T!

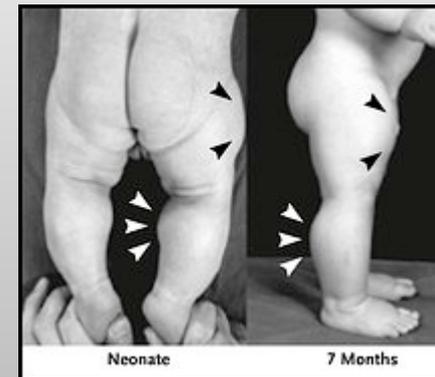


R. J. REYNOLDS TOBACCO COMPANY, WASHINGTON, D.C.

10 0110

# Dynamic Nature of Knowledge

- Muscle Contraction from the 1930s – 1940s
- Myostatin
- Blood Flow Occlusion Training
- Dietary and Exercise Recommendations for health



Top image retrieved from: <http://futurismic.com/wp-content/uploads/2009/02/belgian-blue-cow.jpg>

Schuelke, M., Wagner, K. R., Stolz, L. E., Hübner, C., Riebel, T., Kömen, W., ... & Lee, S. J. (2004). Myostatin mutation associated with gross muscle hypertrophy in a child. *New England Journal of Medicine*, 350(26), 2682-2688.

# Accumulation Theory of Science

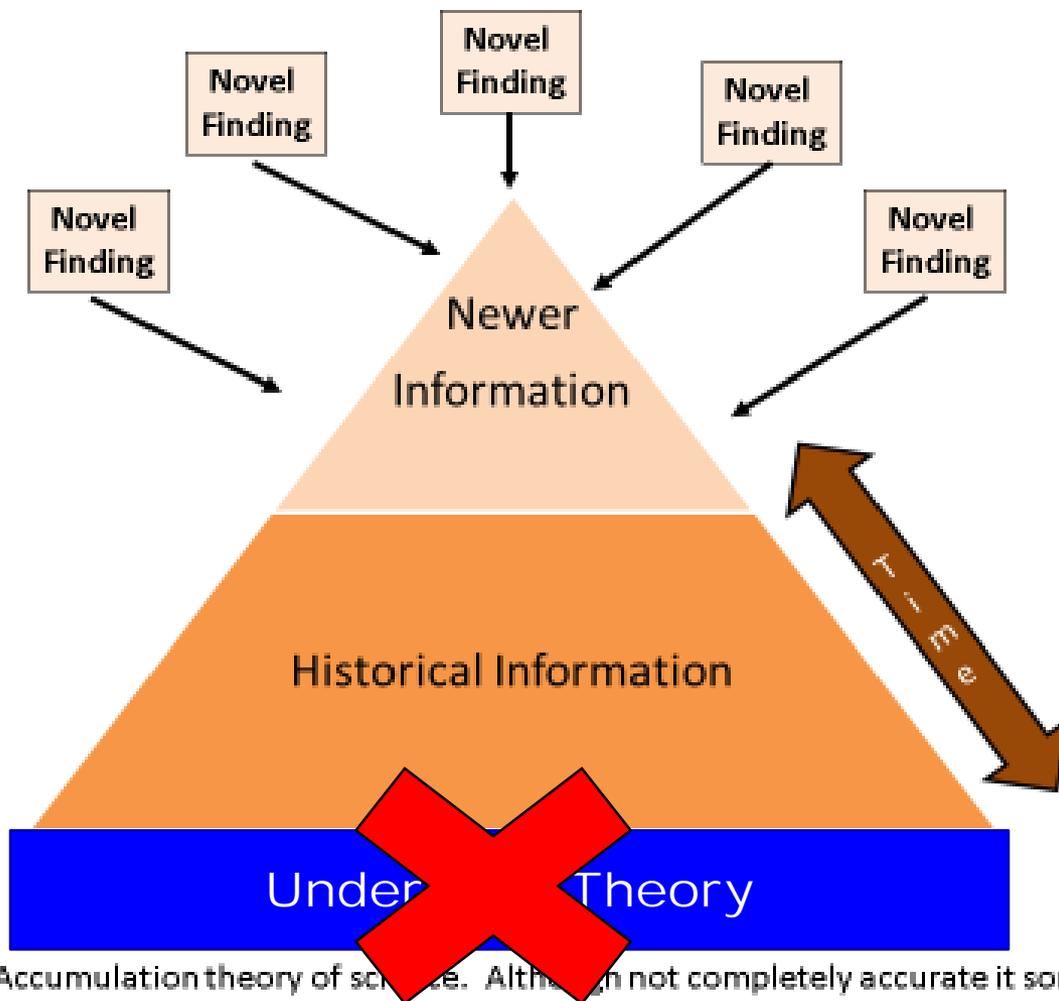


Figure 5.5 – Accumulation theory of science. Although not completely accurate it somewhat reflects the structure of the introduction section of a paper.

**Theory – It doesn't matter how much I eat as long as I exercise hard.**

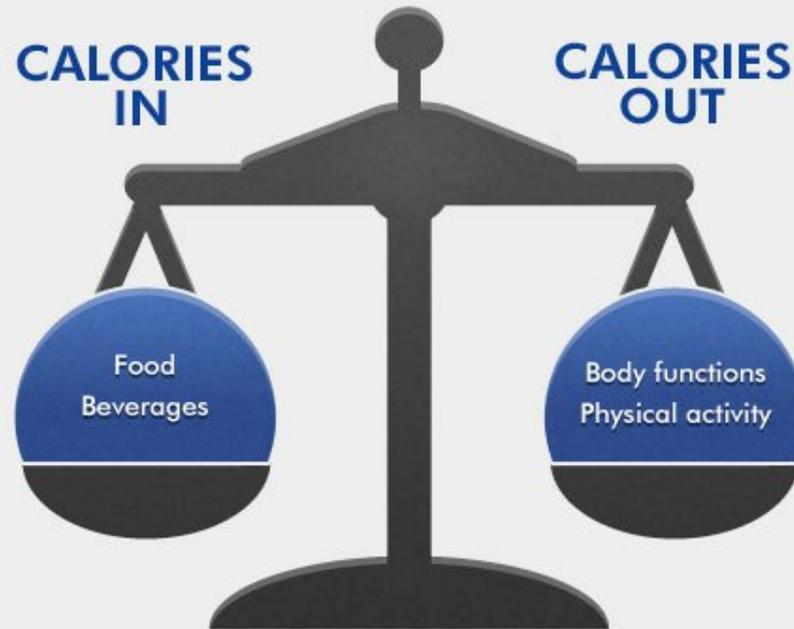


Image retrieved from: <https://wileynutritionbytes.com/wp-content/uploads/2013/12/calories-scale.jpg>

# Theory: An adipocyte (fat cell) is just a storage contain for lipid droplets

**Table.**  
Major Molecules Released by Adipocytes or Adipose Tissue Macrophages<sup>a</sup>

Adipokine(s)	Site of Action	Function
Leptin	Hypothalamus	Represses hunger, increases energy metabolism
	Immune system	Keeps immune system up-regulated
	Cardiovascular system	Anti-inflammatory effect
	Endocrine system	Regulates puberty and reproduction
	Skeletal muscle	Improves insulin sensitivity
Adiponectin	Immune system	Decreases release of inflammatory molecules
	Skeletal muscle	Increases fatty acid oxidation, glucose uptake, and lactate production
	Liver	Reduces levels of molecules involved in gluconeogenesis, increases free fatty acid metabolism
	Cardiovascular system	Antiatherosclerotic effect
Resistin	Immune system	Stimulates inflammation
	Cardiovascular system	Impairs vascular relaxation
Retinol-binding protein 4	Plasma	Transports vitamin A
	Skeletal muscle	Impairs insulin signaling
Tumor necrosis factor alpha (TNF- $\alpha$ )	Skeletal muscle	Impairs insulin signaling
Visfatin	Skeletal muscle	Binds to insulin receptors and mimics insulin
	Immune system	Causes release of TNF- $\alpha$ and interleukins (inflammatory signals)
Interleukin 6	Skeletal muscle	Impairs insulin signaling
Angiotensinogen and angiotensin II	Vascular system	Induces smooth muscle cell contraction and raises blood pressure
	Adipose tissue	Pro-inflammatory effect
Free fatty acids	Skeletal muscle	Promotes insulin resistance
	Liver	Promotes insulin resistance

<sup>a</sup> Adipocytes and other cells within fat tissue release molecules that work locally or are transported throughout the body.

# Theory: The Food Guide Pyramid

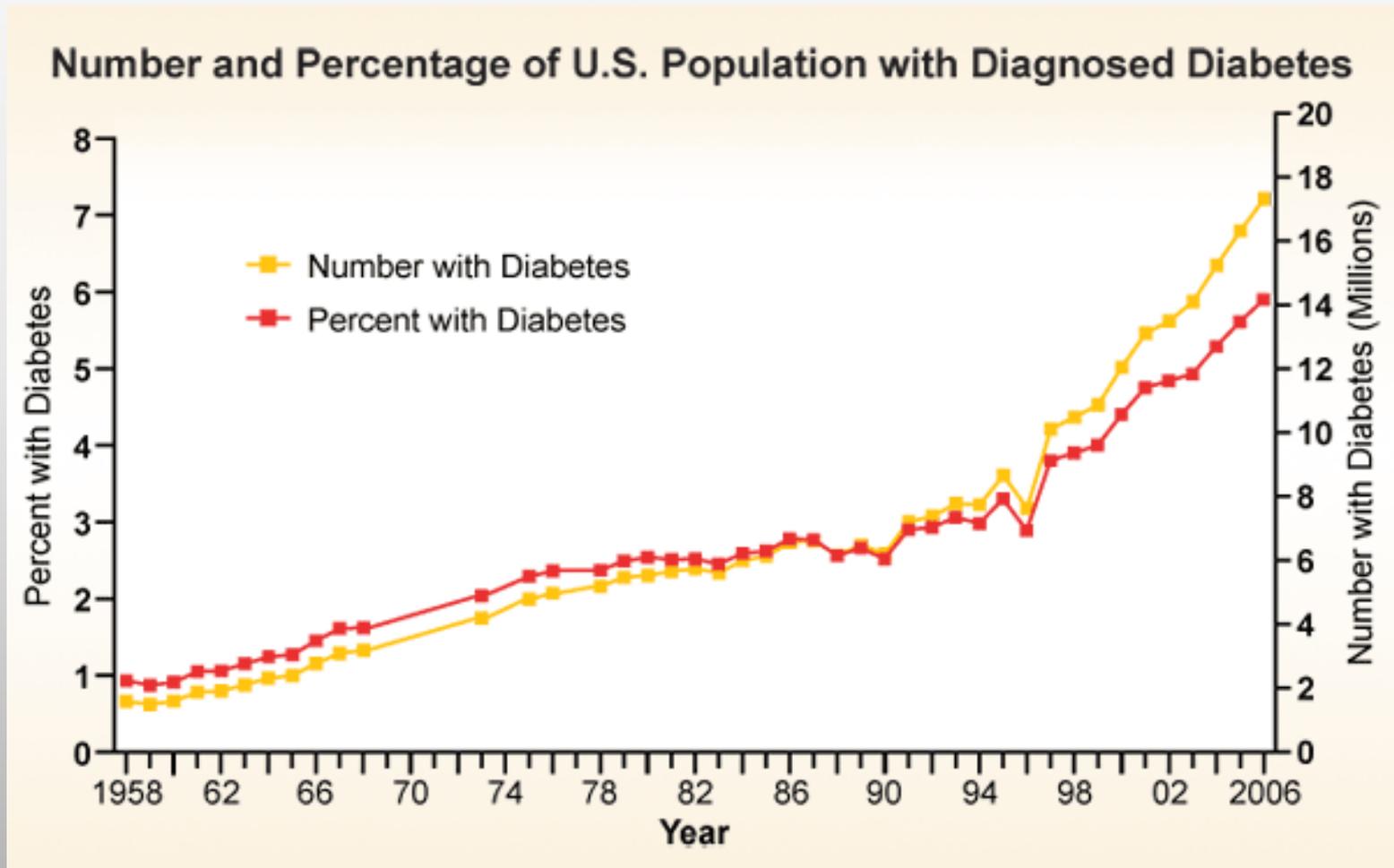


Image retrieved from: <http://realfoodrealfitness.com/sad-truth-behind-the-usda-food-guide-pyramid/>

# The heart disease – lipid hypothesis – where did it come from?

- In 1977 the Senate Select Committee on Nutrition published their dietary guidelines for Americans to embrace a diet low in saturated and animal fat.
- The underlying scientific rationale for this recommendation was based on a theory known as the Lipid-Heart hypothesis (1). Some evidence at the time suggested that saturated fat and cholesterol were major influencers of obesity, heart disease and strokes.
- Thus, the recommendations by the Senate Select Committee were for Americans to reduce the consumption of fat from 40% to 20%, and saturated fat from 20% to less than 7% of all consumed calories.
- The Lipid-Heart hypothesis changed the way Americans eat such that most Americans consume a diet high in refined, and processed grains, added sugar, and vegetable oils.

# Percentage of Population with Diabetes



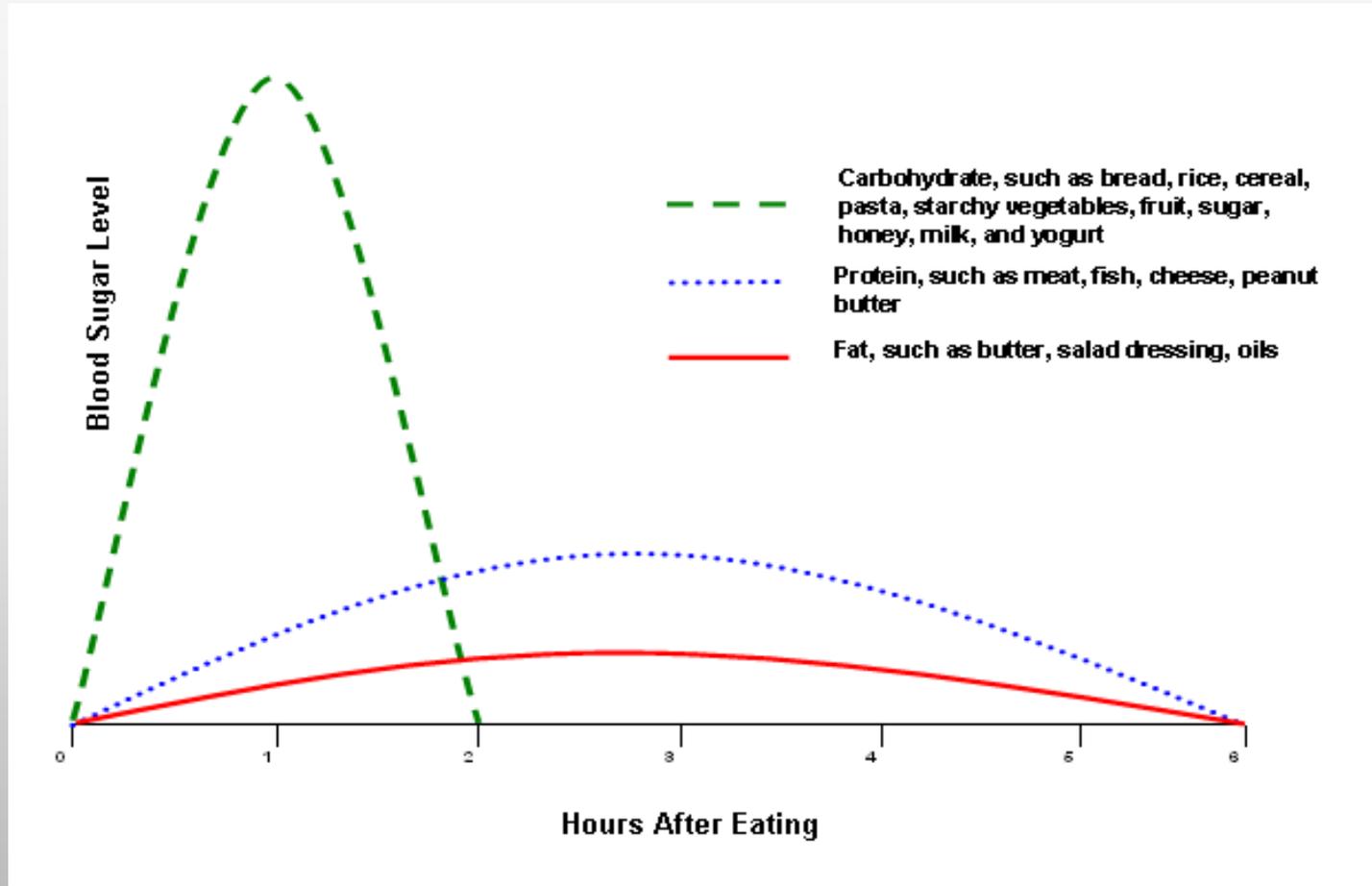
# Population Based Changes in Health Status in the United States

- [Geographic Distribution of Risk Factors](#)
- [Economic Burden of Disease](#)

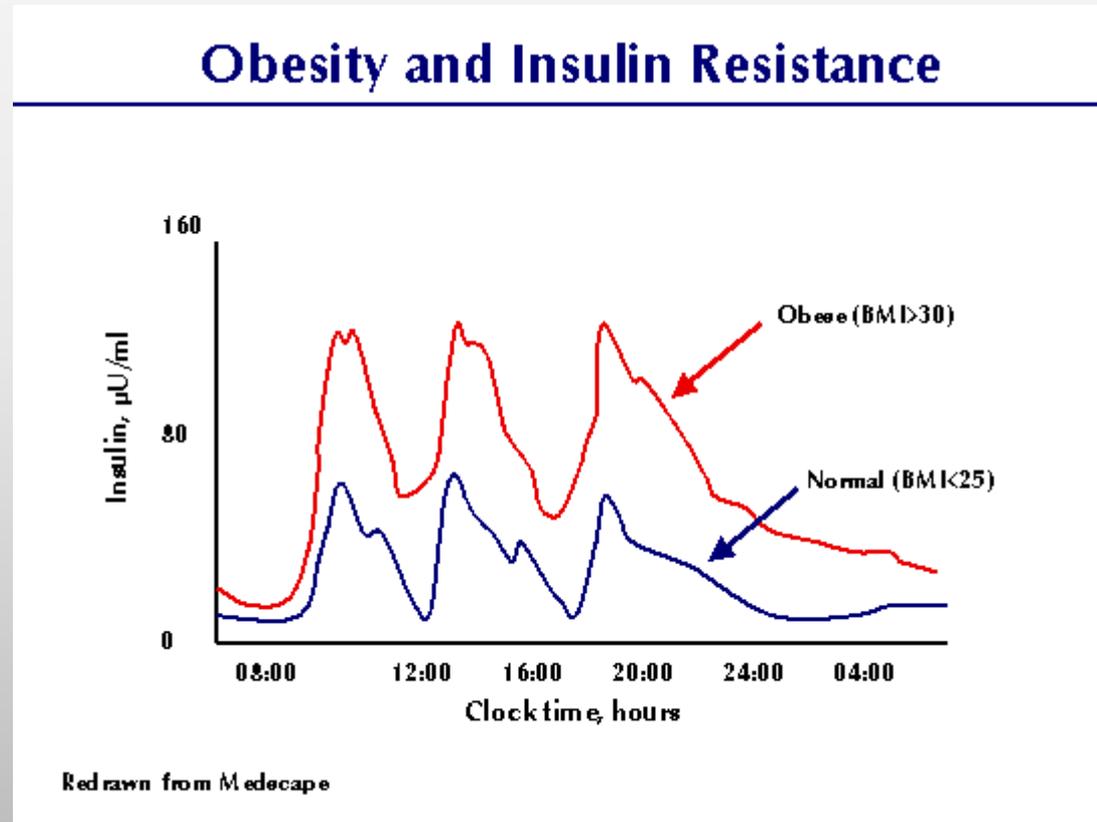
# What is the Culprit? Insulin Resistance!

Lustig, R. H., & Malhotra, A. (2018). The cholesterol and calorie hypotheses are both dead—it is time to focus on the real culprit: insulin resistance. *Stroke*, 13, 57.

# Insulin Response to a Meal



# Obesity and Insulin Resistance

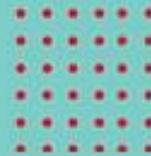




# INSULIN RESISTANCE



HIGH CARB  
DIET



CONSTANT HIGH GLUCOSE  
IN BLOOD



CONSTANT HIGH INSULIN  
DEMAND

Increased insulin demand  
leads to  
increased insulin resistance



INSATIABLE  
HUNGER  
AND CRAVINGS



- GLUCOSE NOT ABSORBED
- CELLS STARVING
- DRIVES HUNGER
- HIGH GLUCOSE AND HIGH INSULIN LEVELS BUT INSULIN RECEPTORS ARE RESISTANT

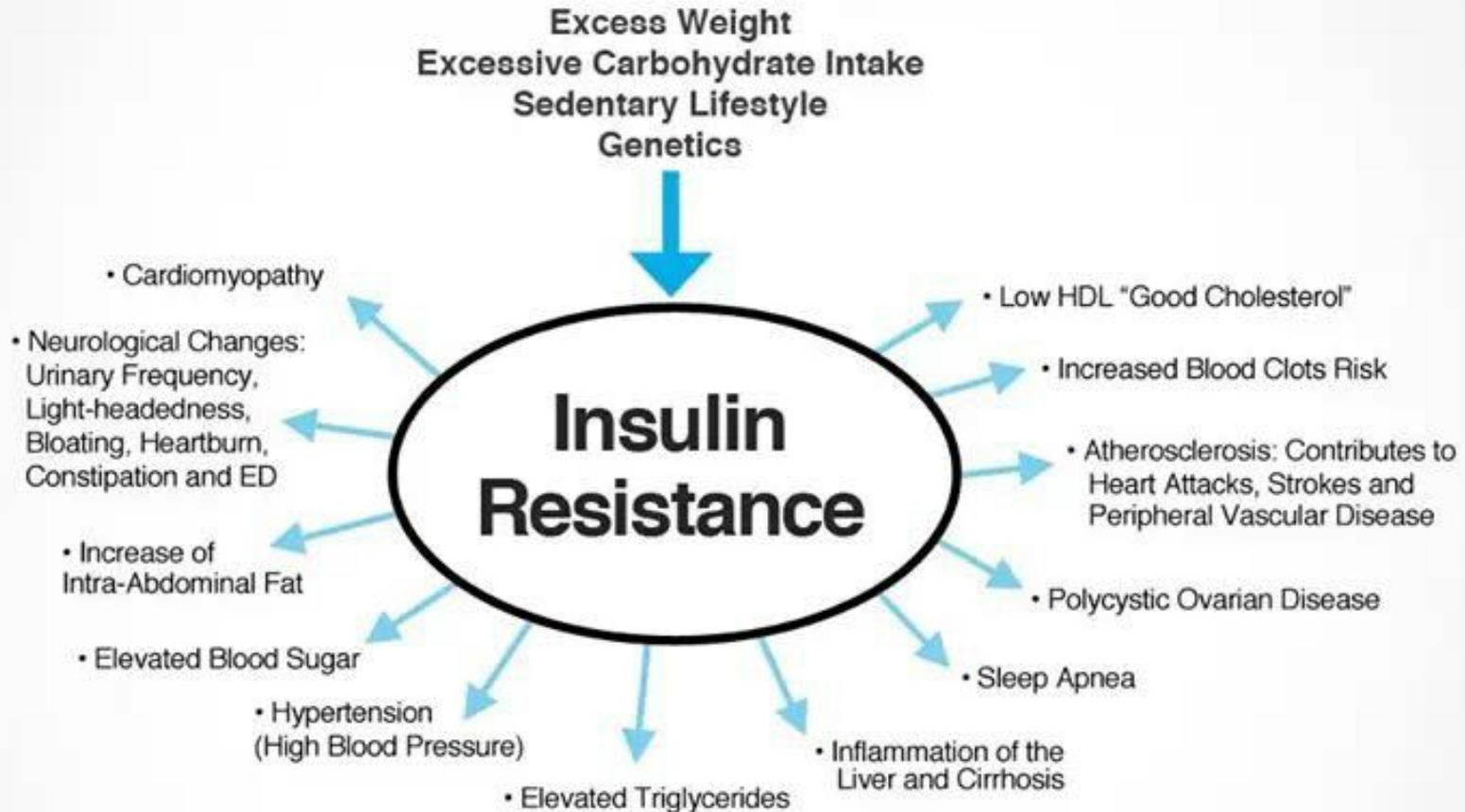


INSULIN RECEPTORS  
BECOME RESISTANT  
(DOWN REGULATED)



LOWCARBRN.COM  
DITCHTHECARBS.COM

# Insulin Resistance



www.draxe.com

# Slow, steady state exercise is better for your heart; interval training is only for athletes

Wisløff, U., Støylen, A., Loennechen, J. P., Bruvold, M., Rognum, Ø., Haram, P. M., ... & Videm, V. (2007). Superior cardiovascular effect of aerobic interval training versus moderate continuous training in heart failure patients: a randomized study. *Circulation*, 115(24), 3086-3094.

Coats, A. J., Adamopoulos, S., Radaelli, A., McCance, A., Meyer, T. E., Bernardi, L., ... & Forfar, C. O. N. W. A. Y. (1992). Controlled trial of physical training in chronic heart failure. Exercise performance, hemodynamics, ventilation, and autonomic function. *Circulation*, 85(6), 2119-2131.

# Practical Recommendations

- Ensure that the majority of your carbohydrates come from leafy green vegetables with a low glycemic index.
- Significantly reduce or eliminate bread, pasta, potatoes, rice, etc.
- Stop eating so much SUGAR!
- Stop eating so processed foods!
- Eat a diet higher in healthy fats, especially Omega-3 fatty acids (cold water fish).
- Eat 20-30g of protein 4 times per day.
- Consider low intensity physical activity immediately after meals.
- Increase your muscle mass through resistance training.
- Under supervision, incorporate high intensity interval training for improved glucose control!

# Questions?

