

Health Consequences of Obesity

Arya M Sharma, MD, FRCP(C)

Professor of Medicine

Research Chair for Obesity Research & Management

University of Alberta

Medical Director

Capital Health Weight Wise Program

Edmonton, AB, Canada

www.drsharma.ca

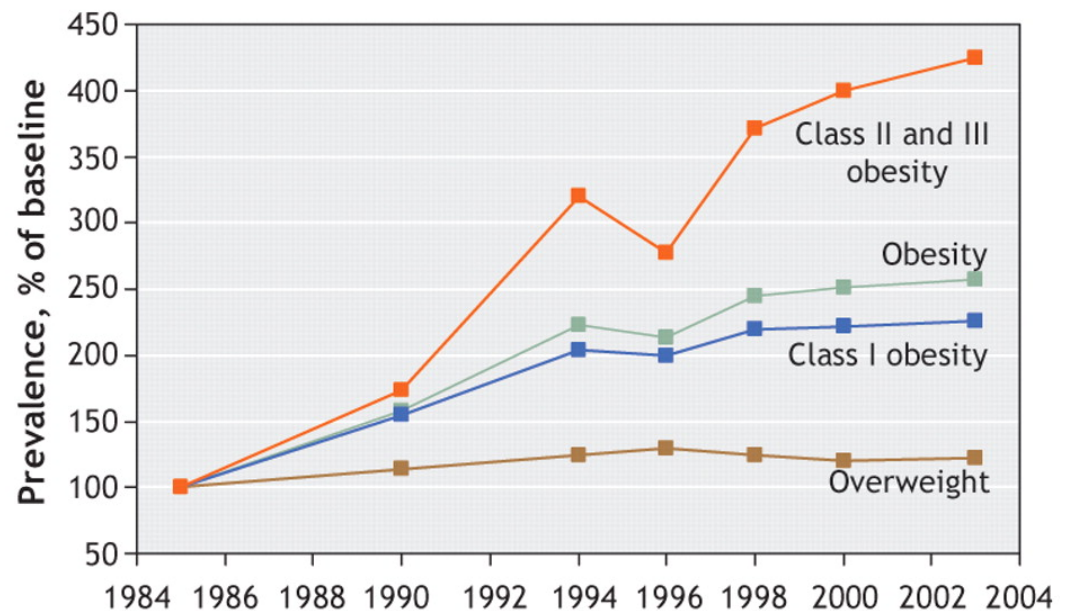
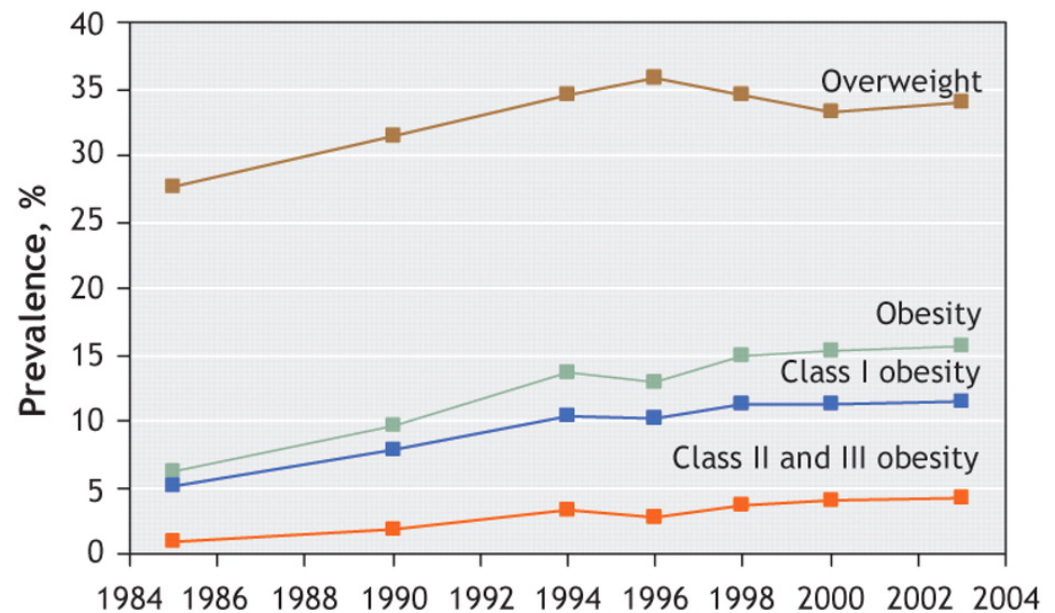


Oversize Coffin



Four-Fold increase in Morbid Obesity in Canada in 20 Years

Katzmarzyk et al. CMAJ, 2006



Size of the Problem

- ◆ **Edmonton Health Region ~ 1,000,000**
- ◆ **BMI > 25 ~ 500,000**
- ◆ **BMI > 30 ~ 250,000**
- ◆ **BMI > 40 ~ 25,000**
- ◆ **Our waiting list ~ 2000**

The Vision of the Capital Health Weight Wise Program

- ◆ **To reduce the incidence of obesity (defined as the accumulation of excess body fat) and related chronic diseases by promoting healthy and active living**

The Vision of the Capital Health Weight Wise Program

- ◆ **To reduce the incidence of obesity (defined as the accumulation of excess body fat) and related chronic diseases by promoting healthy and active living**
- ◆ **To reduce the burden of obesity and related comorbidities by implementing long-term obesity management and treatment strategies**

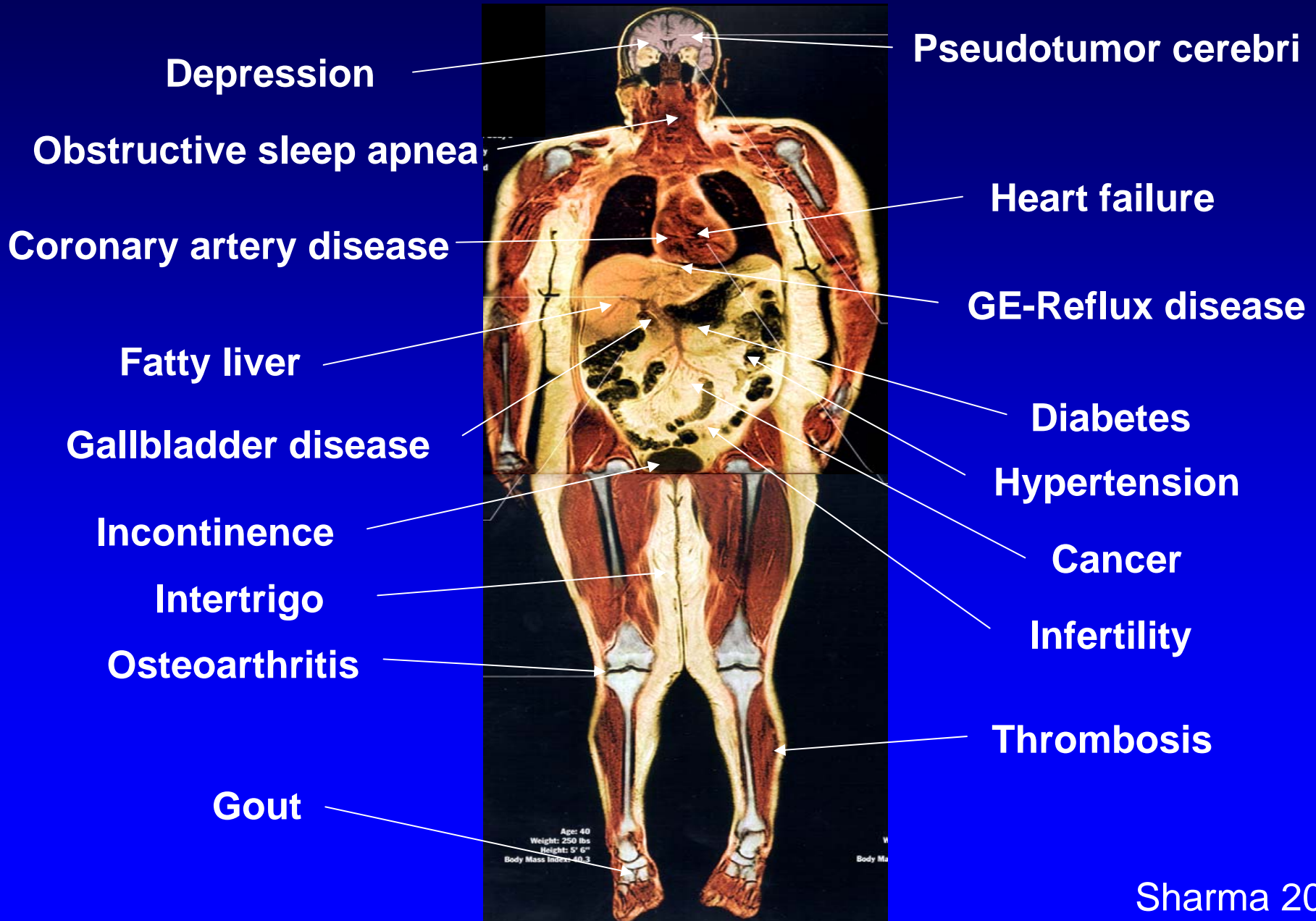
Is obesity a disease?

Obesity is a heterogeneous complex disorder of multiple etiologies characterized by excess body fat that threatens or affects socioeconomic, mental or physical health

Sharma 2007



Health Consequences of Obesity



Health Consequences of Obesity

Mental

- depression
- anxiety
- personality disorder
- self esteem
- etc.

Health Consequences of Obesity

Mental

- depression
- anxiety
- personality disorder
- self esteem
- etc.

Mechanical

- osteoarthritis
- obstructive sleep apnea
- reflux disease
- urinary incontinence
- intertrigo
- etc.

Health Consequences of Obesity

Mental

- depression
- anxiety
- personality disorder
- self esteem
- etc.

Mechanical

- osteoarthritis
- obstructive sleep apnea
- reflux disease
- urinary incontinence
- intertrigo
- etc.

Metabolic

- diabetes
- dyslipidemia
- fatty liver
- hypertension
- cancer
- PCOS
- gall bladder
- infertility
- etc.

Health Consequences of Obesity

Sedentariness/Overnutrition



Mental

- depression
- anxiety
- personality disorder
- self esteem
- etc.

Mechanical

- osteoarthritis
- obstructive sleep apnea
- reflux disease
- urinary incontinence
- intertrigo
- etc.

Metabolic

- diabetes
- dyslipidemia
- fatty liver
- hypertension
- cancer
- PCOS
- gall bladder
- infertility
- etc.

Health Consequences of Obesity

Sedentariness/Overnutrition



Mental

- depression
- anxiety
- personality disorder
- self esteem
- etc.

Mechanical

- osteoarthritis
- obstructive sleep apnea
- reflux disease
- urinary incontinence
- intertrigo
- etc.

Metabolic

- diabetes
- dyslipidemia
- fatty liver
- hypertension
- cancer
- PCOS
- gall bladder
- infertility
- etc.

Hormones / Adipokines / Inflammation

Health Consequences of Obesity

Sedentariness/Overnutrition

Mental

- depression
- anxiety
- personality disorder
- self esteem
- etc.

Mechanical

- osteoarthritis
- obstructive sleep apnea
- reflux disease
- urinary incontinence
- intertrigo
- etc.

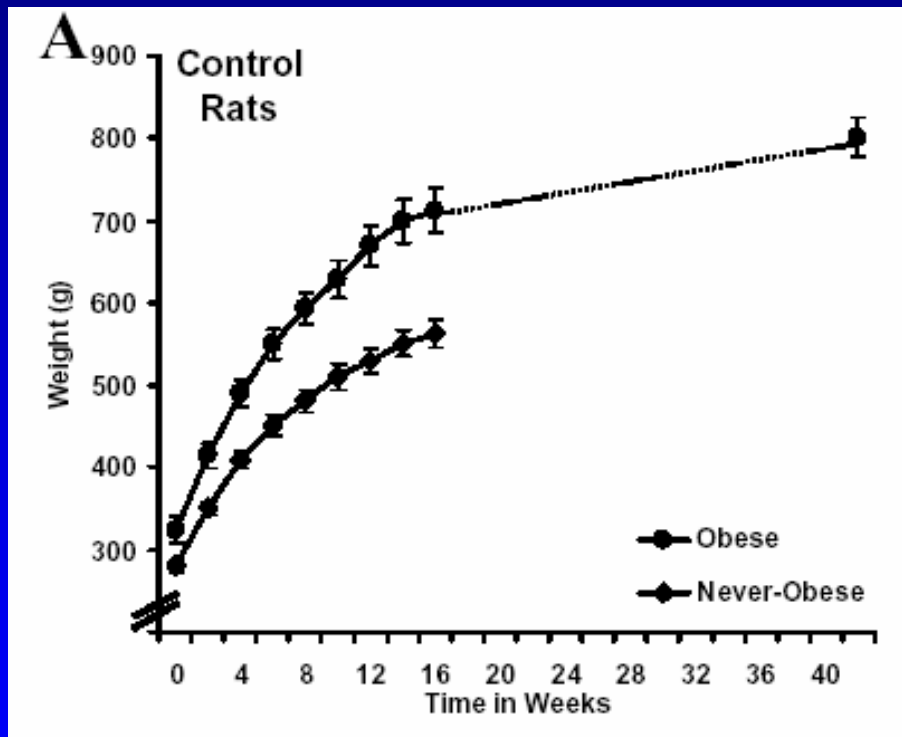
Metabolic

- diabetes
- dyslipidemia
- fatty liver
- hypertension
- cancer
- PCOS
- gall bladder
- infertility
- etc.

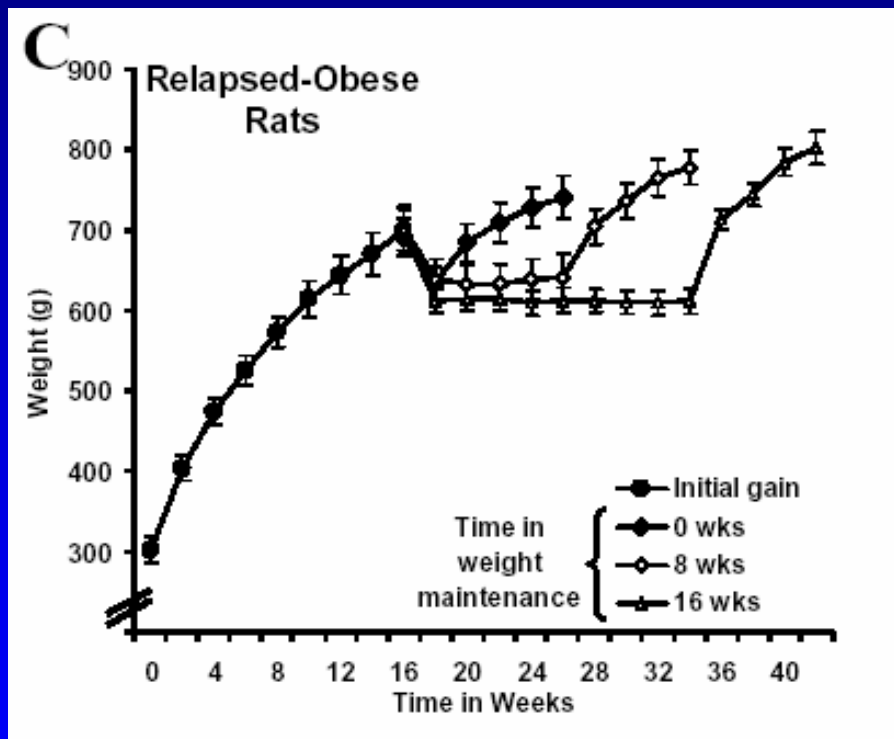
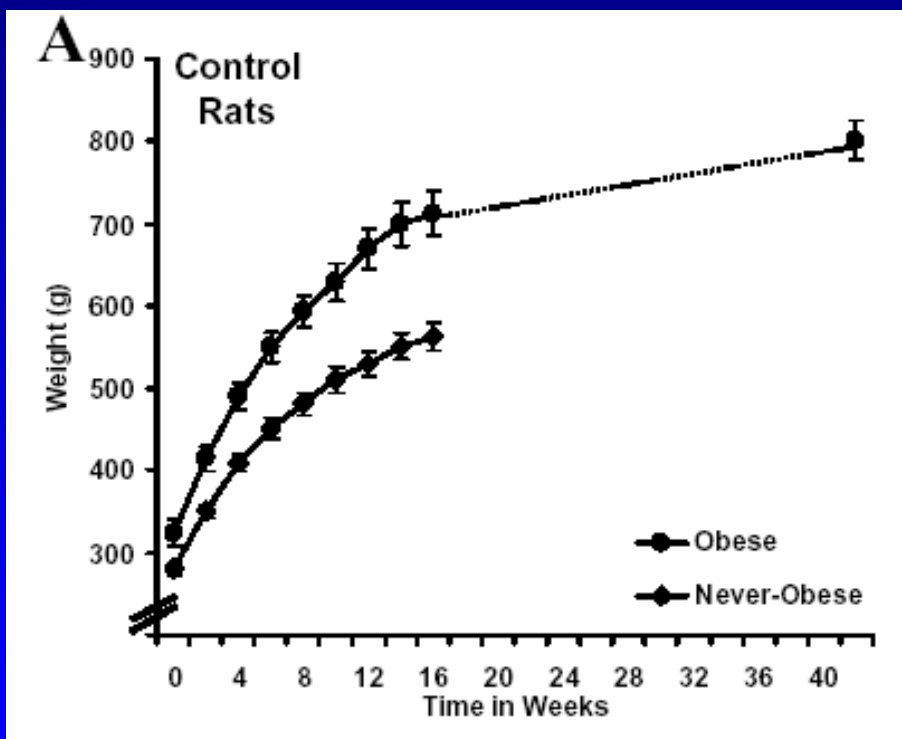
Hormones / Adipokines / Inflammation

Is there a cure for obesity?

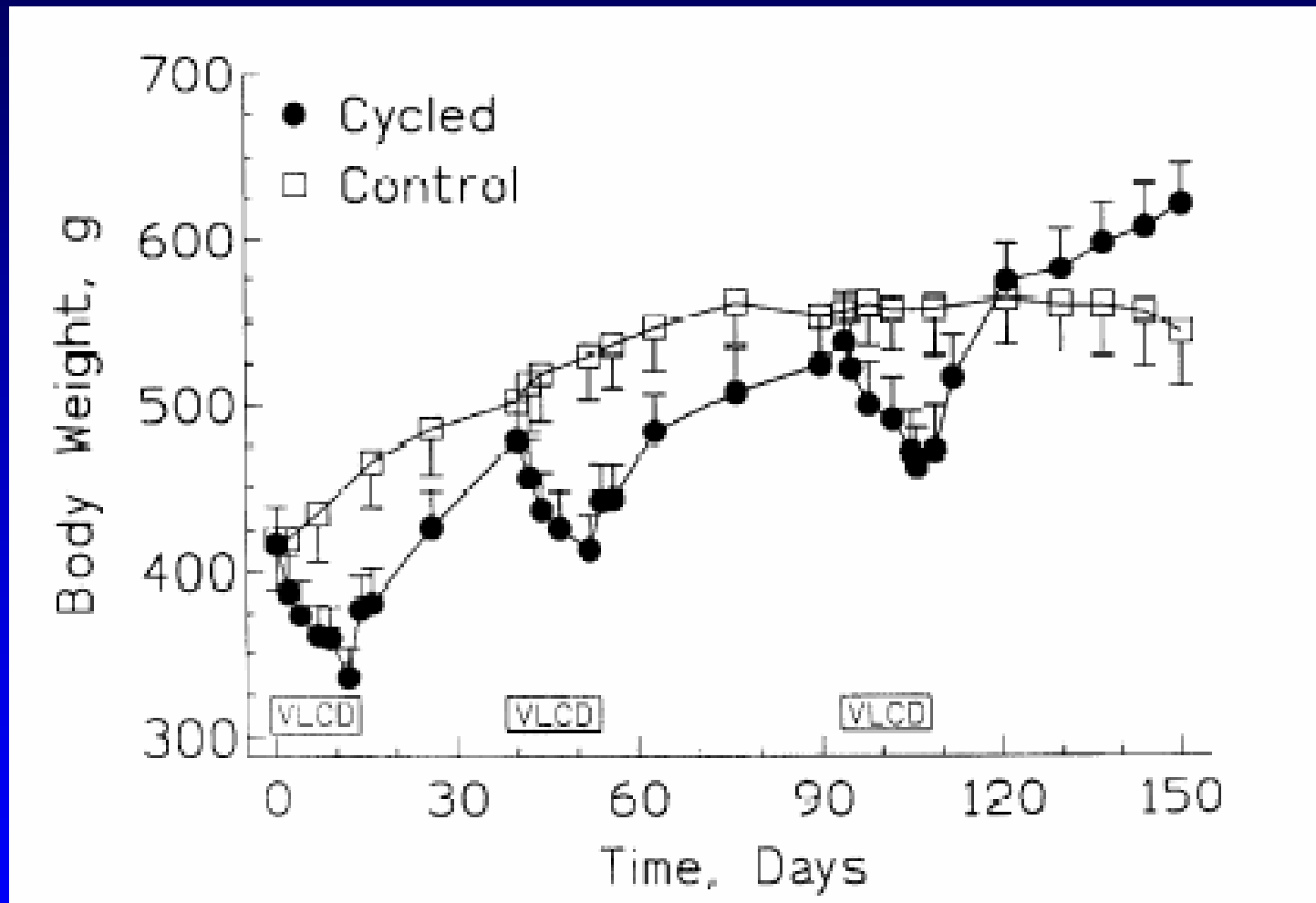
Weight Curves in Obese and Never-Obese Rats



Weight Curves in Obese and Never-Obese Rats



Consequences of Weight Cycling in Obese SHR



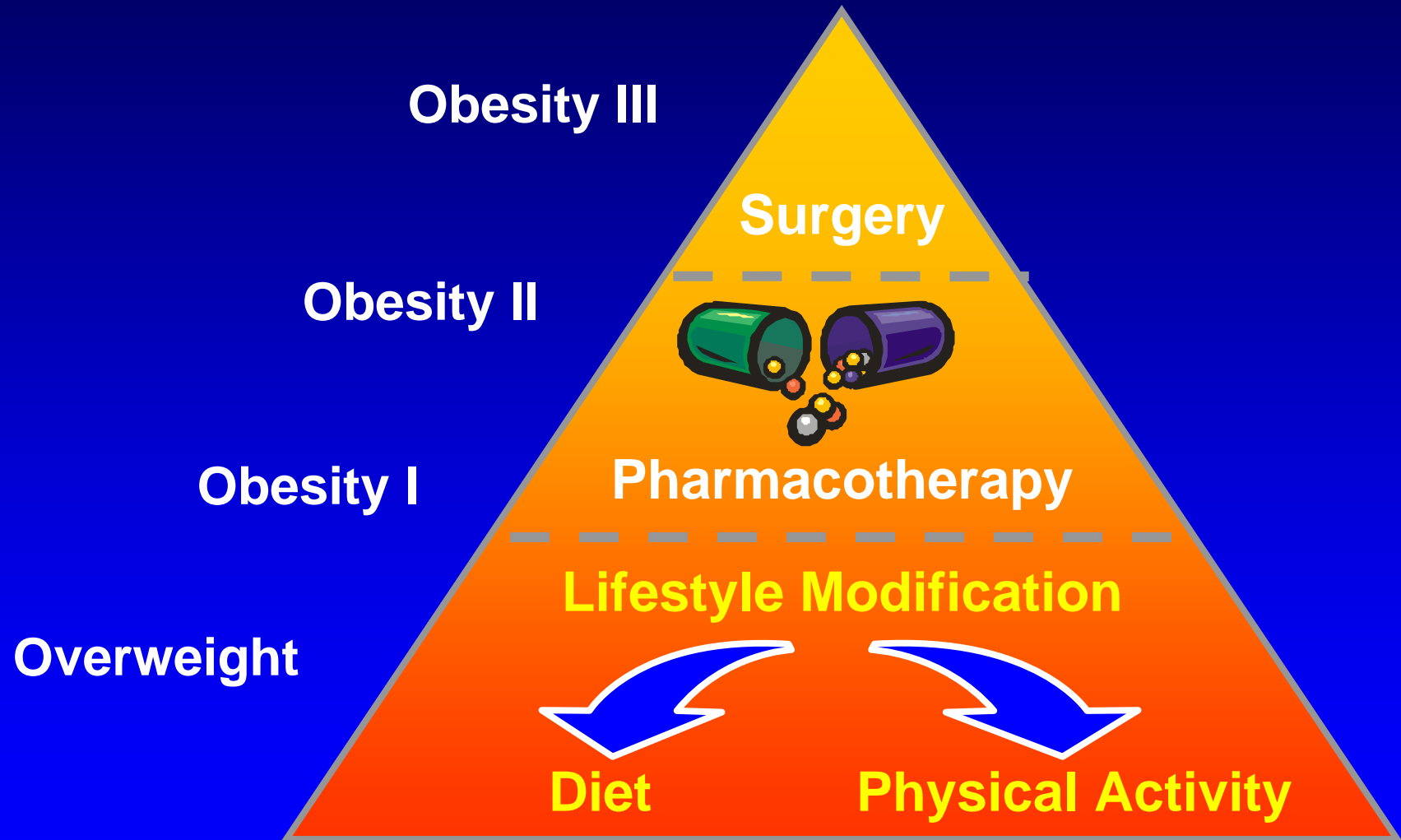
Ernsberger P ym, AJP 1996;270:R864.

The Dilemma

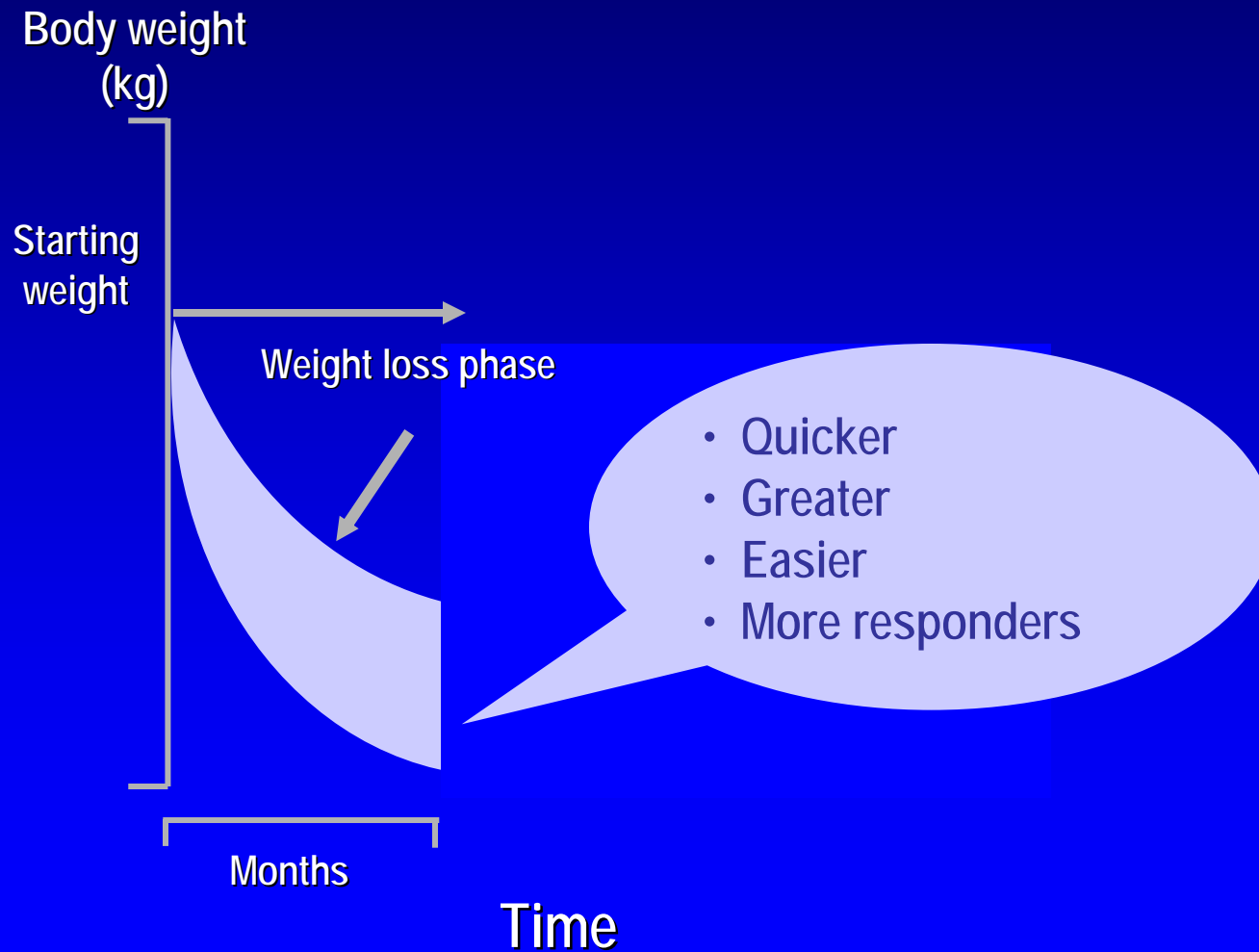


Can we treat obesity?

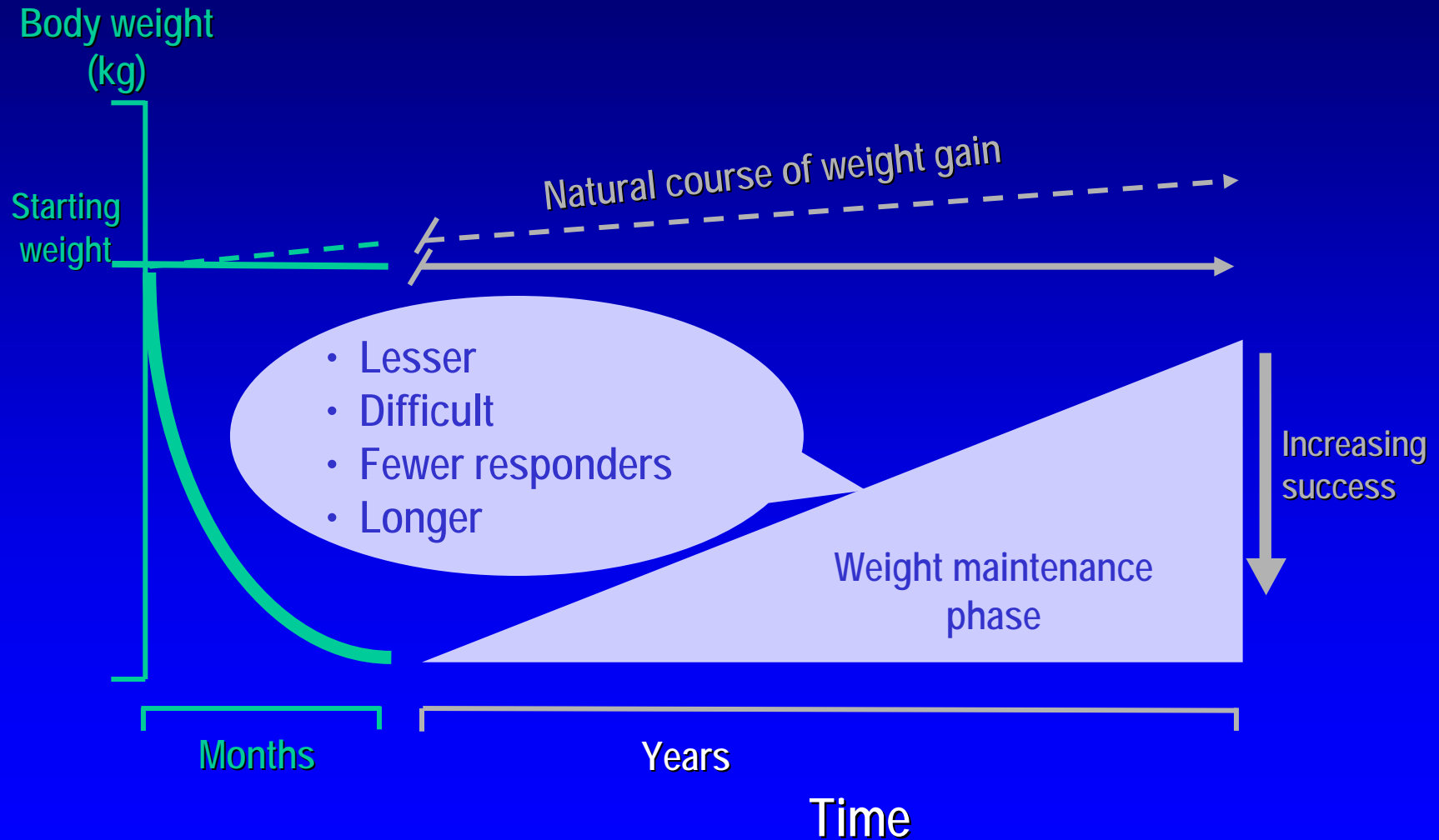
Obesity Treatment Pyramid



What is Success in Weight Management?



What is Success in Weight Management?

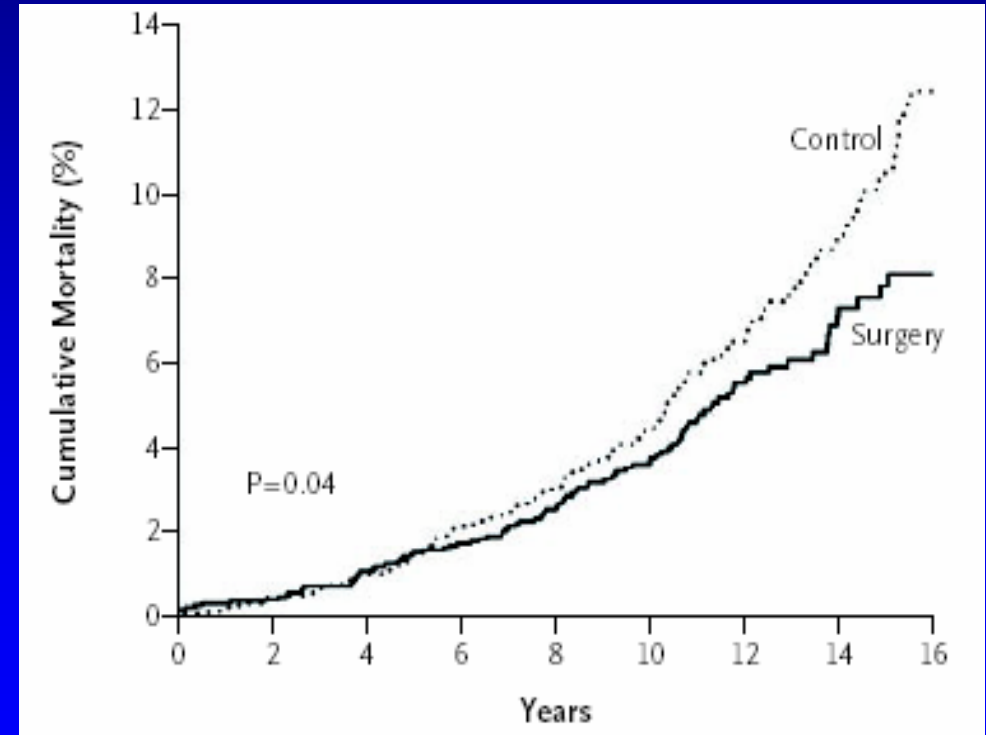
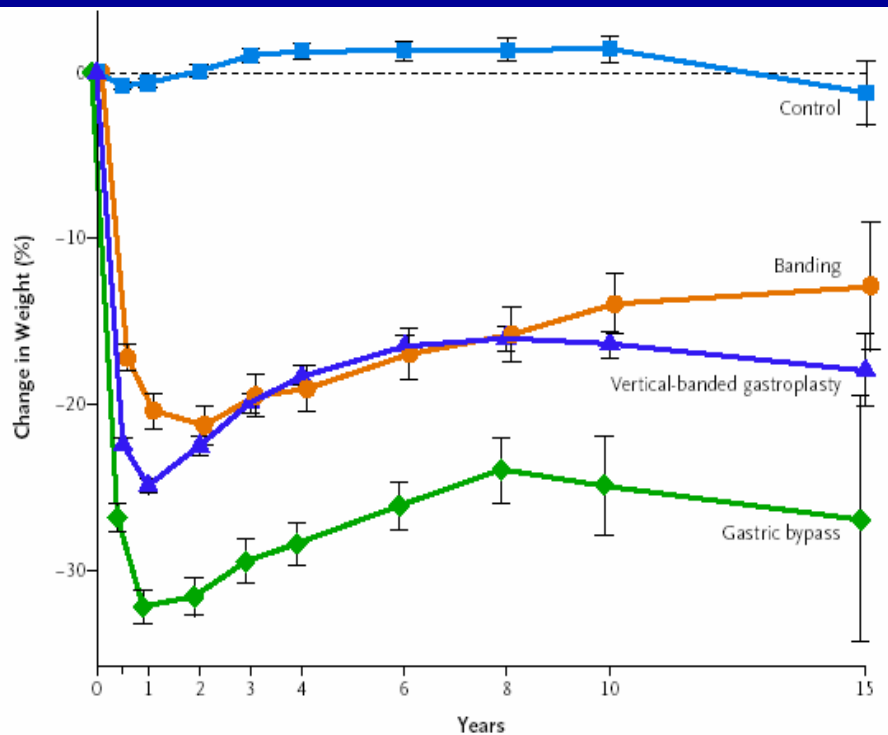


Systematic Review of Major Commercial Weight Loss Programs in the United States

- ◆ **Best data for Weight Watchers:**
 - 3.2% weight loss at 2 years
- ◆ **Very low calorie diets:**
 - 15-25% weight loss but associated with
 - High costs
 - High attrition rates
 - High probability of weight regain
- ◆ **Internet and self-help programs:**
 - minimal weight loss

Bariatric Surgery Reduces Mortality in Swedish Obese Subjects (n=2010 vs. 2037)

30% Reduction in All Cause Mortality

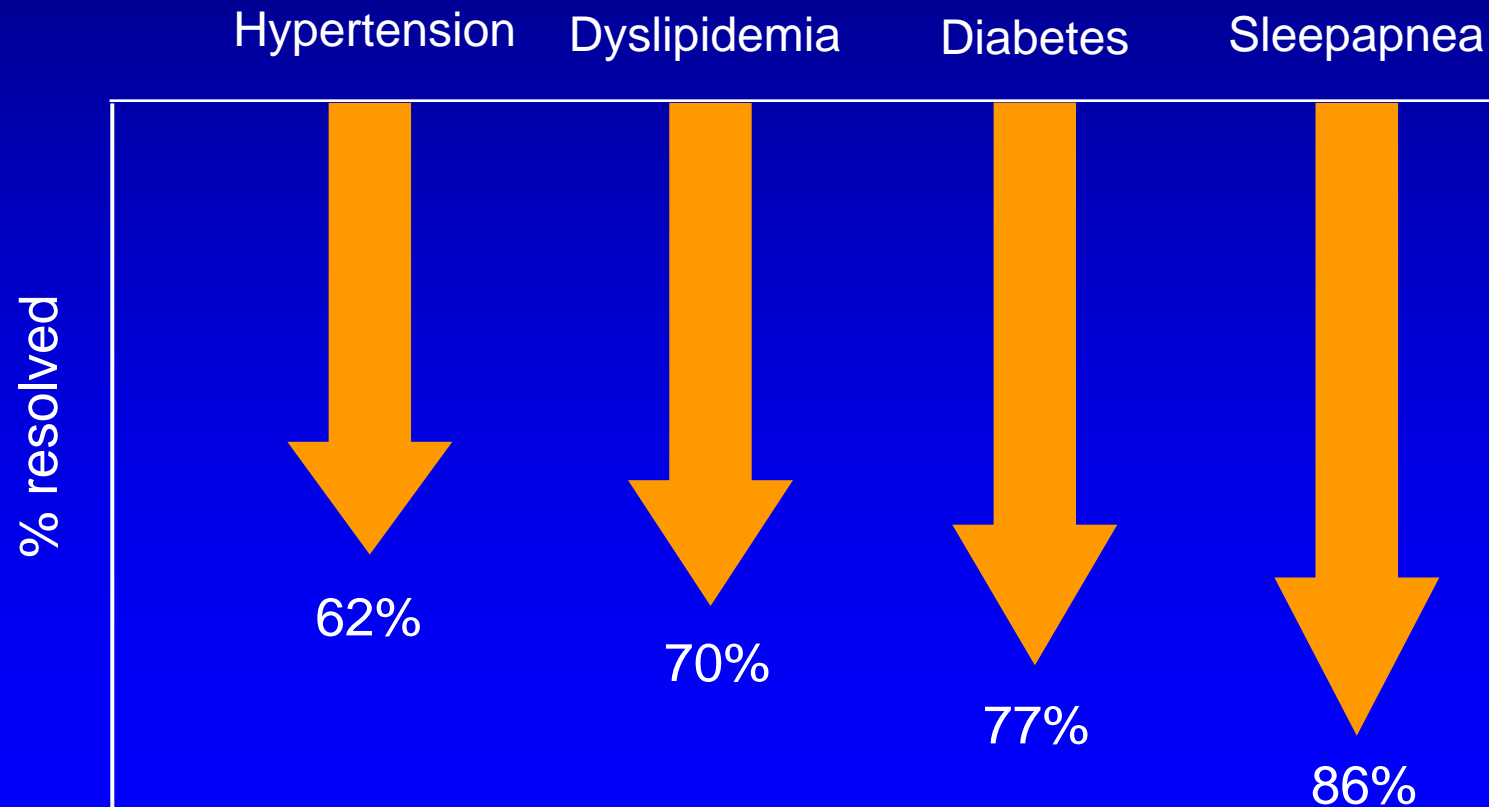


Sjostrom L et al. NEJM 2007;357:741-52

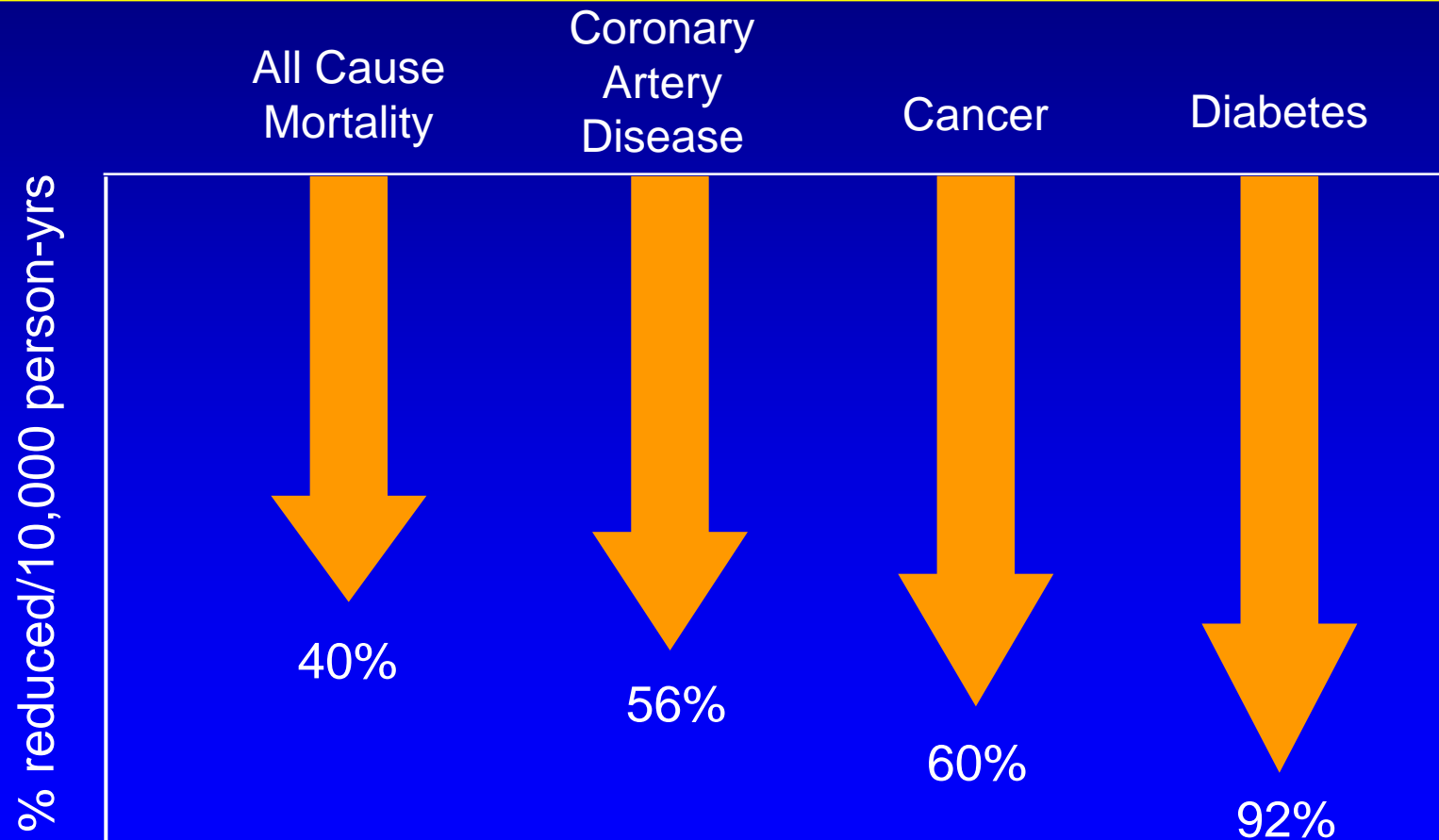
Bariatric Surgery

Effect on Cardiovascular Risk

A Systematic Review and Meta-Analysis of 22,090 Patients



Long-Term Mortality After Gastric Bypass Surgery (n=7928 vs. 7925)



STORM Mean bodyweight changes during weight loss and weight maintenance phases over 2 years



Same diet and exercise for both **sibutramine** and **control**

James WPT, Lancet 2001

Barriers to Weight Management

- ◆ **Socio-economic?**
- ◆ **Emotional?**
- ◆ **Comorbidities?**
- ◆ **Medications?**
- ◆ **Saboteurs?**
- ◆ **Substance abuse?**
- ◆ **Genetics?**

Vicious Cycles in Obesity

obesity

**Depression
Osteoarthritis
Sleep Apnea
Reflux disease
Medications**

Selected Medications That Can Cause Weight Gain

◆ Psychotropic medications

- Tricyclic antidepressants
- Monoamine oxidase inhibitors
- Specific SSRIs
- Atypical antipsychotics
- Lithium
- Specific anticonvulsants

◆ β -adrenergic receptor blockers

◆ Diabetes medications

- Insulin
- Sulfonylureas
- Thiazolidinediones

◆ Highly active antiretroviral therapy

◆ Tamoxifen

◆ Steroid Hormones

- Glucocorticoids
- Progestational steroids

**Can obese people lead “normal”
lives?**

Successful Weight-Loss Maintainers

- ◆ limit their intake of certain foods
- ◆ consume an average of 1400 cal/d
 - 24% of cal from fat
 - 19% of cal from protein
 - 56% of cal from carbohydrates.
- ◆ Eat five times a day
- ◆ Burn an average of 2,800 cal a week through exercise
 - 400 cal/day or 60 min of walking at 15 min/mile
- ◆ 75% weighed themselves at least once a week
- ◆ 42% reported that maintaining weight loss was less difficult than initially losing the weight

<http://www.obesity.org/prevention/maintaining.shtml>

The Maths of Successful Weight-Loss Maintainers

	weekly	daily
calorie consumption:	9,800	1,400
exercise expenditure	2,800	400
non-exercise expenditure	7,000	1,000

The Maths of Successful Weight-Loss Maintainers

	weekly	daily
calorie consumption:	9,800	1,400
exercise expenditure	2,800	400
non-exercise expenditure	7,000	1,000

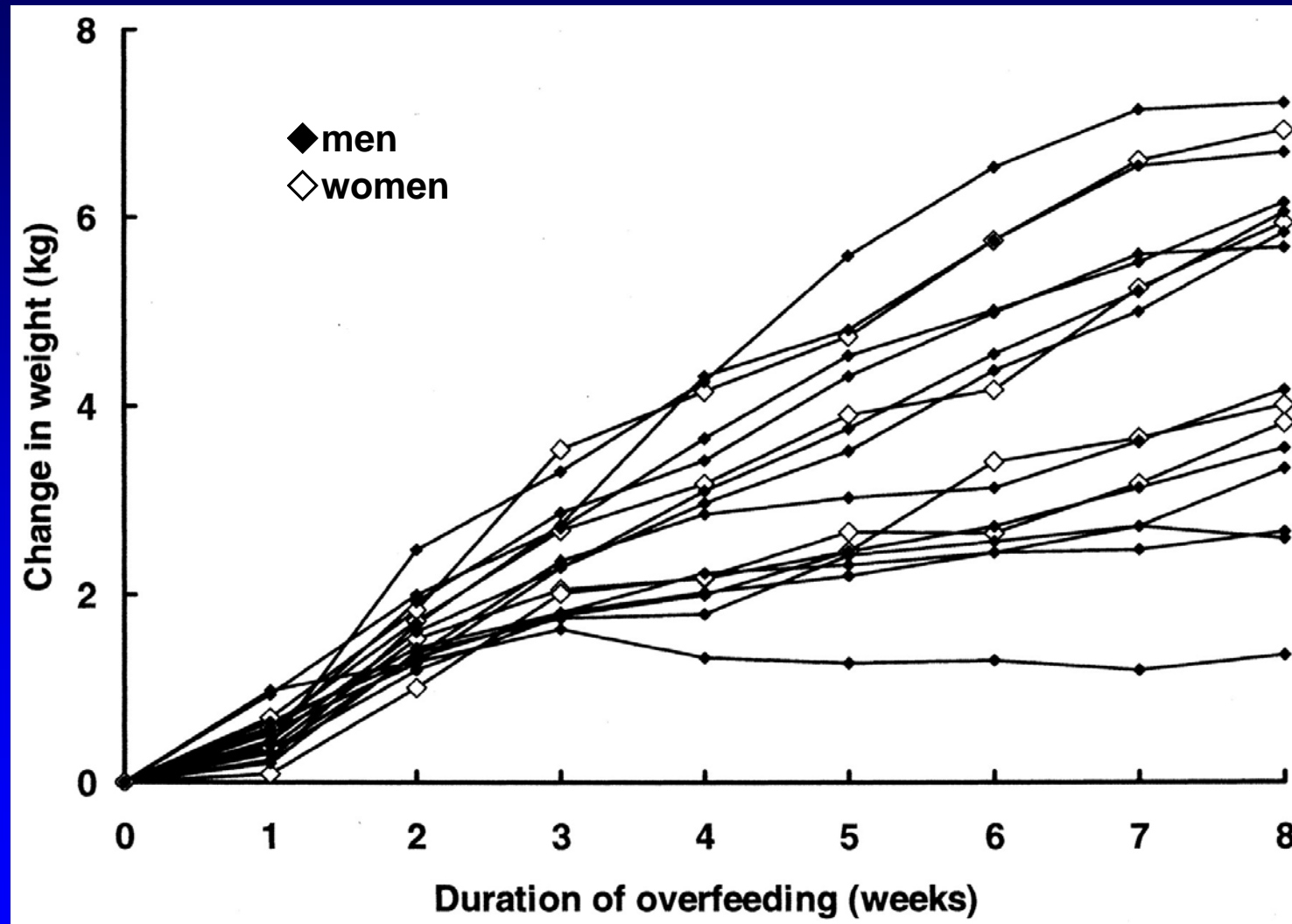
Weight-loss maintainers must maintain a caloric intake of less than half that of the per-capita daily intake or RDA – indefinitely?

Can we “teach” people to be thin?

How Important are Genetic Factors in the Development of Obesity?

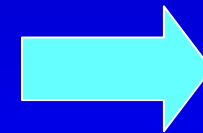
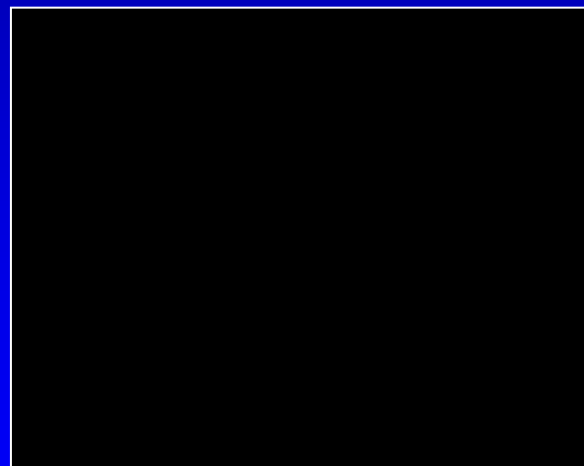
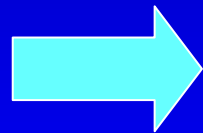


Variability in Weight Gain Response to Overfeeding (+1000 KCal/day) in Healthy Sedentary Volunteers



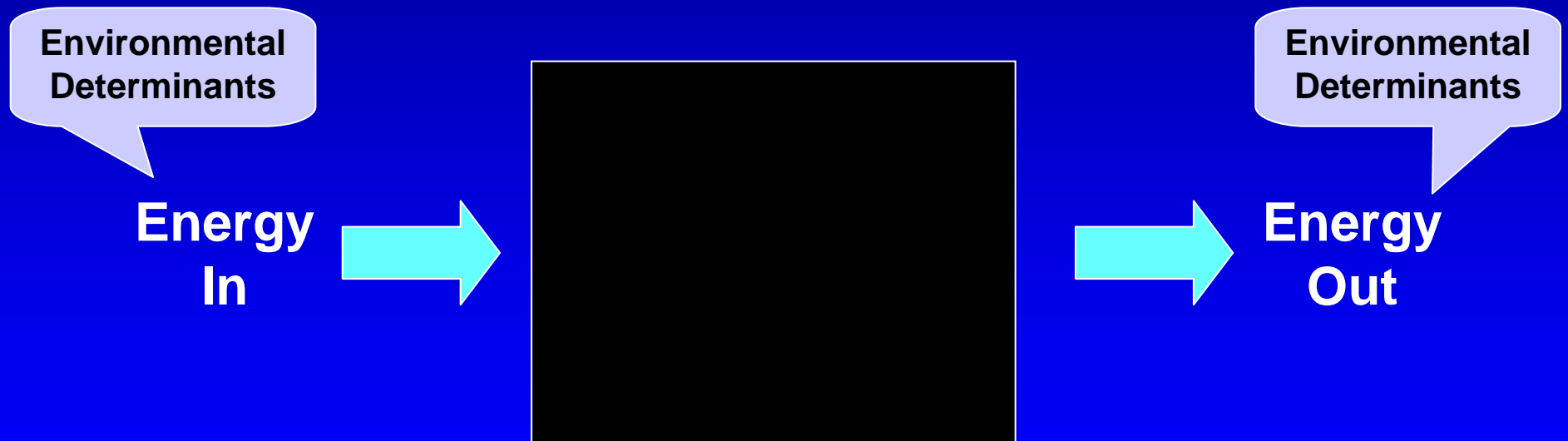
Isn't Obesity Simple?

Energy
In



Energy
Out

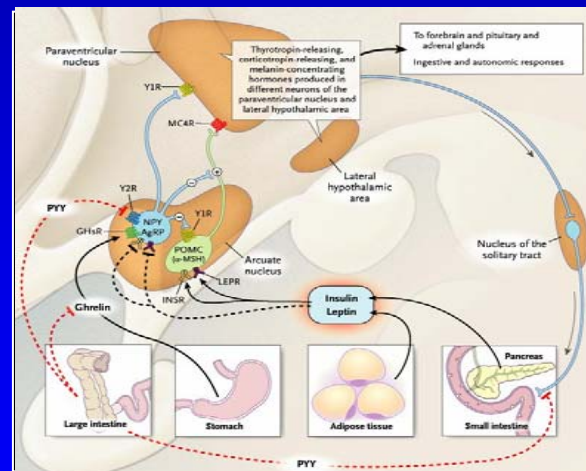
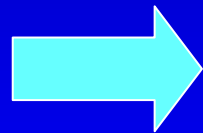
Isn't Obesity Simple?



Isn't Obesity Simple?

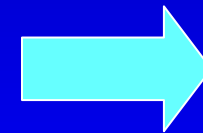
Environmental
Determinants

Energy
In

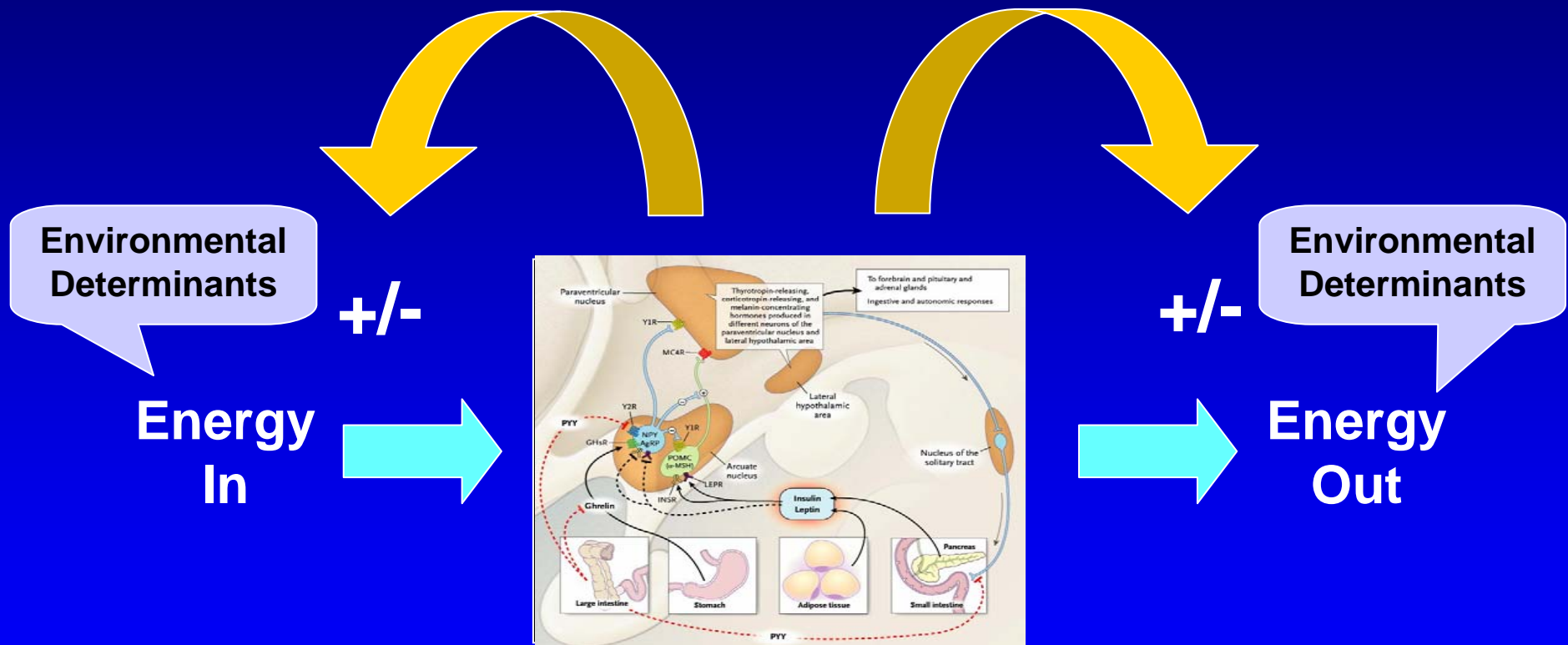


Environmental
Determinants

Energy
Out

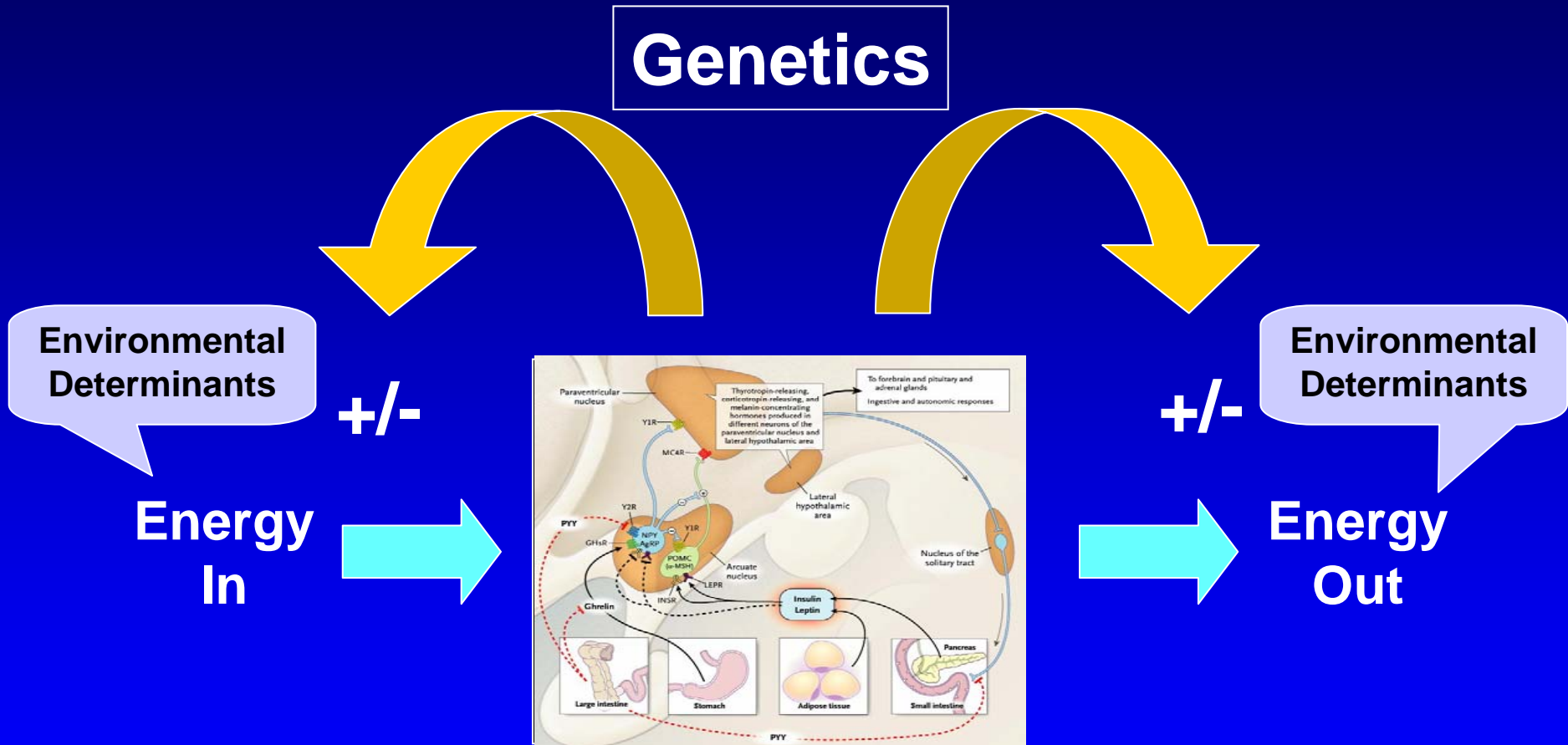


Isn't Obesity Simple?



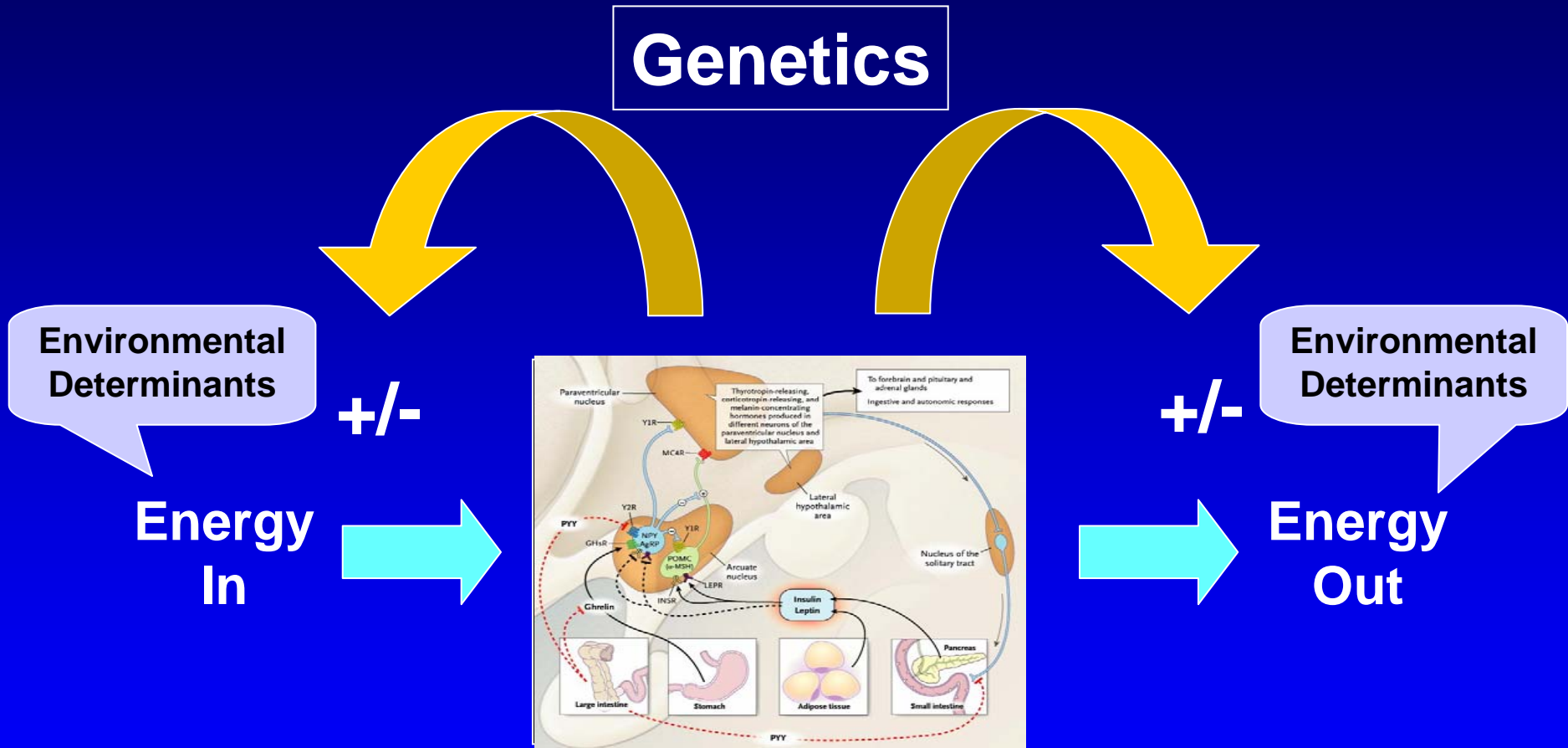
Isn't Obesity Simple?

Genetics



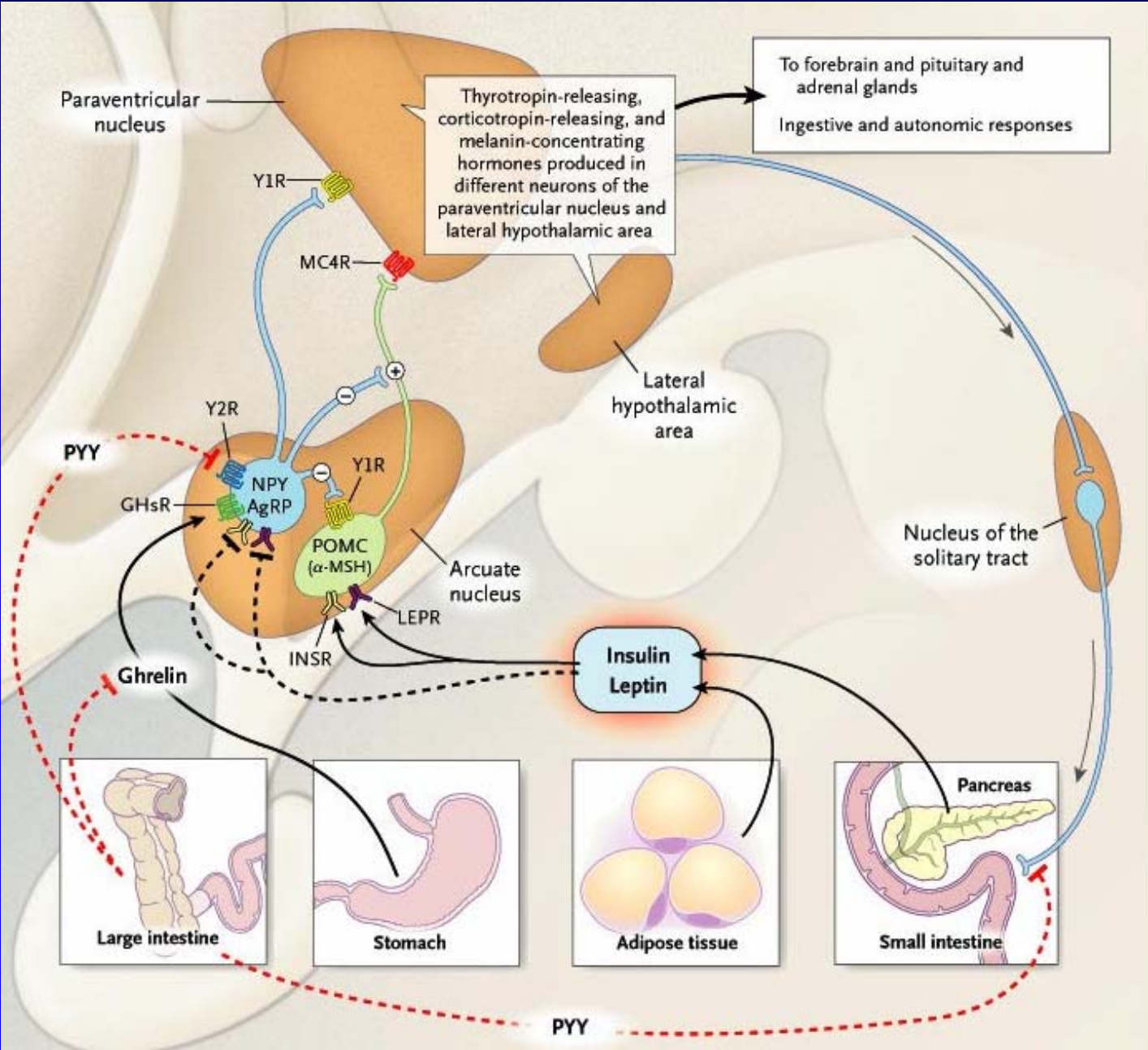
Isn't Obesity Simple?

Genetics



Energy Regulation is Complex!

Central Control of Energy Metabolism



Energy Balance is Tightly Regulated

- ◆ Average annual caloric intake
= 1 Mill KCal
- ◆ Average annual weight gain
= 1 – 2 lbs
= 3,500 to 7,000 KCal
- ◆ This equals an **0.35 to 0.7%** deviation in annual energy expenditure
or
a **10 to 20** KCal deviation in daily energy expenditure!

Some Basic Assumptions

- ◆ **Healthy active living is important at any weight**

Some Basic Assumptions

- ◆ **Healthy active living is important at any weight**
- ◆ **Maintenance of healthy eucaloric diets and physical activity are essential to prevent weight gain**

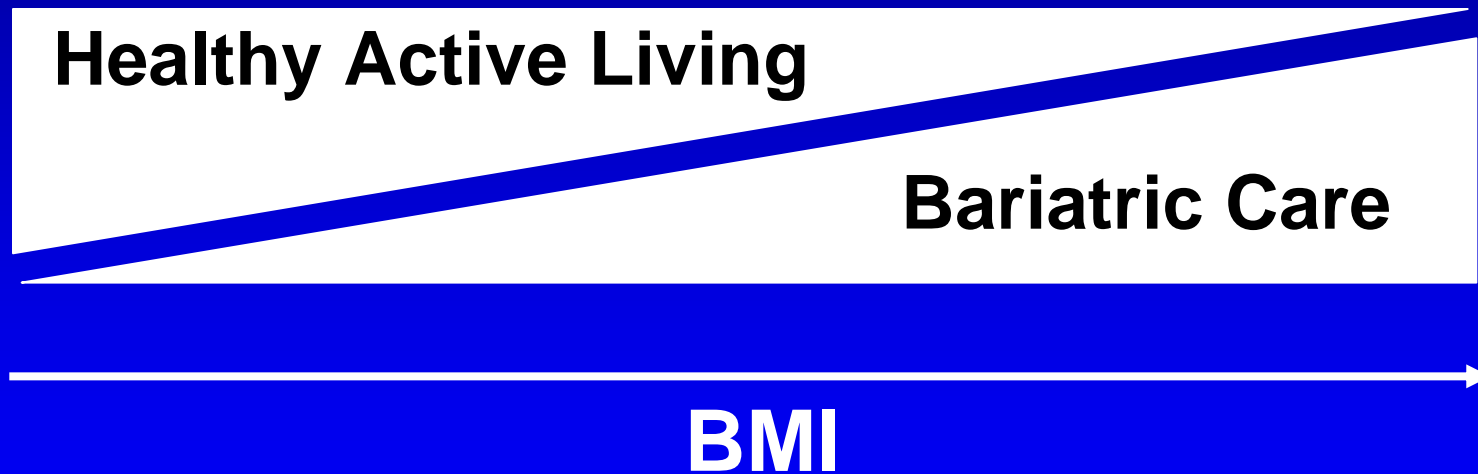
Some Basic Assumptions

- ◆ **Healthy active living is important at any weight**
- ◆ **Maintenance of healthy eucaloric diets and physical activity are essential to prevent weight gain**
- ◆ **Once established, obesity is a chronic disease and requires long-term management and treatment**

Some Basic Assumptions

- ◆ **Healthy active living is important at any weight**
- ◆ **Maintenance of healthy eucaloric diets and physical activity are essential to prevent weight gain**
- ◆ **Once established, obesity is a chronic disease and requires long-term management and treatment**
- ◆ **Weight alone is a poor indicator of body fat or related health risks**

Weight Wise Program



**“In today’s environment,
obesity treatment consists of
the systematic search for
compromise“**

Angelo Tremblay,
Laval, QB
2006

"No health system is yet meeting the challenges of managing obesity, and no society has developed an effective strategy to prevent it"

The Lancet,
May 13, 2006

OBESITY+

www.obesityplus.org

OBESITY+ Online Best Evidence Service In Tackling Obesity+

Home Search Alerts My Account Tools Logout Help

In this section:

- Home Page
- About This Site

You are on: Home -> Home Page

Welcome to Online Best Evidence Service In Tackling obesityY+(OBESITY+), a collaborative project of the Canadian Obesity Network/Réseau canadien en obésité and McMaster University's Health Information Research Unit.

OBESITY+ provides access to the current best evidence about the causes, course, diagnosis, prevention, treatment, and economics of obesity and its related metabolic and mechanical complications.

The best evidence relevant for clinical practice in the fields of medicine, nursing, dietetics, and rehabilitation is identified from over 130 premier clinical journals with a focus on or strength in obesity. All citations are pre-rated for quality by research staff, then rated for clinical relevance and interest by at least 3 members of a worldwide panel of practising health professionals with an interest in obesity.

Here's what we offer:

- A [searchable database](#) of the best evidence from the health care literature
- An [email alerting system](#)

Resources

- Canadian Obesity Network
- [bmjupdates+](#)
- CON Links listing
- MedlinePlus
- EBM Tools

Links

- Feedback
- Email the Canadian Obesity Network

Hit Parade: The most often read articles in the past 30 days

- [Effects of a life skills intervention for increasing physical activity in adolescent girls.](#)
Arch Pediatr Adolesc Med. 2006 Dec;160(12):1255-61. (Original)
- [Bone mineral density response to caloric restriction-induced weight loss or exercise-induced weight loss: A randomized controlled trial.](#)
Arch Intern Med. 2006 Dec 11-25;166(22):2502-10. (Original)
- [Sex differences in the relationships between BMI, WHR and incidence of cardiovascular disease: a population-based cohort study.](#)
Int J Obes (Lond). 2006 Dec;30(12):1775-81. Epub 2006 Apr 11. (Original)
- [Height and body mass index and risk of lymphohematopoietic malignancies in two million Norwegian men and women.](#)

OBESITY+

www.obesityplus.org



Ratings and Discussions

OBESITY+ Online Best Evidence Service In Tackling Obesity+

Home | **Search** | Alerts | My Account | Tools | Logout | Help

In this section:

- Quick Search
- Advanced Search



Resources

- Canadian Obesity Network
- [bmjupdates+](#)

You are on: Search -> Quick Search

Quick Search

Search Term(s):

Order By Most Recent Order By Best Match

Article #1 of 62 articles.

Villareal DT, et al. *Bone mineral density response to caloric restriction-induced weight loss or exercise-induced weight loss: A randomized controlled trial.* Arch Intern Med. 2006 Dec 11-25;166(22):2502-10.

Read the Abstract...

RATERS	<u>RELEVANCE</u>	<u>NEWSWORTHINESS</u>	COMMENTS
Nurse	■■■■■□ 6/7	■■■■■□□ 5/7	
Physician	■■■■■□□ 5/7	■■■■□□□ 4/7	<input type="button" value="View"/>

[View discussion on this article](#)

OBESITY+

www.obesityplus.org

e-Mail Alerting Service

Dear Arya Sharma

New articles. Your clinical colleagues have found these new articles to be of interest:

Title (click for details)	Discipline	R-score*	N-score*
<u>Youth: a health plan-based lifestyle intervention increases bone mineral density in adolescent girls.</u>	Physician	5/7	6/7

* R-score: relevance to your clinical discipline; N-score: how new is this information?

Best wishes from OBESITY+

Note: if you are unable to access your alert by clicking on the article link, please login directly to OBESITY+ at <http://plus.mcmaster.ca/Obesity/> and access the article under 'Alerts' which is listed in the top panel. If you continue to experience difficulties, please contact obesity@mcmaster.ca for further assistance.

Google: Weight Wise

Weight Wise Medical Director's Blog:

<http://ch-weightwisemd.blogspot.com/>

www.obesitynetwork.ca

www.obesityplus.org