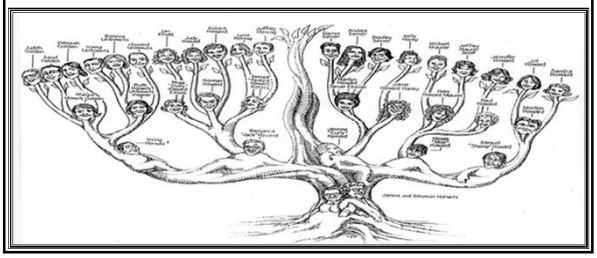
METABOLIC FACTORS TO CONSIDER?

- Genetics
- Hormones
- Age & LBM
- Menopause
- Temperature
- Circumference
- Caloric Reduction

"Don't weigh your self-esteem."

GENETIC INFLUENCE

- Genetic variations influence energy metabolism!
- 0 obese parents; ~ 20% chance.
- 1 obese parent; ~ 40% chance of obesity.
- 2 obese parents; ~ 80% chance of obesity.



SIMS STUDY

- Studies indicate that genes explain ~ 50% of weight ↑.
- 12 pair of identical twins in controlled conditions were overfed 1,000K a day 6 days a week for 100 days. Excess consumption was 84,000K. **(24)**

Ethan AH Sims, Twins Overeat, New Eng J Med 322 (May 1990)

SIMS STUDY FINDINGS

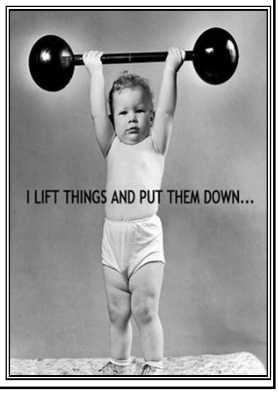
- **Identical** weight gain of identical twins when overfed.
- Some sets gained 8.21 kg (18) & others 13.3 kg.(29)
- Genetics govern energy as fat or LMT via expenditure.

METABOLISM & BODY TYPE

- **Endormorph:** Rounder, pear shaped with a **higher fat** to muscle percent.
- **Mesomorph:** Strong bone, rectangular frame, & **high muscle** to fat ratio.
- **Ectomorph:** Thin, linear body shape, narrow waist. **Highest metabolism.**

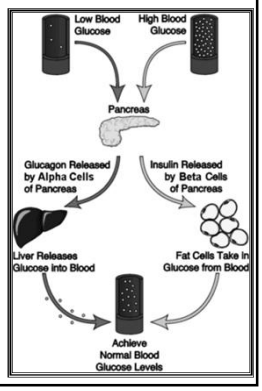
FAT CELL METABOLIC VARIABLES

- Average ~ 25 billion fat cells; overweight have ~ 65 billion.
- Body adds at **3** crucial times: last trimester, 1st year of life & puberty. **(4th time?)**
- Where is the fat stored?



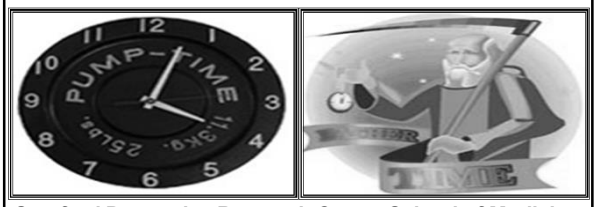
ALPHA & BETA RECEPTORS

- Beta receptors ↑ fat usage.
- Alpha receptors often block it.
- Alpha cells release glucagon.
- **Resistant** to give up fat!
- Alpha's are in large volume in femoral fat stores in females.



AGE & FATHER TIME

- Stanford Nutrition Studies shows an **average** weight gain of 25 lbs between the ages of 35 - 60.
- Findings: ~ 99.8% of all K's ingested were utilized.
- **~ 0.2%** of all the K's consumed were not utilized.



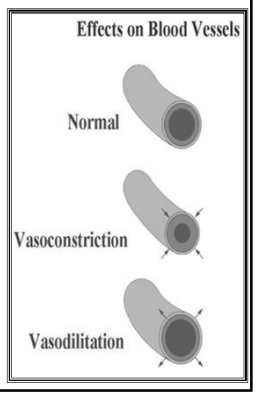
Stanford Preventive Research Center School of Medicine

LEAN MUSCLE TISSUE LOSS

- Age 45 - 65 LMT loss ~ 30%.
- A lb of LMT uses 35 - 50 K's per day!
- A loss of a ½ lb LMT equals weight gain of 3 lbs a year.
- **MAYBE** 25 lbs in 10 years.
- 50 lbs in 20 years.

SURFACE AREA & TEMPERATURE

- It requires more K's to maintain a larger area.
- Taller individuals have more skin & more vascular area.
- Maintaining core temperature is a metabolic function.
- K's burn with vasodilatation (sweat) in heat & constriction (shiver) in the cold.



CALORIC REDUCTION

- Lowering K's beyond your needs starts survival mechanisms **decreasing** metabolic rate ~ 20%!

Eating patterns and meal frequency of elite athletes. International J Sport Nutrition Exercise Metabolism. 2003 Dec; 13(4):521-38.

↓ CALORIE INTAKE ↓ METABOLISM

- KIS The body uses LMT as fuel. WHY?
- Not enough K's to provide energy for metabolism!

- **Nutrient Deficiency**
- Low K's ↓ vitamin B12, electrolyte & iron absorption.

- **Organ & Bone Damage**
- Long term, low K can ↑ osteopenia/osteoporosis.
- Long term, low K can damage the kidneys & heart.

LOW CALORIE INTAKE

- **Lowers** metabolic rate!
- Studies show an ↑ in fat storage with K restriction!
- The lowest K intake had the highest body fat!

Eating patterns and meal frequency of elite athletes. ***International J Sport Nutrition Exercise Metabolism. 2003 Dec; 13(4):521-38.***

WOMEN BEWARE!

- Often females (athletes too) tend to restrict calories!
- Low ks alters reproduction & contributes to B.A.D.

Bone Loss, Amenorrhea & Disordered Eating.

MORE K'S = WEIGHT!

HORMONE METABOLISM

- **Growth Hormone:** High intensity, high volume, low rest training magnifies release. (TUT)

1. ↑ GH mobilize fatty acid, spares glucose.
2. Eat ASAP after training = ↑ pulses!

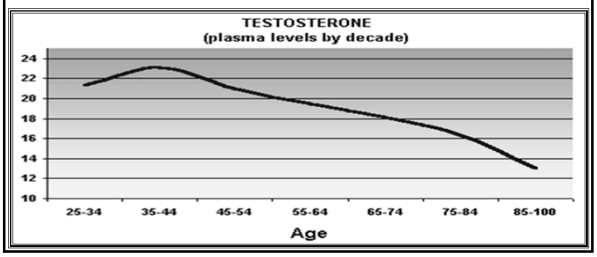
	EXERCISE	INTESITY	GH SECRETION
1.	Running	High	266% ↑
2.	Spinning	High	114% ↑
3.	Weight Training	70% 1RM	300% ↑
4.	Weight Training	85% 1RM	400% ↑

GH release during resistance exercise. Sports Med. 2002; 32(15):987-1004.

HORMONE METABOLISM

- **Testosterone:** High intensity, high volume training **raises** levels, ↑ protein synthesis.

1. Programming (giant sets, super sets, etc)
2. Adequate calories & protein.(30-35+) & rest!

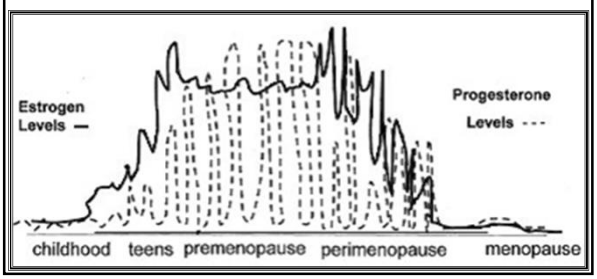


ESTROGENS

- 3 naturally occurring.
- **Estriol** (E3) Primary estrogen during pregnancy.
- **Estradiol** (E2) Primary estrogen when not pregnant.
- **Estrone** (E1) Primary estrogen post reproductive age.

ESTROGEN & PROGESTERONE

- Estrogen & progesterone live a life of highs & lows!
- When balance is lost, your body acts in unpredictable **and** undesirable ways!



HORMONE HEALTH

- Estrogen(3), progesterone, ↓ test & ↑ GH.
- Two **HUGE** times when estrogen ↑ fat storage.
- Estrogen ↑ fat storage in breasts, hips, thighs & butt!

ESTROGEN & THYROID LEVELS

- Estrogen ↑ fat storage during puberty & pregnancy.
- Other hormones ↑ fat storage.
- Glucagon - secreted by the pancreas.
- Epinephrine - secreted by the adrenal gland.
- Norepinephrine - secreted by nerve endings.
- Fluctuating hormones can alter thyroid function!
- **T3 & T4 levels determine proper thyroid function.**
- **T3 → 2-4mcg/dl** **T4 → 4-12mcg/dl**

TRIODO-THYRONINE & THYROXINE

- AA tyrosine based hormones.
- **Iodine required** to produce T3 & T4.
- T3 & T4 helps control CHO, fat & protein metabolism!

FUNCTIONS OF IODINE

- Helps regulate cortisol!
- ↑ quantity in breast tissue.

- Low levels ↑ the risk of breast cancer.
- Unborn baby gets vitamins & minerals first.
- After children, iodine reserves can be **depleted.**
- Sacrifice your own well being! Motherhood is tough!

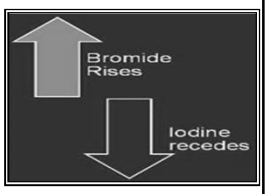
SOURCES & HOW MUCH

- Dulce, Kelp, Hiziki, Arame, Kombu & Wakame.
- Dairy, potatoes, strawberries, cranberries & veggies.
- **RDA:** 150 mcg/day, pregnant 220, breastfeeding 290.

Stadel BV. Dietary iodine and risk of breast cancer. Lancet. 1976 24;1(7965):890-1

BROMIDE ↓ ABSORPTION

- In tons of stuff.



- Bread products!
  UK & Canada banned.
- Citrus drinks, plastics, toothpaste & mouth wash.

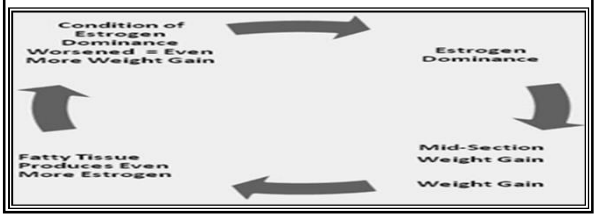
Velicky, Bromide & the thyroid gland Immunochemistry 1997.

ESTROGEN & CORTISOL

- Estrogen & cortisol (stress hormone) levels fluctuate.
- Response to fluctuation **Cravings!** CHO and fats!
- Another culprit serotonin. Pleasure factory.
- If cortisol is ↑ & serotonin ↓, usually crave sweets.
- If cortisol is ↓ & serotonin ↑, usually crave salty or fat.

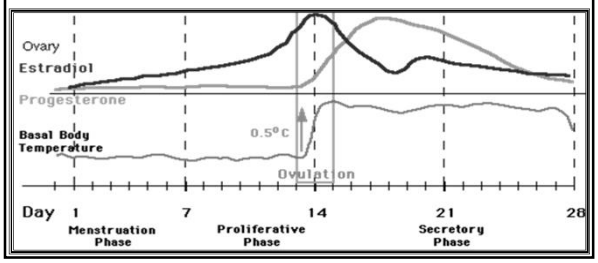
ESTROGEN & INSULIN

- The body constantly strives for homeostasis.
- **Big Problem…**Insulin is a fat storing hormone.
- ↑ estrogen provokes the pancreas to ↑ insulin.
- One reason of weight ↑ w/estrogen dominance.



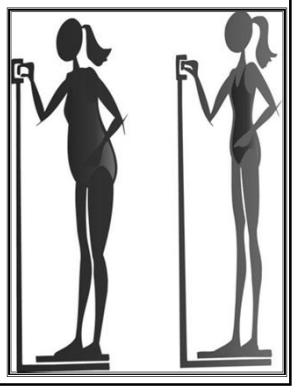
PROGESTERONE

- Progesterone peaks following ovulation causing an **increase** in body temperature & metabolic rate.
- **High estrogen** is a component of fluid retention!



METABOLISM & MENOPAUSE

- Post ovulation a women's metabolic rate **increases** ~ 300 K's per day.
- At menopause this loss could ↑ weight ~ 5 lbs yr!
- Adjustment required in expenditure & intake.
- **Avoid the transition!**



B.E.S.T. TRAINING METHODS

- Incorporate **moderate intensity** cardiovascular using 70-80% of maximum heart rate on apparatus.
- Regulate **not** fluctuate with long cardio. (Catabolic)
- **a)** Over-training **b)** 90/90 rule **c)** Adrenal gland
- High load training provides superior BMD than low.

METABOLIC COMPONENTS

- ~ 10 reps @ 60 70% of a 1RM was **more effective** than 15 20 reps @ 20 40% of a 1RM.
- The formula increases balance, strength, BMD, metabolism & stability to large muscles.
- ↑ resistance & ↓ reps provide **more** BMD! Presses, raises & rows ↑ upper body strength.

METABOLIC COMPONENTS

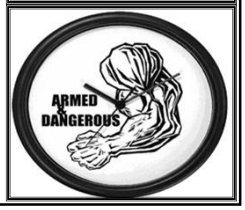
- Exercises done standing were used to provide additional weight bearing forces. **(recruitment)**
- Core training exercises were added with T.U.T.
- **Stretching** was incorporated to reduce stiffness. Confusion principle applied every 6 □8 weeks.

STRENGTH TRAINING METABOLISM

- Higher intensity strength training uses lots of K□s & **increases** fat oxidation, LMT & metabolic rate.

TOTAL WORKOUT TIME

- **~** 60 minutes:
- Cortisol levels begin to **rise!**
- ↑ muscle catabolism.
- ↓ in MPS.
- Testosterone & GH levels ↓.
- **Note to self:** Stop texting & lift!



POST EXERCISE METABOLISM

- **Excess Post Oxygen Consumption.**
- Number of calories burned post exercise.
- During exercise, large amounts of oxygen is used.
- Post exercise, the body **continues** to expend energy.

POST EXERCISE METABOLISM

- Evidence shows that resistance training produces **greater** EPOC responses than aerobic exercise.
- **Findings:** ↑ intensity weight training ↑ metabolic rate.
- ↑ energy used post training to re-oxygenate the blood.

- Bahr, R. & Sejersted, O. M. Effect of intensity of EPOC. Metabolism, 40, (8), 836-41.

CARDIO & STRENGTH METABOLISM

- Conditioned females use ~ 5 - 6 K□s p/m via aerobics.
- Conditioned females use ~ 7 - 8 K□s p/m wgt training.

REST & RECOVERY

- ~ 3 days off per body part.
- ~ 60□90 seconds between sets.
- Type 2 fibers (anaerobic) **need** rest.
- Glutamine ↑ recovery. Essential AA ↓ MPB.

NUTRIENT METABOLISM

- **CARBS:** ~ 10 k□s per 100 k□s are used in digestion.
- **PROTEIN:** ~ 25 k□s per 100 k□s are used in digestion.
- **FAT:** ~ 2 calories per 100 are used in digestion ↓ TEF.

CALORIC COMPOSITION

- **CARBS:** ~ 4 grams per kg/bw daily.
- **PROTEIN:** ~ 1.2-1.7g per kg/bw daily with a ↑ BV. Excessive protein can affect calcium absorption.
- **FAT:** ~ 20% from monounsaturated & Omega 3□s to **maintain** healthy triglyceride levels.
- Carbs prior to **and** within 2 hours after training allows insulin to regulate catabolic hormones.

OMEGA'S

- **Research:** ↑ CHO metabolism, ↓ BP & triglycerides.
- Cold water fish, algae, eggs & green leafy veggies.
- **SOME OILS & SEEDS:** Hemp, Flax, Grape Seed, Pumpkin, Soy, Canola & Walnut. Omega 9 = Olive Oil.

POST- WORKOUT METABOLISM

Within 30 minutes:

- Drink a liquid protein with CHO.
- Whey protein is fast digesting & starts the rebuilding process.
- **Eat a meal within 2 hours!**
- ~ 2:1 CHO to protein ratio to replenish glycogen stores.
- ~ .8g of CHO per kg/bw, & .4g of pro per kg/bw for hyperplasia.
- 30 □35k□s per kg/bw to support aerobic & an-aerobic activity.

WAY BETTER THAN WHEY?

- Sprouted whole grain brown rice or pea protein.
- 100% Organic enzymes, 98.2% BV, 23 AA□s.
- Non-GM, hypoallergenic & gluten free.