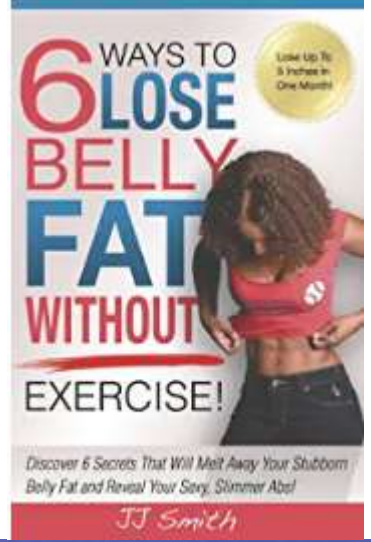
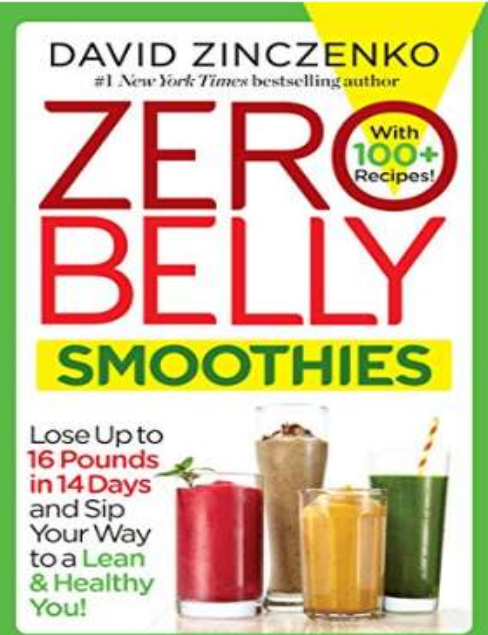
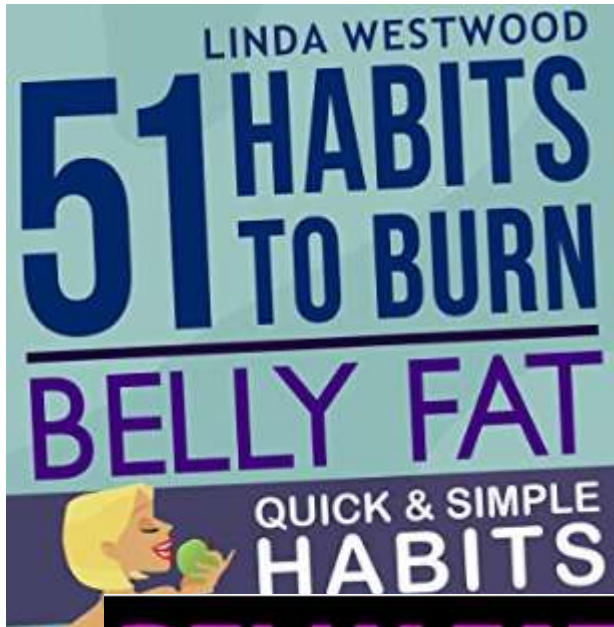
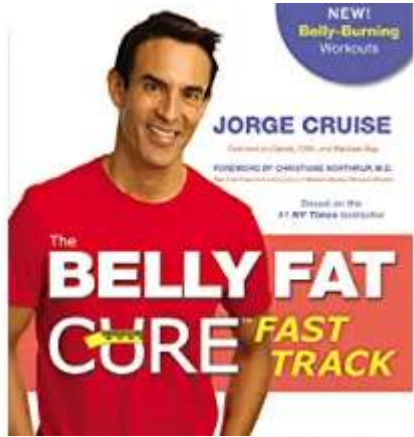


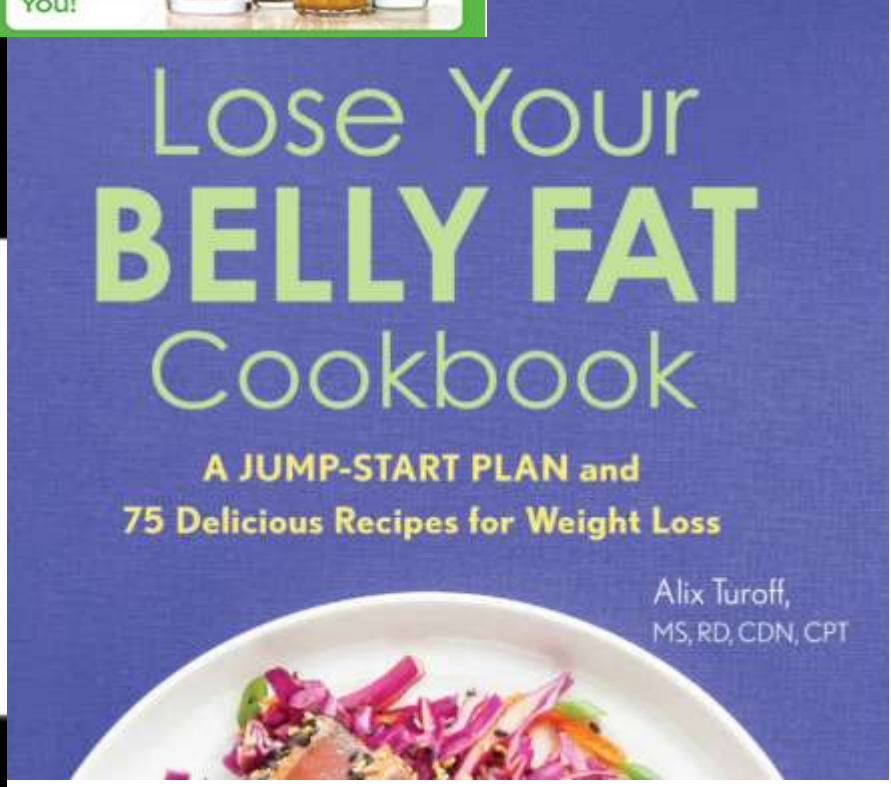
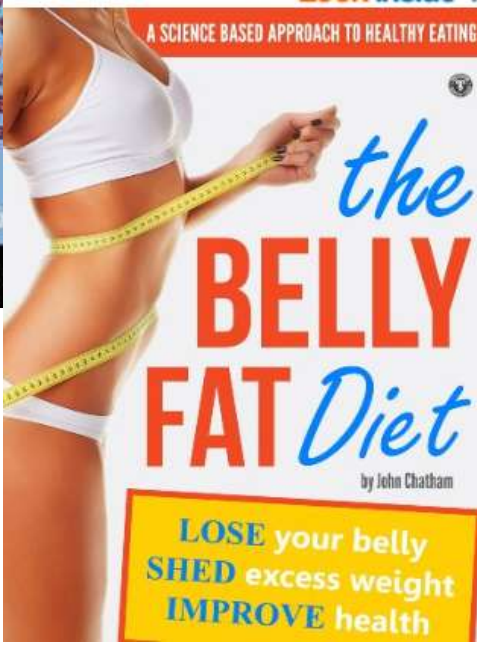
# Banishing Belly Fat

Academy for Lifelong Learning  
Spring 2020  
Patricia Read-Hunter, EdM, PhD

# Over 1,000 results in Kindle Store : "lose belly fat"



- Stop Fat Storage
- Detoxify Your Body
- Balance Your Blood Sugar
- Kick Carbohydrates
- Lose Weight Effortlessly
- Make Sense of Portion Control
- Shift to a Plant-Based Diet
- Restore Your Health
- Reverse Disease



# Why this focus on belly fat (BF)?

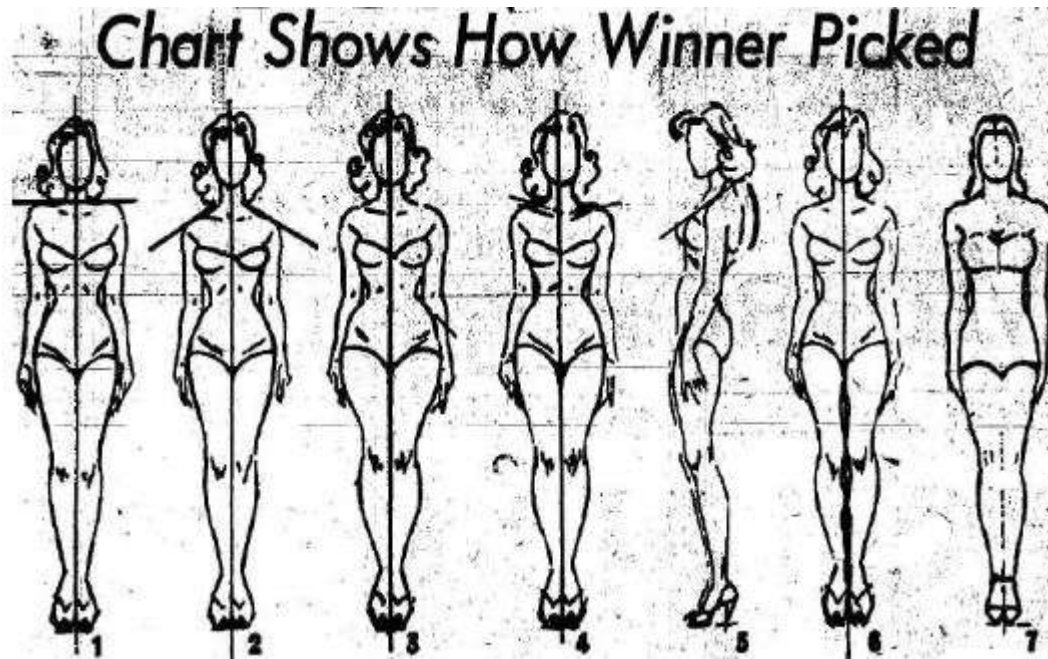
- BF and beauty (both female and male)
- BF and clothes
- BF as an index of health
- BF and frailty syndrome

# BF and Definition of Beauty

- Slim waist has defined “beauty” for the last 100 years – 13” Victorian waists, “six packs”
- Standards today are more realistic, but satisfaction with our body image has an obvious relationship with BMI & BF

WEIGHT		lbs	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290
		kgs	41	45	50	54	59	64	68	73	77	82	86	91	95	100	104	109	113	118	122	127	132
HEIGHT	ft/in	cm	Underweight				Healthy				Overweight				Obese				Extremely Obese				
	4'8"	142.2	20	22	25	27	29	31	34	36	38	41	43	45	47	49	52	54	56	58	61	63	65
4'9"	144.7	19	22	24	26	28	30	32	35	37	39	41	43	45	48	50	52	54	56	58	61	63	65
4'10"	147.3	19	21	23	25	27	29	31	33	36	38	40	42	44	46	48	50	52	54	56	58	61	63
4'11"	149.8	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	61
4'12"	152.4	18	20	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
5'1"	154.9	17	19	21	23	25	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58
5'2"	157.4	16	18	20	22	24	26	27	29	31	33	35	37	38	40	42	44	46	48	50	52	54	56
5'3"	160.0	16	18	19	21	23	25	27	28	30	32	34	35	37	39	41	43	45	47	49	51	53	55
5'4"	162.5	15	17	19	21	22	24	26	27	29	31	33	34	36	38	39	41	43	45	47	49	51	53
5'5"	165.1	15	17	18	20	22	23	25	27	28	30	32	33	35	37	38	40	42	44	46	48	50	52
5'6"	167.6	15	16	18	19	21	23	24	26	27	29	31	32	34	36	37	39	41	43	45	47	49	51
5'7"	170.1	14	16	17	19	20	22	24	25	27	28	30	31	33	34	36	38	39	41	43	45	47	49
5'8"	172.7	14	15	17	18	20	21	23	24	26	27	29	30	32	33	35	37	38	40	42	44	46	48
5'9"	175.2	13	15	16	18	19	21	22	24	25	27	28	30	31	33	34	35	37	38	40	42	44	46
5'10"	177.8	13	14	16	17	19	20	22	23	24	26	27	29	30	32	33	34	36	37	39	41	43	45
5'11"	180.3	13	14	15	17	18	20	21	22	24	25	27	28	29	31	32	33	35	36	38	39	41	43
5'12"	182.8	12	14	15	16	18	19	20	22	23	24	26	27	28	30	31	33	34	35	37	38	39	41
6'1"	185.4	12	13	15	16	17	18	20	21	22	24	25	26	28	29	30	32	33	34	36	37	38	39
6'2"	187.9	12	13	14	15	17	18	19	21	22	23	24	26	27	28	30	31	32	33	35	36	37	38
6'3"	190.5	11	13	14	15	16	18	19	20	21	23	24	25	26	28	29	30	31	33	34	35	36	37
6'4"	193.0	11	12	13	15	16	17	18	19	21	22	23	24	26	27	28	29	30	32	33	34	35	36
6'5"	195.5	11	12	13	14	15	17	18	19	20	21	23	24	25	26	27	28	30	31	32	33	34	35
6'6"	198.1	10	12	13	14	15	16	17	18	20	21	22	23	24	25	27	28	29	30	31	32	33	34
6'7"	200.6	10	11	12	14	15	16	17	18	19	20	21	23	24	25	26	27	28	29	30	32	33	34
6'8"	203.2	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	29	30	31	32	33
6'9"	205.7	10	11	12	13	14	15	16	17	18	19	20	21	23	24	25	26	27	28	29	30	31	32
6'10"	208.2	9	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
6'11"	210.8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	25	26	27	28	29	30	31

# BF as Social Index of Female Beauty



Above: Beauty pageant standards reflect a very specific fat distribution

- Desirable waist:hip ratio is 0.7 or lower (vs. the .85 that's the upper end of "healthy")
- Fewer than 10% of women show this desired hourglass figure

# BF and Clothes

- Most manufacturers have not reflected the increasing waist:hip ratio in *proportioning* clothes, especially clothes produced overseas
- BF affects our satisfaction with clothes\*
- Excess BF may force us to buy Alfred Dunner rather than Ann Taylor, affecting our public image

\*Fan, J., Yu, W., & Hunter, L. (2004). *Clothing appearance and fit: Science and technology*. Boca Raton, FL: CRC Press LLC

# BF as an Index of Health

- When doctors talk about BF, they're talking about “central obesity” (can coexist with a normal BMI)
- Waist hip ratio (WHR) is used as a crude measure of this: pear shape less dangerous than apple shape\*
- Women's maximum waist – 35” (some say 37”) with  $WHR \leq 0.85$
- Men's maximum waist – 40” with  $WHR \leq 0.9$

\*Sahakyan KR, Somers VK, Rodriguez-Escudero JP, et al. Normal-Weight Central Obesity: Implications for Total and Cardiovascular Mortality. *Ann Intern Med.* 2015;163:827–835.

# Risk and BF

- If you added up all the %age risk reductions associated with specific weight distributions or eating certain foods, you'd be immortal
- Likewise, if you summed up all the added mortality risks of fat and processed food, you'd find you were one of the “walking dead”
- Medical studies often have methodological issues that undermine their conclusions
- Reportage of medical studies is almost always misleading



# Belly Fat and Frailty Syndrome

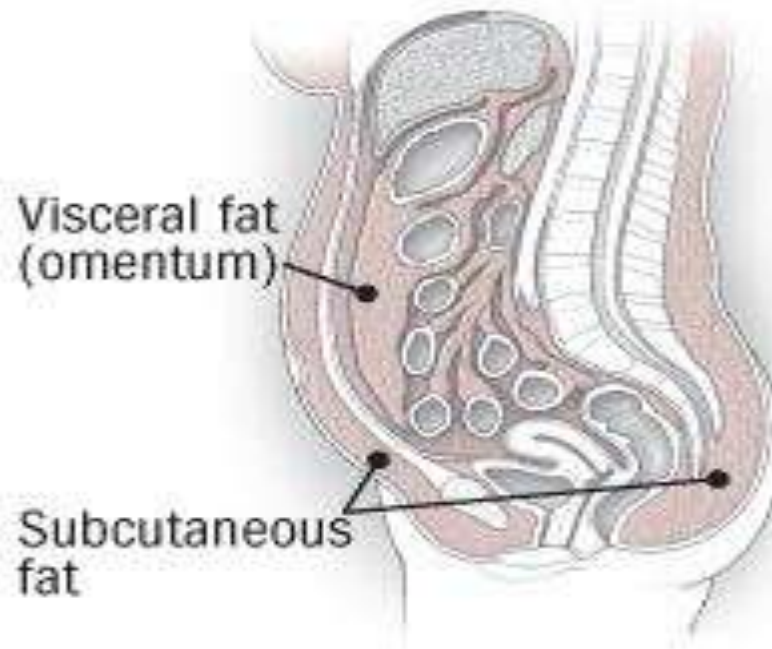
- As lifespan increased, the “frailty syndrome” emerged
- BF (& obesity in general) leads to frailty by reducing your ability/inclination to be physically active and increasing metabolic instability
- Symptoms include
  - unintentional weight loss (10 or more pounds in the past year)
  - muscle loss, muscle weakness
  - fatigue
  - slow walking speed
  - low levels of physical activity

For all these reasons, we'd love to banish belly fat – is it safe to do so?

- There are different types of fat with different functions
  - Essential fat
  - Triglycerides (saturated, monounsaturated and polyunsaturated fatty acids)
  - Subcutaneous fat
  - Visceral fat
- Yet we also talk about white, brown, & beige fat
- Which one is “belly fat”?

# Fat Terminology Is Confusing

- Most of us think of BF as the subcutaneous fat around the midriff, just under the skin
- Some of us also realize that there is fat *inside the abdomen* (visceral fat)
- Visceral fat is primarily what physicians identify (and vilify) as belly fat because it's implicated in
  - Heart disease
  - Type 2 diabetes
  - High blood pressure
  - Abnormal cholesterol
  - Breathing problems



It's best to think of BF as both -  
SF and VF.

So, getting back to my question, is it  
safe to selectively target belly fat?

# Before I answer that – think about the general functions of fat

- Protects you
  - Keeps your organs in place, cushions joints and muscles
  - Small, white filters located among the omentum fat cells [milky spots] collect antigens, cells, and bacteria and then respond immunologically
- Insulates you
- Stockpiles energy and vitamins
- Allows neurological function
- Balances blood sugar
- **Secretes hormones that drive metabolism**

# Fat is an Endocrine Organ

- Fat cells are biologically active, although different types of fat behave differently: SF is the “goodie” and BF is the “baddie,” relatively speaking
- Fat produces a wide range of hormones, including
  - leptin, adiponectin, and resistin
  - cytokines
  - estrogen
- Fat cells are “faithful friends”: They shrink but stay with us

# You say I have different types of fat???

There are two ways we talk about fat:

- White, brown, beige
- Essential, circulating, subcutaneous, and visceral

Brown and beige fat burn fatty acids and have desirable anti-obesity effects; white fat has both helpful and harmful features

# Essential Fat

- Supports key functions like cognition, blood cell production, hormone production
- Found in the brain, bone marrow, and nerve sheathes
- The American Council on Exercise tells us that women's body composition needs to be at least 10-13% essential fat for good health; men require at least 2-5%



# Circulating Fat

- Circulating fat is mostly triglycerides
- Energy store
- Risk factor for cardiac function

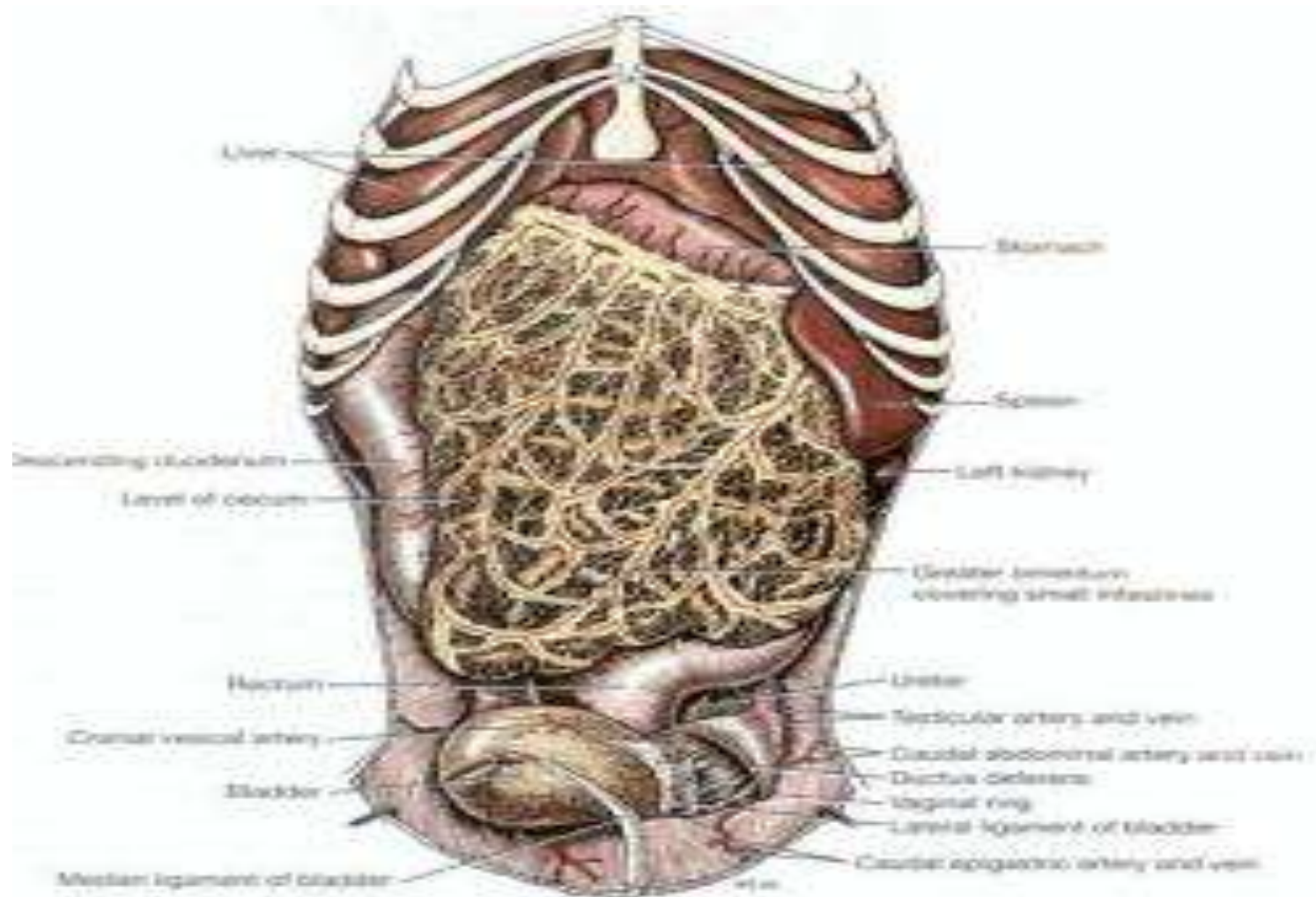
# Subcutaneous Fat

- A high % of what you identify as “belly fat” is likely to be subcutaneous (SF) – soft and jiggly
- SF, as the name tells you, is the largely white fat that lies under the skin, separate from the muscle layer
- SF has *some* beneficial products
  - Leptin, which suppresses appetite and burns stored fat
  - Adiponectin, which helps protect against diabetes and has an anti-inflammatory effect on the linings of blood vessels

# Visceral Fat Cells

- Typically, visceral fat (VF) is only 10% of body fat – but it makes more damaging substances:
  - Retinol-binding protein 4 (RBP4) increases insulin resistance (→leads to fat deposition)
  - Cytokines cause low-level inflammation, a risk factor for many chronic conditions
  - Fatty acids that lead to higher LDL cholesterol, triglycerides, blood glucose, and blood pressure
- VF is under the abdominal wall, packed around your liver, intestines, etc., and in the omentum, the sheet of tissue that supports the intestines

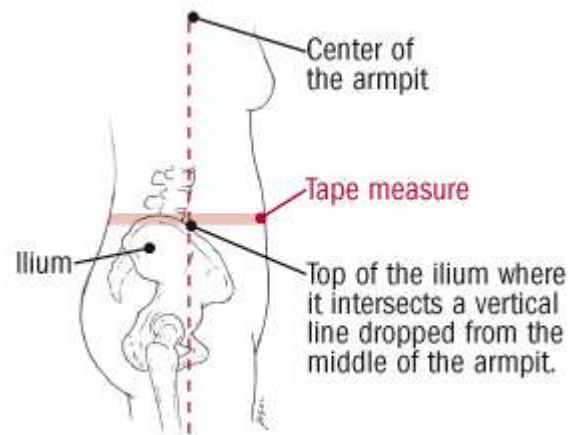
# The Omentum



See Meza-Perez, S., & Randall, T. D. (2017). Immunological functions of the omentum. *Trends in Immunology*. DOI:<https://doi.org/10.1016/j.it.2017.03.002>

# How to Estimate Your VF

- Measure your waistline at your navel —
- not at the narrowest part of your torso
- Women: waist  $> 35''$  indicates too much VF
- Men: waist  $> 40''$  indicates too much VF
- Waist size should be  $\leq 0.5 \times$  your height



# More Precise Measures of VF

- BIA: Many high-end bathroom scales perform bioelectrical impedance analysis, giving a rough % of VF
- MRI scans or body fat analyzers measure visceral fat more accurately and report results on a scale 1-59, with <13 being a healthy result
- Other methods: DEXA, hydrostatic weighing, plethysmography, bioimpedance spectroscopy, electrical impedance myography, 3-D body scanners, multi-compartment models

# What governs VF?

- For everyone: genes, hormones, age, birth weight (smaller babies more readily add belly fat later in life), lifestyle
- For women,
  - Bearing children (women who have given birth tend to develop more visceral fat than women who haven't)
  - Entering menopause (lower estrogen levels increase the proportional influence of testosterone which shifts you toward the male pattern)

# Rats, isn't there any *good* news?

- Belly fat of both types responds to diet and exercise (defined as 30 minutes of activity daily)
- Because it's more readily metabolized into fatty acids, VF responds more efficiently to diet and exercise than SF
- The underlying muscle plate (rectus abdominus) “tones” better than many others



# What can you do? Dietary and exercise approaches:

- Lose weight (also reduces inflammation) – a loss of even 3-5% is helpful; a loss of 10% has huge benefits
- Move around more – every activity has exercise value, however leisurely
- Try formal exercise – any combination of aerobic, resistance, and flexibility training – 30 minutes daily
- Lower your stress levels

# Surgical Approaches

## 1. Bariatric surgery

Alteration of stomach size

Alteration of GI tract arrangement

## 2. Liposuction

## 3. Aspiration

# Pros and Cons of Surgical Approaches

- Cost, preparation, and risks
- High failure rate
- Requirement for lifestyle change
- Lipo and subsequent tummy tuck
- “Medical bulimia” - too new to assess

# What *doesn't* work:

- Electrical stimulation of the muscles
- Vibration platforms
- Food enhancers
- Plant-based drugs – garcinia, cinnamon, ephedra, green coffee extract, etc.
- Human growth hormone
- Waist trimmers, rubber garments

# Dietary Approaches to BF

1. **Cut out sugar**, particularly in the form of sweetened drinks or juices
2. Eat high-protein, unprocessed food when possible: highly processed food upends hormonal regulatory systems (soluble fiber)
3. Frequent meals or snacks should be avoided; intermittent fasting is effective (seek approval from your medical advisor)
4. Monotony works (through sensory satiety)

# The General Exercise Approach

Exercise reduces inflammation, lowers blood sugar, and improves metabolic abnormalities associated with BF

- Train your **core** muscles, rather than standard crunches that target separate muscles
  - Pilates - deep-body conditioning & rehabilitation
  - Stability ball
- Isometrics and body weight exercises enable you to work exercise into the busiest of lives

# The Muscle Groups to Target

- Transversus abdominis (stabilises your body and maintains internal abdominal pressure)
- Rectus abdominis (aka 'the six pack')
- Obliques (on each side of the rectus abdominis, allow you to twist)
- The transversus abdominis and obliques form part of the **core muscles** that allow everything else to work

# Appendices



# Recap: Obesity Guidelines

Organization	Measurement used	Definition of abdominal obesity
American Heart Association, National Heart, Lung and Blood Institute (10)	Waist circumference	Women: > 88 cm (35 inches), Men: > 102 cm (40 inches)
International Diabetes Federation (11)	Waist circumference	Women: > 80 cm (31.5 inches), Men: > 90 cm (35.5 inches) Different cut-points for different ethnic groups
World Health Organization (12)	Waist-to-hip ratio	Women: > 0.85, Men: > 0.9

# Why are women's clothing sizes meaningless?

- 1958: National Bureau of Standards (now the National Institute of Standards and Technology, NIST) developed scale of sizes 8-38, derived from bust measurement—with all other measurements based on the hourglass figure
- 1995, 2008, 2011: ASTM revises sizing, using NIST framework, but reflecting vanity sizing (e.g., 2008, size 2; 2011, size 00)
- Textile Clothing Technology Corporation study distinguished multiple body shapes
- ***Sizing is primarily a brand characteristic***

# Follow-up Information

How much protein do you need?

Woman, sedentary – 46 gms or 1.6 oz

Male, sedentary – 56 gms or 2 oz

Remember, this is minimum.

Taking 25-30% of your caloric intake as protein will regulate your weight (via protein's thermic effect and the satiating quality of protein).

Vegetarians and vegans need to pay attention to get enough bioavailable protein.

# Selected References

Fan, J., Yu, W., & Hunter, L. (2004). *Clothing appearance and fit: Science and technology*. Boca Raton, FL: CRC Press LLC

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