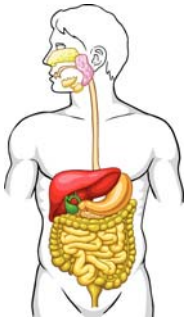
HORMONES, THE GUT AND THE MICROBIOME

DIGESTIVE HEALTH. WHY SO IMPORTANT?



THE MICROBIOME

- A Unique Vital ORGAN!
- 3 pounds of weight (1.5kg) same as brain
- Metabolic activity RIVALS that of LIVER
- Colonized at birth
- CNS – doesn't mature Normally without the right Microbiota

WHAT BACTERIA DO

- Harvest energy from FOOD INDIGESTIBLE COMPONENTS
- Make Vitamins AKE VITAMINS
- KEEP GUT CLEAN
- EAT UP EGGS AND LARVAE
- 75% OF THE IMMUNE SYSTEM
- REGULATE BLOOD PRESSURE
- "IT TAKES GUTS TO GROW A BRAIN"
- OUR GUT HAS BRAIN CELLS TOO AND CAN GROW NEW BRAIN CELLS.

MICROBES MANIPULATE US VIA CNS

- Affect HOW WE EAT **Eating Behavior, Dietary Choices?**
- Affect WHAT WE CHOOSE TO EAT **Craving?** SEROTONIN
- Release signaling molecules into the gut — linked to the endocrine and nervous system. **2nd Brain.**

DO NOT PASSIVELY LIVE OFF OF WHAT WE FEED THEM. THEY WANT US TO TAKE IN WHAT **THEY GROW BEST ON. (Pathogens or commensal?)**

MICROBES MANIPULATED BY:

- DIET
- MEDICATIONS (antibiotics, steroids and then drug associated conditions like diarrhea)
- STRESS
- AGE
- GENETICS – Our genes are always "talking" to them.
- HORMONES
- NEUROTRANSMITTERS.
- IMMUNE FACTORS colostrum, HMOs, Lactoferrin,

WE DESTROY THEM WITH FOOD AND DRINK

- HIGH FAT DIET – too many "good fats" — refined and industrialized
- SUGAR AND HFCS
- WHEAT
- NEW-TO-NATURE FOODS
  - Food additives and preservatives, pesticidesGMOs
- GMOs – Healthy Gut Summit – Jeffrey Smith
- COFFEE
- ALCOHOL

WE DESTROY THEM WITH:

- Drugs
  - Birth Control Pill, Steroids and antibiotics
- Chlorine exposure,
- STRESS
- Lack of Sleep - cortisol

YOU HAVE CONTROL!

EVOLVING EVERY MINUTE

MEASURABLE CHANGES IN MICROBIOME WITHIN 24 HOURS.

MICROBES EASILY MANIPULATED BY
- PROBIOTICS, PREBIOTICS, PROBIOTIC FOODS
- SWITCHING ONE MICROBIOME FOR ANOTHER

EASILY MANIPULATED

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MICROBIOME ACQUIRED AT BIRTH

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GERM FREE ANIMALS DON'T SEXUALLY MATURE

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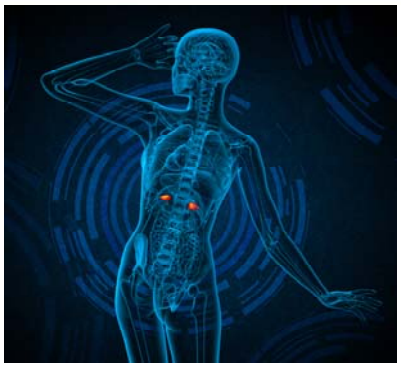
ADRENALS – VITAL FOR HORMONE PRODUCTION



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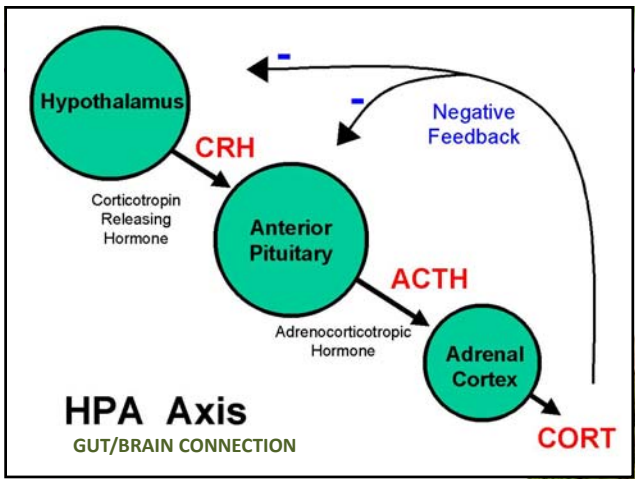
SYMPTOMS OF ADRENAL INSUFFICIENCY

- Fatigue
- Hormone Imbalances
- Mood swings and Depression
- Poor Sleep
- Loss of muscle tone
- Early aging

THE ADRENALS/GUT/HORMONE CONNECTION

PRODUCE
- SEX HORMONES
- ALDOSTERONE
- CORTISOL

ADRENAL INSUFFIENCY - Stage 4 Burnout – LOW DHEA and CORTISOL
- Neurotransmitters and T. are low also.



LPS LOWERS ADRENAL RESPONSE TO ACTH

- Cortisol needed to suppress inflammation - important part of immunity.
- Pathogenic bacteria produce toxin — LPS
- Cells in adrenal gland do not respond to ACTH so produces less cortisol.

LPS causes significant decrease in Cortisol

Another reason for ADRENAL "Fatigue", Hormone Imbalance.

CHRONIC ENDOTOXIN EXPOSURE CAUSES "ENDOTOXIN TOLERANCE"

- First exposure okay but then a tolerance to the endotoxin occurs with the **second exposure** or with **chronic exposure** to LPS from Gram Negative (PATHOGENIC) Bacteria
- CHRONIC LPS IN THE GUT WEAKENS THE ADRENAL'S RESPONSE TO ACTH
- Less cortisol to to control inflammation.

Endotoxin tolerance of adrenal gland: attenuation of corticosterone production in response to lipopolysaccharide and adrenocorticotropic hormone. Liu S1, Zhu X, Liu Y, Wang C, Wang S, Tang X, Ni X.

PITUITARY AND THYROID

- **LPS downregulates PITUITARY function AND**
- **Decreases TSH secretion**
- **Decreases secretion of T4 and T3 from cells**
- **Sharp drop in T4 but not in conversion of T4 to T3.**

[Regulation of thyroid and pituitary functions by lipopolysaccharide], Iaglova NV, Berezov TT, Biomed Khim. 2010 Mar-Apr;56(2):179-86.

Bio-Identical Hormones?

INTESTINAL MICROBES HAVE ENZYMES THAT DEGRADE HORMONES

THEIR ENZYMES DO THIS
THESE ENZYMES ARE NOT IN OUR TISSUES

ALL BACTERIA DO THIS:
Commensal and beneficial bacteria
Pathogenic bacteria,
Marine
Break down:

- Estrogen - Into their metabolites
- Corticosteroids (Cortisol, Aldosterone)
- Regulate Testosterone and the Release of Androgens

STUDY – SAYS DIVERSITY MATTERS

Breakdown
and Excretion of
Estrogen Urinary
Metabolites
Higher with….
More Diversity
of gut micobiome.

Associations of the fecal microbiome with urinary estrogens and estrogen metabolites in postmenopausal women.
Fuhrman BJ1, Feigelson HS, Flores R, Gail MH, Xu X, Ravel J, Goedert JJ.

TRILLIONS MORE and MORE DIVERSITY

Estrogen

ESTROGEN AND THE GUT

Strictly Related to Ovary Function

Gastrointestinal Disorders

- IBD,
- GERD, Gall Bladder Attacks
- Gall Stones,
- Nausea,
- Vomiting,
- Abdominal and pain, Distension,
- Satiety,
- Bloating, Diarrhea, Constipation….

FOLLICULAR STAGE CONTROLLED BY ESTROGEN

- Day 1 to Ovulation
- **Abdominal discomfort at the beginning** of Follicular phase - *right after period ends*.
- **Small intestine transit time** appears to be *faster in the Luteal phase* than in the follicular phase.
- **Gastric emptying** and **colonic transit time NOT significantly different** between Follicular Phase and Luteal Phase.

OVARIECTOMY REDUCES ABDOMINAL PAIN

THIS study clearly shows:

1) Abdominal pain related to ovaries

2) We must address sex hormones in helping to correct digestive problems

AND VICE VERSA

Ovarian function and gastrointestinal motor activity.Palomba S1, Di Cello A, Riccio E, Manguso F, La Sala GB. Minerva Endocrinol. 2011 Dec;36(4):295-310.

ADD MORE on Estrogen here

PROGESTERONE

CONSTIPATION

ESTROGEN DOMINANCE IN WOMEN DECREASES G.I. MOTILITY

AS PROGESTERONE ELEVATES DURING PREGNANCY

MICROGENDEROME

- NEW TERM - Difference between microbiome of men and women
- Microbial exposures in early life determine sex hormone levels.
- Transferring Gut microbiota from *adult males* to *immature females* resulted in elevated testosterone, metabolomic changes, reduced islet inflammation and autoantibody production.

MICROGENDEROME

Estrogen – Activates the Immune system

Progesterone Balances the Immune system

Testosterone - Depresses the Immune system

Males and male animals are more susceptible to pathogenic infections.

But are protected from Autoimmune Infections

.

TESTOSTERONE – PROVIDES ROBUST PROTECTION AGAINST AUTOIMMUNE CONDITIONS

- TESTOSTERONE PROVIDES ROBUST PROTECTION AGAINST T1 DIABETES
- Study:**Gut bugs help protect males from diabetes. [Nat Rev Immunol. 2013]PMID: 23328391 [PubMed - indexed for MEDLINE] Free full text**
- **MICROBES CONTRIBUTE TO 2/3^{rds} OF THE IMMUNE SYSTEM BUT HORMONES MATTER TOO.**

Gut Bugs Help Protect Males From T1D

- **Sex differences in the gut microbiome drive hormone-dependent regulation of Autoimmunity.** .Markle JG1, Frank DN, Mortin-Toth S, Robertson CE, Feazel LM, Rolle-Kampczyk U, von Bergen M, McCoy KD, Macpherson AJ, Danska JS.Author. [Science. 2013]Autoimmunity:

VITAMIN D – IS A HORMONE TOO

DEFICIENCY IN VITAMIN D=
GREATER RISK FOR GUT PROBLEMS:

- CROHN'S DISEASE
- COLITIS

- **Vitamin D deficiency increased the severity of colitis and the bacterial numbers in the colons of mice** [66] **With the increased burden of pathogens this can cause colon cancer and ulcers**
- **Vitamin D deficiency increased lung inflammation and bacterial numbers [65];**
- **Collectively, these studies suggest that vitamin D is instrumental in regulating the microbiome of the lungs and gut, and is entwined with the maintenance of immune tolerance.**

VITAMIN D LINKED TO COMPOSITION OF MICROBIOTA

Studies have linked vitamin D with specific changes to the composition of the bacterial flora in the gut microbiome.

PROBIOTICS ENHANCE EXPRESSION OF THE VITAMIN D RECEPTOR

Probiotics can regulate the responsiveness of immune cells to vitamin D by enhancing the expression of the vitamin D receptor (VDR) thus reducing tissue inflammation.

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Sulphoraphane in Fermented Foods Opens Up Vitamin D Receptor

THE GUT PRODUCES GUT HORMONES

- More than 50 identified- widely distributed through out the GI tract
- Gastrin, CCK, Ghrelin, Somatostatin, Secretin, bombesin, gastrin-releasing peptide (GRP)
- Control Digestion- (secretion, absorption and digestion, and gut motility.)
- Regulate growth of the GI mucosa.
- Pathogenesis can cause abnormal cell growth (cancer) and atrophy.

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GHRELIN – GUT HORMONE

- Brain receives satiety signals from the Gut.
- Ghrelin stimulates the release of growth hormone from the pituitary both *in vitro* and *in vivo*. (Shows another gut/brain connection)
- Plays an important role in the regulation of food intake, energy homeostasis, gastric emptying, and acid secretion.
- Ghrelin makes us hungry.

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GHRELIN - A Gut Hormone

- After a meal a whole slew of gut hormones (peptides) can be released.
- Ghrelin – says, "I'm HUNGRY!"
- Leptin – says, "STOP EATING. I'M FULL!
- STUDY: Commensal Bacteria and Prebiotics Tell Your Body "Don't Eat!"

Prebiotics increased gut peptide production and lowered hunger and glucose response after a meal. .

OLD SAYING: "DISEASE BEGINS IN THE GUT"
ENDOCRINE BALANCE & HEALTH DO TOO!

Importance of Fermented Foods

HORMONE BALANCING =
PROBIOTIC FOODS AND DRINKS

Body Ecology Is Very Focused on Healing the Gut

- Understanding of the Inner Ecosystem
- Use of Fermented Foods and Beverages
- Food Combining
- Preparation of Foods So They Can Be Digested
- Use of Digestive Enzymes
- 80/20 Rules Improve Digestion, too

Why Body Ecology and Fermented Foods Work!

- Control Toxic Pathogens in the Gut that produce the Endotoxin LPS
- Less Overall Toxicity in ALL Cells in Body
- Healthy Immune response
- Balanced hormones
- Ideal Weight - No obesity – a beneficial side effect
- Protection Against Autoimmune Conditions
- Feeling Happier
- More energy
- Positive Aging

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Thank You!

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BIOFILMS

SOME BACTERIA CAN EXPLOIT SEX HORMONES AND USE THEM TO THEIR OWN BENEFIT

- E.g. CANDIDA – USES ESTROGEN FOR GROWTH.

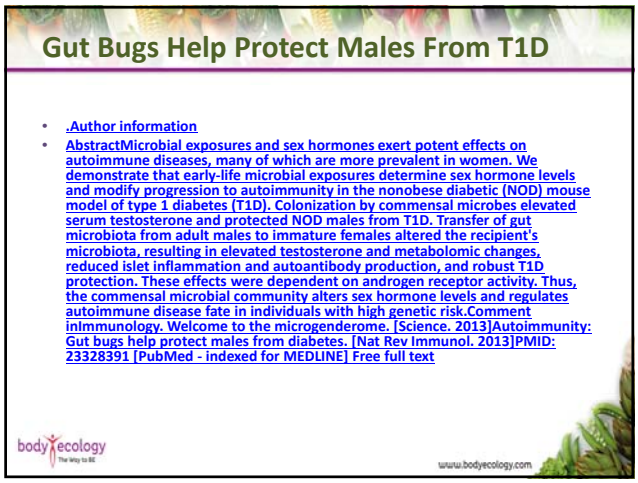
This has to potential to be BENEFICIAL

- Hormones (Birth Control pills and BHT) are found in city drinking water.
- We could use pathogenic bacteria to clean up our drinking water. But have to clear out the pathogen before drinking the water.

Gut Hormones

- https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0CAcQjRw&url=http%3A%2F%2Fquantumleapwellness.com%2Fblog.html%2Fnews%2Fbac-academy-part-ii-transcript%2F&ei=E-wuVZaLJ4mdygS16ICgCQ&bvm=bv.90790515,d.aWw&psig=AFQjCNHgQU9jJbp9rSwiwJb0nVUH_wWm7A&ust=1429224767968435

MICROBES "EDUCATE" THE IMMUNE SYSTEM.


Gut Bugs Help Protect Males From T1D
.Author information
AbstractMicrobial exposures and sex hormones exert potent effects on autoimmune diseases, many of which are more prevalent in women. We demonstrate that early-life microbial exposures determine sex hormone levels and modify progression to autoimmunity in the nonobese diabetic (NOD) mouse model of type 1 diabetes (T1D). Colonization by commensal microbes elevated serum testosterone and protected NOD males from T1D. Transfer of gut microbiota from adult males to immature females altered the recipient's microbiota, resulting in elevated testosterone and metabolomic changes, reduced islet inflammation and autoantibody production, and robust T1D protection. These effects were dependent on androgen receptor activity. Thus, the commensal microbial community alters sex hormone levels and regulates autoimmune disease fate in individuals with high genetic risk.Comment inImmunology. Welcome to the microgenderome. [Science. 2013]Autoimmunity: Gut bugs help protect males from diabetes. [Nat Rev Immunol. 2013]PMID: 23328391 [PubMed - indexed for MEDLINE] Free full text
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