

Intersection of Nutrition & Skin

Robyn Johnson MS, RDN, LD



- Registered Dietitian
- Private practice
- Founder Clear Skin Lab
- Founder Rayvi

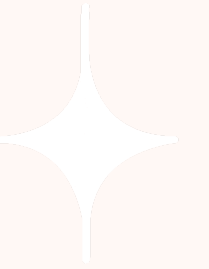


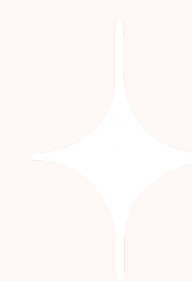
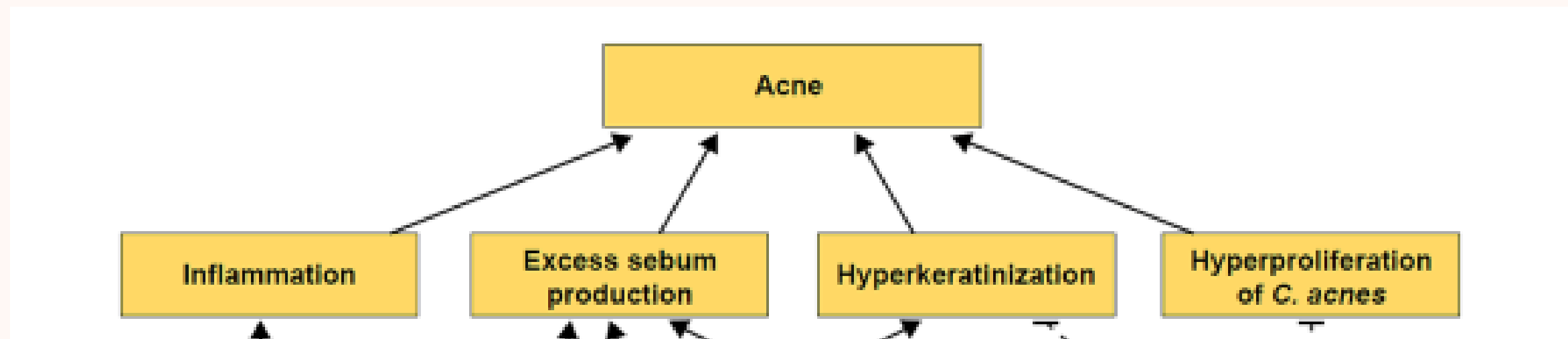
IT'S
PERSONAL

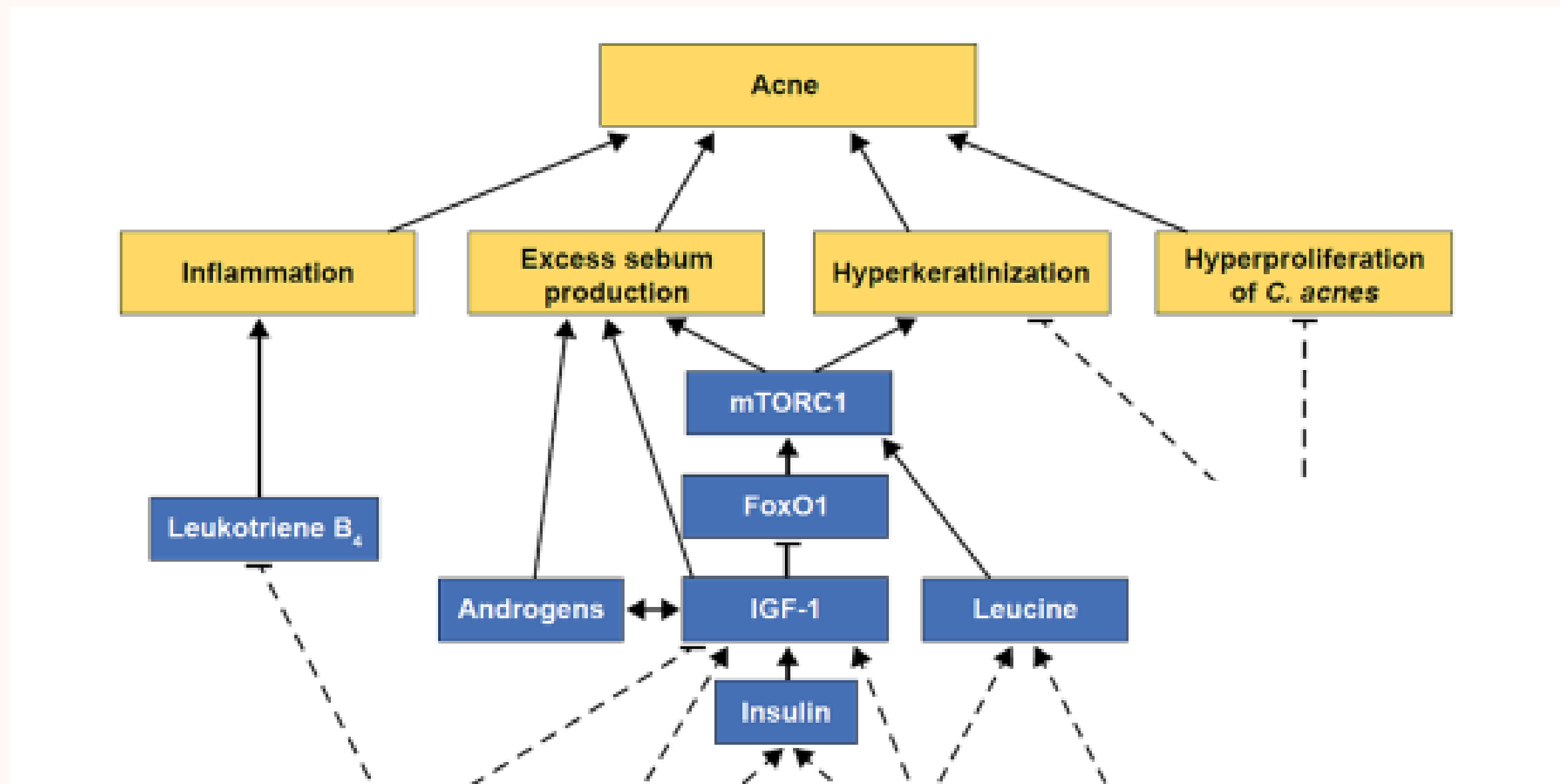
Intersection of Nutrition & Skin



Evidence Based Acne Root Causes







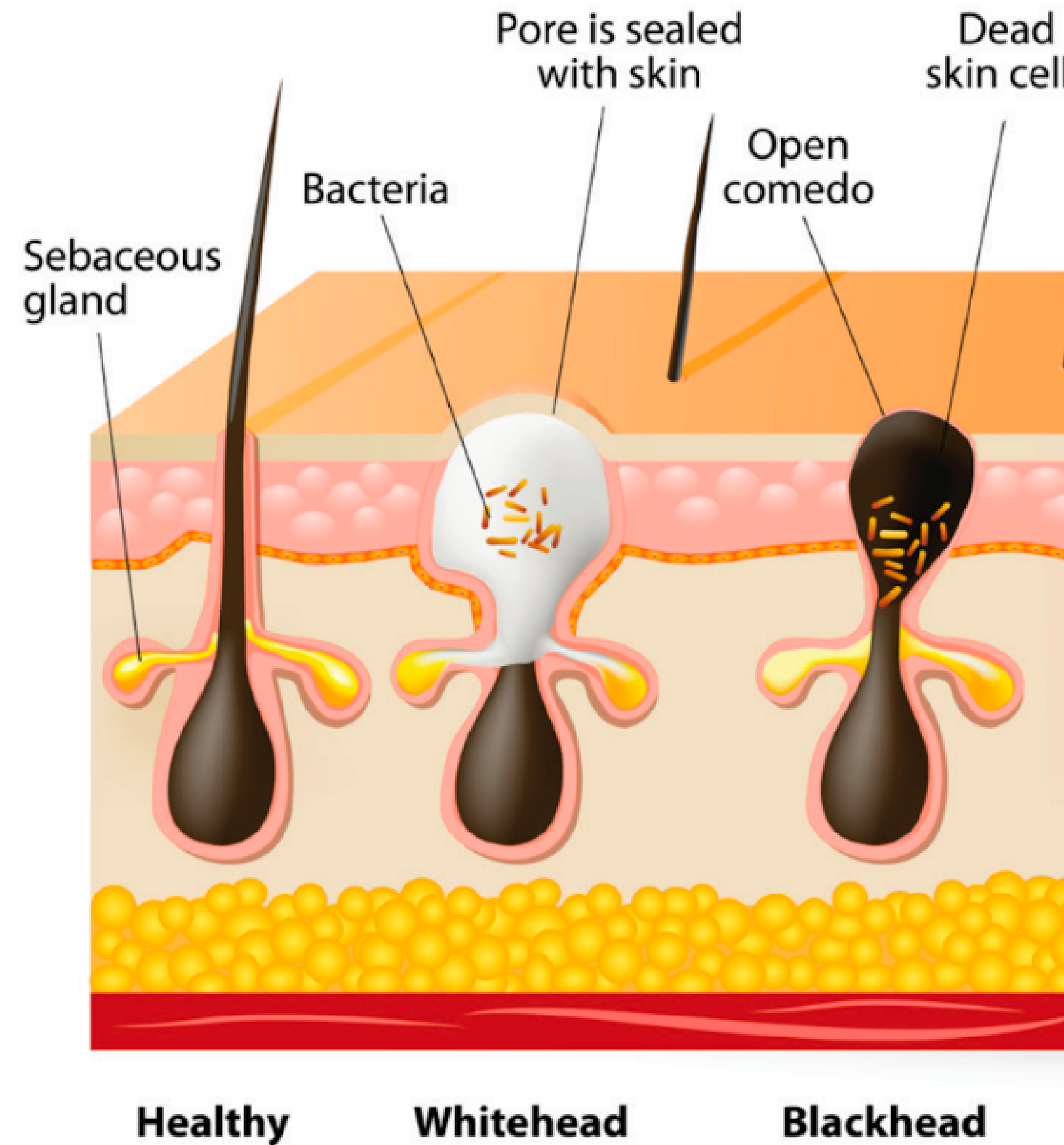
- Hormones
- Inflammation
- Microbiome

WHAT WE KNOW: HORMONES

- Elevated Androgens
- Insulin Resistance
- Low estrogen
- Low progesterone

ANDROGENS

- Stimulates sebum production



INSULIN

- Increases sebum production
- Can increase androgens

INSULIN RESISTANCE MEASURES IN ACNE PATIENTS VS. HEALTHY CONTROLS		
	ACNE PATIENTS	CLEAR SKIN
Fasting serum glucose (mg/dl)	88.9	84.3
Fasting serum insulin (μ U/mL)	10.6	5.5
120 min OGTT serum glucose (mg/dl)	86.5	85.4
120 min OGTT serum insulin (μ U /mL)	30.1	7.6
HOMA-IR	1.7	1.1
Serum IGF-1(nmol/L)	338.8	308
Free testosterone (pg/ml)	16.8	20
Total testosterone (ng/dl)	5.1	5.3
120min OGTT = 120 minute reading in the oral glucose tolerance test, HOMA-IR = measure of insulin resistance.		
Source: Del Prete M, et al. Insulin resistance and acne: a new risk factor for men? Endocrine. 2012 Mar 25. http://www.ncbi.nlm.nih.gov/pubmed/22447309		

LOW ESTROGEN & PROGESTERONE

- P: Inhibits 5- α reductase
- P: Blocks androgen receptors
- P: Reduces LH = reduced testosterone production
- E: Blocks the sebum boosting effect androgens have on the skin
- E: Reduces androgen production in the gonads
- E: Regulates genes involved in sebum production



Why are those
hormones responding
this way?

HOW BIRTH CONTROL SUPPRESSES ACNE

- Delivers potent doses of synthetic hormones
- Acne: Reduction of sebum production (due to progestin & estrogen)
- Acne: Lower testosterone (androgen)



HOW SPIRONOLACTONE SUPPRESSES ACNE

- Lower testosterone (androgen)
- Potassium sparing (also lowers androgens)
- Lowering androgens = lower sebum production



HOW ANTIBIOTICS SUPPRESSES ACNE

- anti-inflammatory effect
- antibacterial effect



HOW ISOTRETINOIN SUPPRESSES ACNE

- anti-inflammatory properties
- antibacterial properties
- permanently shrinks sebaceous glands/reduces oil



ELIZABETH



- Spironolactone
- Birth control
- Antibiotics
- Topicals

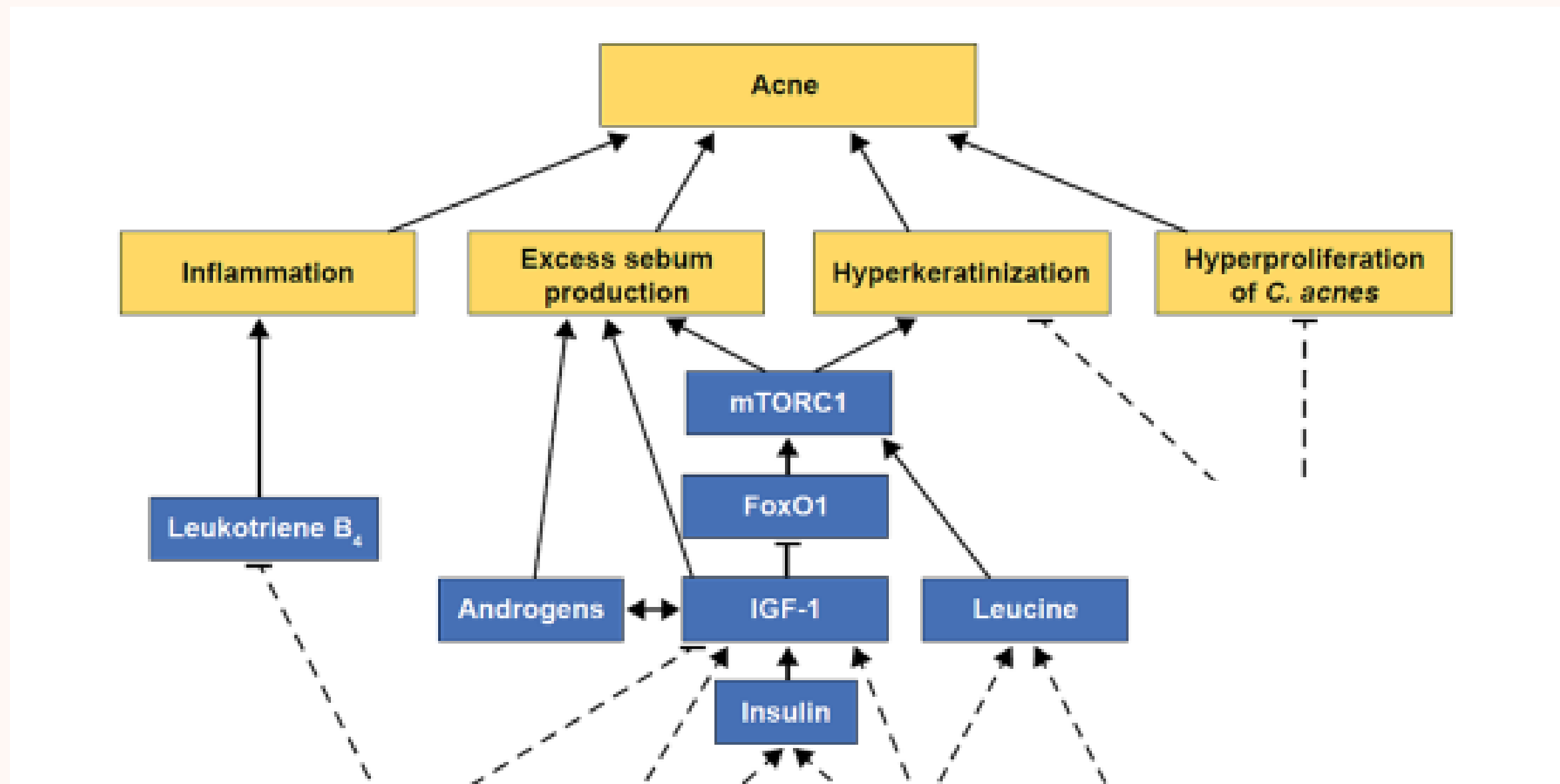
ELIZABETH



- Started looking at acne with a root cause lens
 - "changed her attitude about acne"
- Got through stress of grad school + moving
- Blood sugar balanced plate
- Daily mineral mocktails
- Began spore based probiotic
- Pre-biotic
- Beef liver
- Vitamin E
- Prioritized skin barrier support with topicals

ELIZABETH



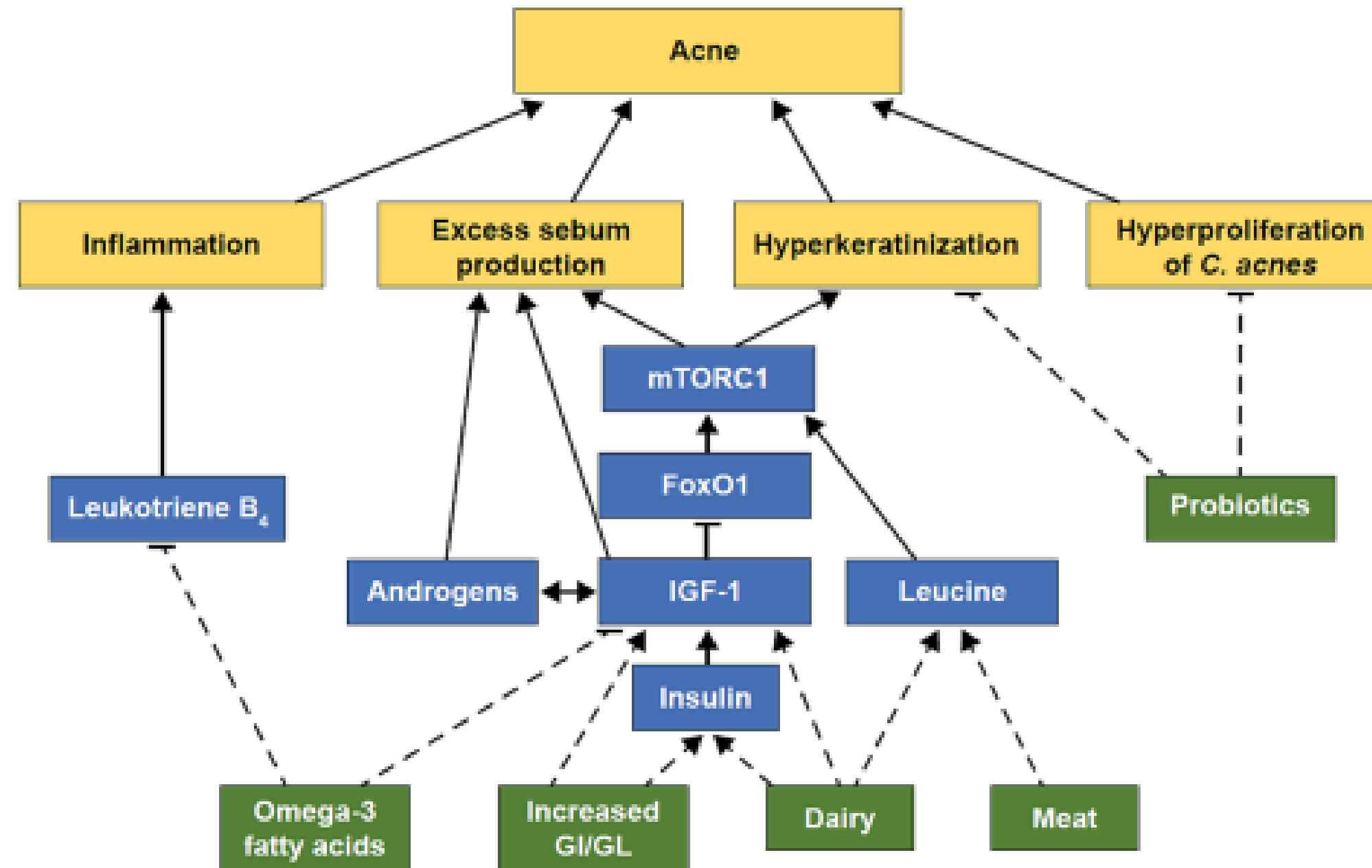


- Hormones
- Inflammation
- Microbiome

WHAT WE KNOW: INFLAMMATION

- mTOR
- Increased expression of T cells
- IGF1
- Increased number of macrophages
- various oxidative stress markers

where is the
inflammation coming
from?



- Hormones
- Inflammation
- Microbiome

FOODS & ACNE, A REVIEW

Table 1 Select diets and their association with acne

Diet	Role in acne pathophysiology	Acne findings	References
Low GL ± low GI	Reduces free androgens, increases IGFBP-3, and decreases IGF-1 levels	Evidence supportive of reduction in lesion quantity and severity of lesions	Smith et al. [39], Smith et al. [40], Burris et al. [41], Smith et al. [42], Çerman et al. [45], Burris et al. [46], Burris et al. [47], Smith et al. [51], Kwon et al. [52]
Dairy	Milk increases insulin and IGF-1 levels	Evidence supportive of association of milk and whey proteins in increasing acne lesions	Rich-Edwards et al. [54], Adebamowo et al. [58], Adebamowo et al. [60], Adebamowo et al. [61], Okoro et al. [62], Grossi et al. [63], Karadag et al. [64], Duquia et al. [65]
Fat and fatty acids	Omega-3 fatty acids decrease IGF-1 and inhibit pro-inflammatory leukotriene B ₄	Supportive of omega-3 fatty acids and γ-linoleic acid use in reduction of acne lesions	Logan [70], Li et al. [71], Simopoulos et al. [72], Zouboulis et al. [74], Jung et al. [75]
Vegetarian and vegan	Activation of mTORC1 decreased, leading to decreased signaling of pro-inflammatory nuclear factor-κB	No significant evidence supportive of vegan/vegetarian diets in reducing acne	Melnick [11], Young et al. [76], Stewart and Bazergy [77]
Probiotics	Possible production of bacteriocin-like inhibitory substances, may improve glucose metabolism and insulin levels, may increase levels of anti-inflammatory fatty acids	Mostly theoretical findings in support of acne reduction; early studies show promising results in acne improvements with probiotic supplementation	Bowe et al. [79], Kim et al. [80], Puch et al. [82], Salem et al. [83], Fabbrocini et al. [84]

GI glycemic index, GL glycemic load, IGF-1 insulin-like growth factor-1, IGFBP-3 insulin-like growth factor-binding protein 3, mTORC mammalian target of rapamycin complex 1

Common acne triggers:

- High glycemic index/load foods
- Dairy foods
- Highly processed fatty foods

Possible acne triggers:

- Eggs (> 3x/week)
- Soda

Beneficial for acne:

- Produce (fruits and veg)
- Mediterranean diet (omega 3's)
- Low glycemic diet

"HALLIE"



"HALLIE"



H [REDACTED]
Registered Dietitian

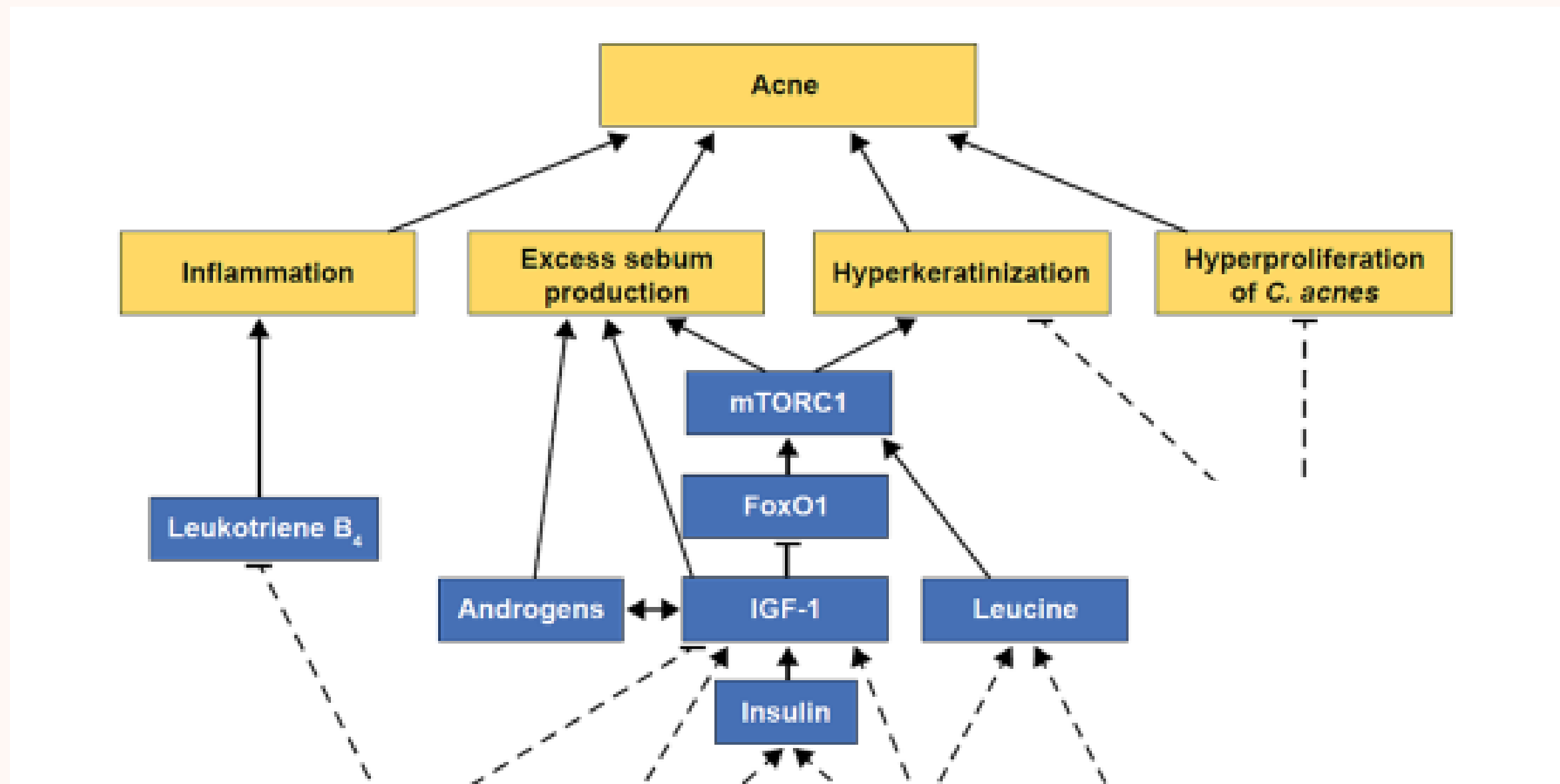
I wanted to share this because I think it's SO cool.

First pics are my acne probably at it's worst. I've never had completely clear skin, but when I moved to Vegas, it got really mad. Nothing I tried helped, and I tried a lotttttttt of different things.

Introduce mineral mocktails and here we are today! It cleared up after maybe 2-3 weeks.

"HALLIE"

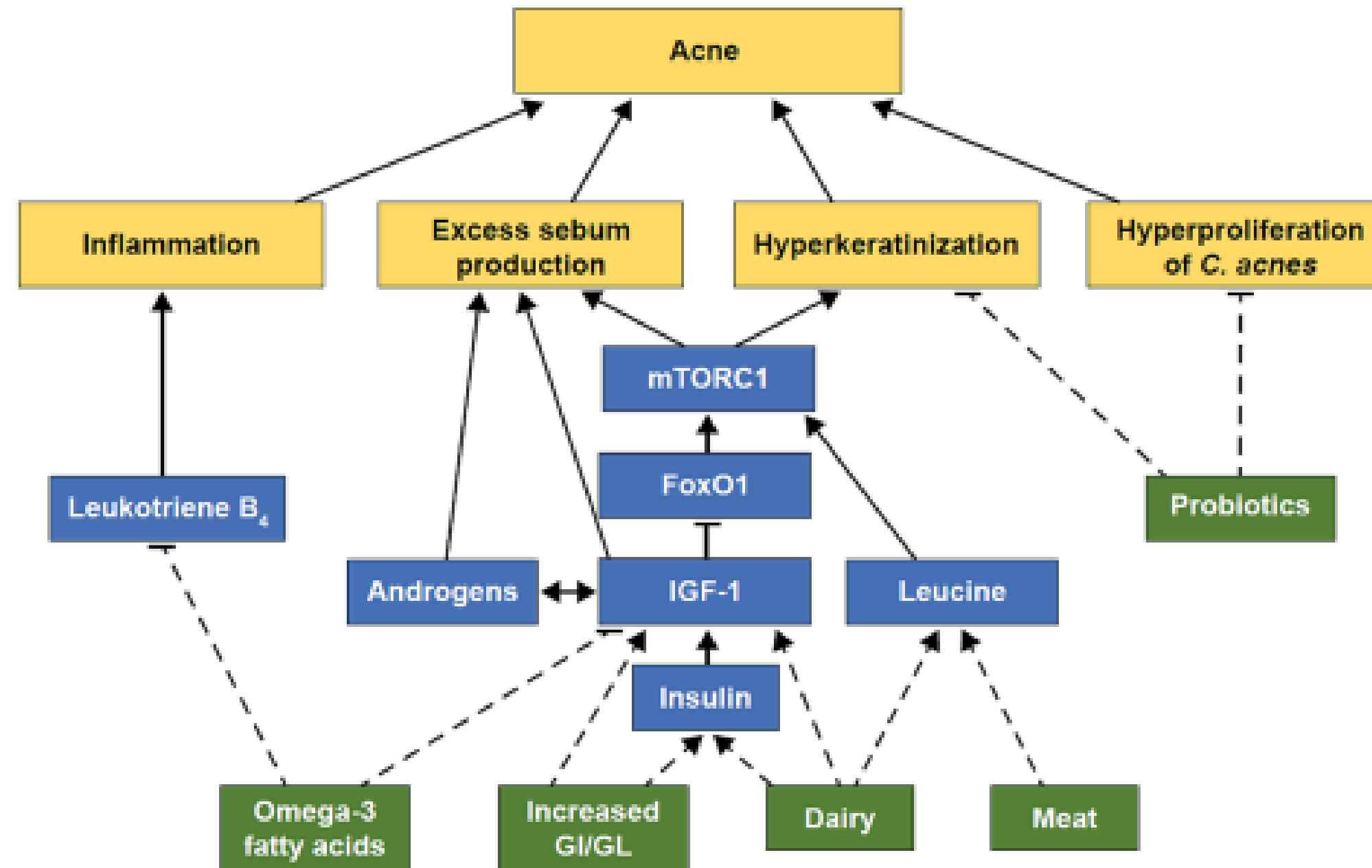




- Hormones
- Inflammation
- Microbiome

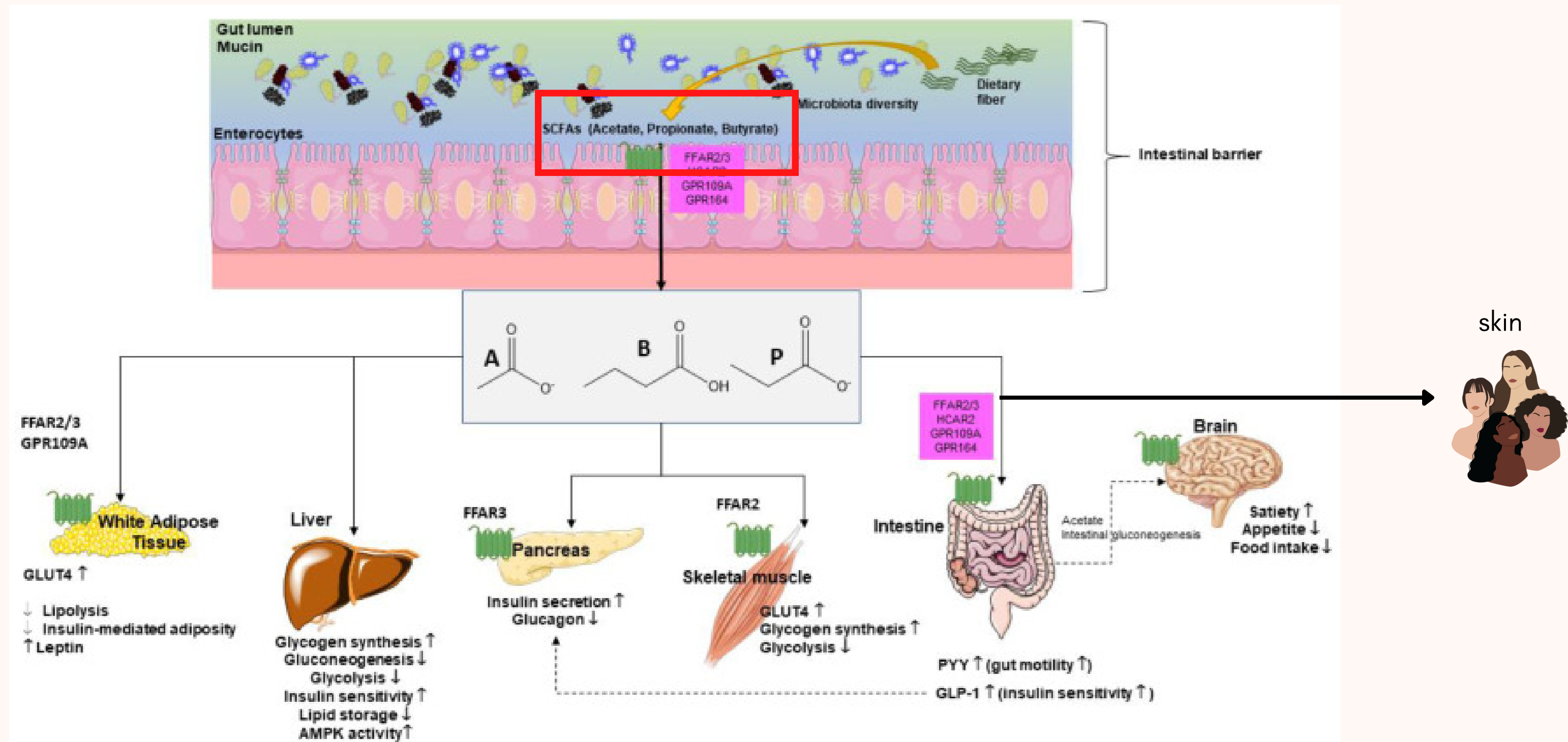
WHAT WE KNOW: MICROBIOME

- Gut
- Skin
- prebiotics
- probiotics
- SCFA
- pathogens



- Hormones
- Inflammation
- Microbiome

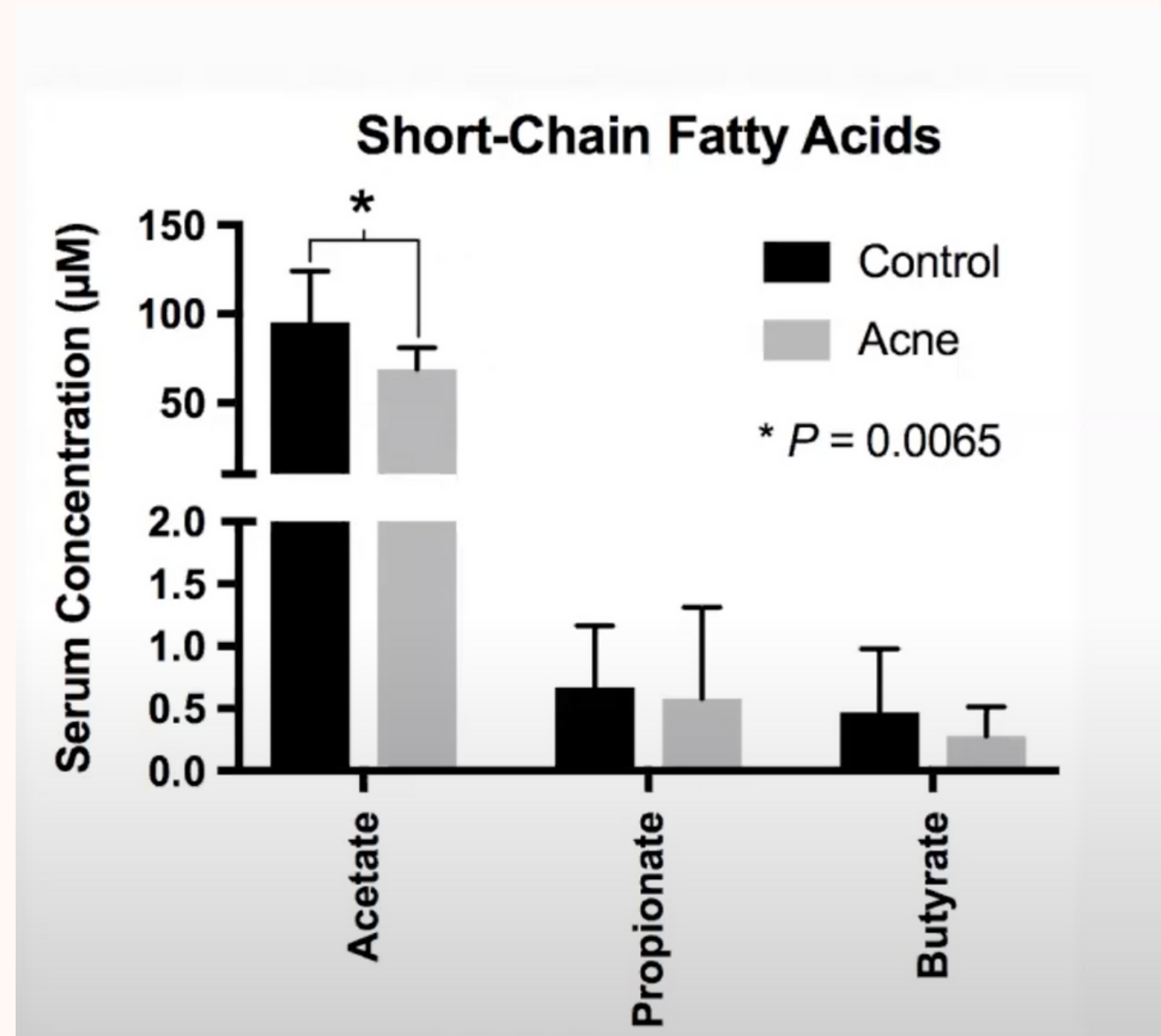
SHORT CHAIN FATTY ACIDS



Portincasa P, Bonfrate L, Vacca M, De Angelis M, Farella I, Lanza E, Khalil M, Wang DQ, Sperandio M, Di Ciaula A. Gut Microbiota and Short Chain Fatty Acids: Implications in Glucose Homeostasis. *Int J Mol Sci.* 2022

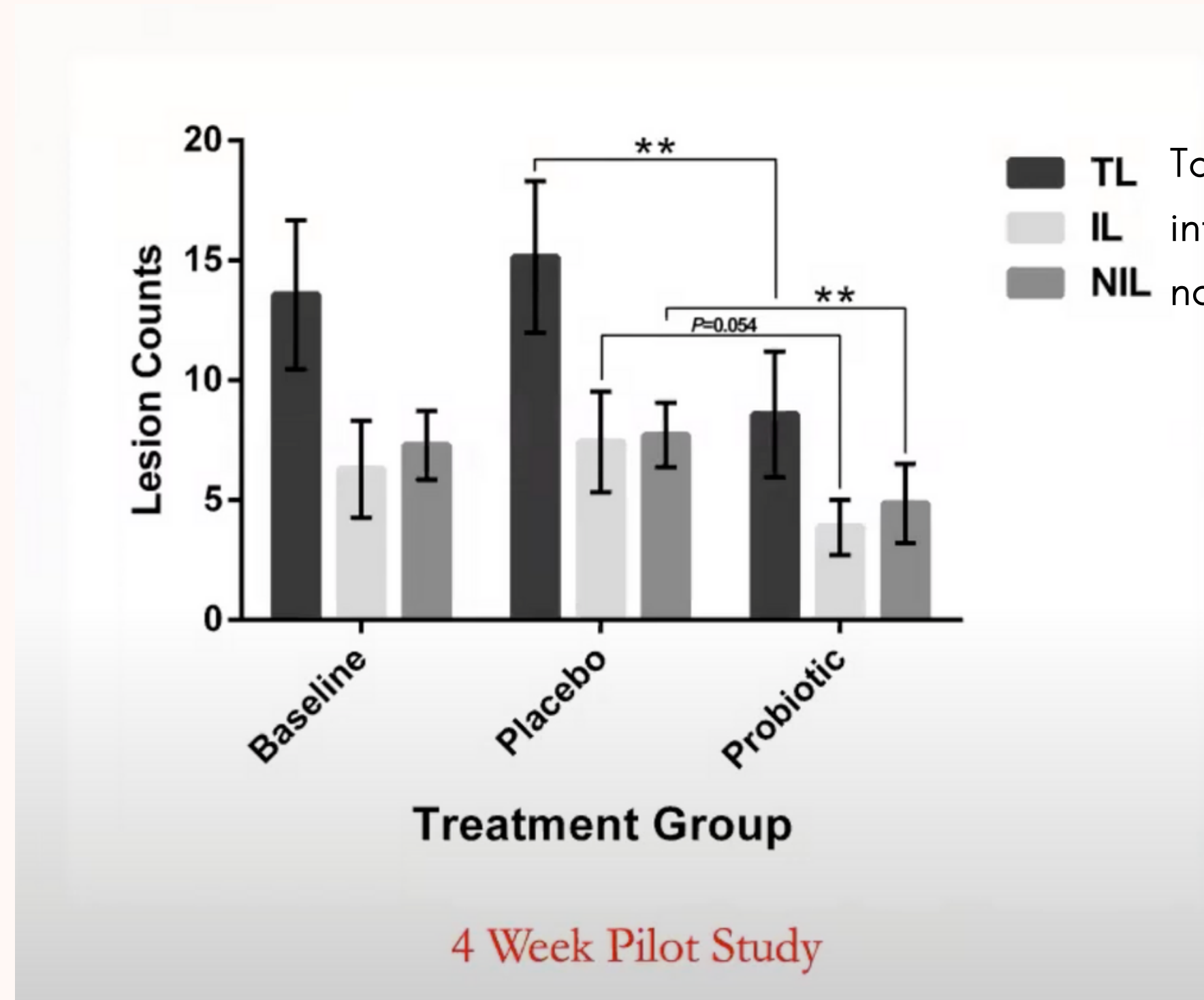
SHORT CHAIN FATTY ACIDS

SCFA deficiencies and acne



In review, Sivamani, et al.

SHORT CHAIN FATTY ACIDS



LACTOBACILLUS RHAMNOSUS

Table 2. Change from baseline to 12 weeks in the investigator's global improvement rating of adult acne in the two study groups (data are given as counts and percentages).

Rating	Probiotic group (n=10)	Placebo group (n=10)
Worsened	0 (0%)	0 (0%)
Unchanged	2 (20%)	9 (90%)
Improved	6 (60%)	1 (10%)
Markedly improved	2 (20%)	0 (0%)
Resolved	0 (0%)	0 (0%)

Table 1. Changes from baseline to 12 weeks in relative gene expression values of *IGF1* and *FOXO1* in skin biopsies obtained from the acne areas on the back in the two study groups.¹

	Probiotic group (n=10)		Placebo group (n=10)	
	Baseline	12 weeks	Baseline	12 weeks
<i>IGF1</i>	2.31±0.91	1.56±0.77*	2.24±0.82	2.11±0.89
<i>FOXO1</i>	0.81±0.15	1.34±0.26*	0.86±0.13	0.90±0.15

¹ Levels of mRNA were determined after adjustment for age and sex with the following formula: 2^{-ΔCT}, where ΔCT (sample) was defined as CT (gene of interest) – CT (*GAPDH*). * *P*<0.001 vs baseline.

Fabbrocini G, Bertona M, Picazo Ó, Pareja-Galeano H, Monfrecola G, Emanuele E. Supplementation with Lactobacillus rhamnosus SP1 normalises skin expression of genes implicated in insulin signalling and improves adult acne. Benef Microbes. 2016

not all probiotics are equal

Table 2. Acne vulgaris and probiotics.

Reference	Study	Probiotic	Key Results
Bowe [112].	In vitro	<i>Streptococcus salivarius</i>	Bacteriocin inhibited <i>C. acnes</i> growth.
Oh [113].	In vitro	<i>Lactococcus</i> sp. HY 449	Bacteriocin inhibited <i>C. acnes</i> growth.
Deidda [114].	In vitro	<i>Lactobacillus salivarius</i> LS03	Bacteriocin inhibited <i>C. acnes</i> growth.
Lee [109].	In vitro	<i>Bifidobacterium adolescentis</i>	Antimicrobial activity against <i>C. acnes</i> and <i>Staphylococcus aureus</i> .
Wang [115].	In vitro	<i>Staphylococcus epidermidis</i>	Production of succinic acid through glycerol fermentation.
Cosseau [116].	In vitro	<i>Streptococcus salivarius</i> K12	Anti-inflammatory response; modulation of genes associated with epithelial adhesion.
Gueniche [117].	In vitro	<i>Lactobacillus paracasei</i> CNCM I-2126	Improvement of skin barrier function.
Al-Ghazzewi [120].	In vitro	<i>L. casei</i> NCFB 161, <i>L. acidophilus</i> NCFB 1748, <i>L. plantarum</i> DSM 12028, <i>L. gasseri</i> NCFB 2233, and <i>Lactococcus lactis</i> NCIMB 66 plus glucomannan hydrolysates of <i>Amorphophallus konjac</i>	Inhibition of <i>C. acnes</i> growth.
Lopes [121].	In vitro	Several <i>Bifidobacterium</i> and <i>Lactobacillus</i> strains	Adherence to keratin; inhibition of biofilm formation of pathogenic bacteria; limited ability to adhere to <i>C. acnes</i> .
Chae [122].	In vitro	<i>L. plantarum</i> APSulloc 331261 and APSulloc 331266	Inhibition of skin pathogen growth.
Espinoza-Monje [123].	In vitro and murine model	<i>Weissella viridescens</i> UCO_SMC3	Inhibition of <i>C. acnes</i> growth; anti-inflammatory effects.
Siver [124].	Clinical trial	<i>L. acidophilus</i> and <i>L. bulgaricus</i> (oral)	A total of 300 acne patients; 2 weeks of treatment. Clinical improvement in 80% of acne patients.
Jung [127].	RCT, open-label	<i>L. acidophilus</i> (5×10^9 CFU/capsule), <i>L. bulgaricus</i> (5×10^9 CFU/capsule) and <i>B. bifidum</i> (20×10^9 CFU/capsule) (oral); two capsules/day	A total of 45 acne patients; three study groups (probiotic, minocycline, probiotic plus minocycline); 12 weeks of treatment. Patients treated with probiotic mixture plus minocycline had significantly better efficacy in terms of total number of lesions.
Fabbrocini [128].	RCT, double-blinded, placebo-controlled	Liquid supplement containing <i>Lactobacillus rhamnosus</i> SP1 at a dose of 3×10^9 CFU/day (oral)	A total of 20 acne patients; 12 weeks of treatment. IGF-1 and FoxO1 gene expression in skin acne areas. Statistically significant reduction in the expression of the IGF-1 gene of 32% and a statistically significant increase in the FoxO1 gene of 65% in probiotic group. Clinical improvement in patients treated with probiotic.

Table 2. Cont.

Reference	Study	Probiotic	Key Results
Rahmayani [129]	Pre-experimental clinical study with a pretest/posttest	<i>B. lactis</i> W51, <i>B. lactis</i> W52, <i>L. acidophilus</i> W55, <i>L. casei</i> W56, <i>L. salivarius</i> W57, and <i>Lactococcus lactis</i> W58, with total bacterial cells $> 10^8$ CFU per sachet (oral); two sachets/day	A total of 30 acne patients; 30 days of treatment. An increase in IL-10 was seen after probiotic mixture treatment.
Manzhalii [132].	RCT, controlled, nonblinded	<i>Escherichia coli</i> Nissle 1917 (oral); one capsule contained $2.5\text{--}25 \times 10^9$ CFU; two capsules/day	A total of 82 patients with intestinal-borne dermatoses (some of them were diagnosed with acne); 1 month of treatment. Two study groups (patients treated with a conventional topical therapy consisting of ointments containing tetracycline, steroids, and retinoids; and patients treated with conventional topical therapy plus probiotic). A total of 89% of patients treated with <i>E. coli</i> Nissle 1917 improved significantly, while 56% improved in the group treated with only the conventional topical therapy.
Rinaldi [133].	RCT, double-blinded, placebo-controlled	<i>B. breve</i> BR03 (0.5×10^9 CFU), <i>L. casei</i> LC03 ($\geq 0.5 \times 10^9$ CFU), and <i>L. salivarius</i> LS03 ($\geq 1.0 \times 10^9$ CFU) plus a botanical extract of <i>Solanum melongena</i> and <i>Echinacea</i> (oral); one sachet/day	A total of 114 acne patients. Four study groups (placebo, probiotics, botanical extracts, and probiotics plus botanical extracts); 8 weeks of treatment. A decreased number of acne lesions, rate of desquamation, rate of sebum secretion, and presence of <i>C. acnes</i> was found in patients treated with the probiotic mixture and botanical extract, and a mixture of both. Stronger effects were seen with the probiotic mix plus the botanical extract.
Kang [136].	RCT, double-blinded, placebo-controlled	Concentrated powder lotion obtained from supernatant culture of <i>Enterococcus faecalis</i> SL-5 (topical)	A total of 70 acne patients; 8 weeks of treatment. A decrease in inflammatory lesions was seen.
AOBiome [137].	RCT, double-blinded, placebo-controlled	<i>Nitrosomonas eutropha</i> (topical)	A total of 358 acne subjects; 12 weeks of treatment. A reduction in severity and a trend toward a reduction in inflammatory lesions was seen.
Sathikulpakdee [138].	RCT	<i>Lactobacillus paracasei</i> MSMC 39-1 (topical)	A total of 104 acne patients; 4 weeks treatment. Topical probiotics vs. 2.5% benzoyl peroxide lotion were compared. Acne lesions and the erythema index were decreased.

CFU: colony-forming units; RCT: randomized clinical trial.

Table 2. Acne vulgaris and probiotics.

Reference	Study	Probiotic
Bowe [112].	In vitro	<i>Streptococcus salivarius</i>
Oh [113].	In vitro	<i>Lactococcus</i> sp. HY 449
Deidda [114].	In vitro	<i>Lactobacillus salivarius</i> LS03
Lee [109].	In vitro	<i>Bifidobacterium adolescentis</i>
Wang [115].	In vitro	<i>Staphylococcus epidermidis</i>
Cosseau [116].	In vitro	<i>Streptococcus salivarius</i> K12
Gueniche [117].	In vitro	<i>Lactobacillus paracasei</i> CNCM I-2126
Al-Ghazzewi [120].	In vitro	<i>L. casei</i> NCFB 161, <i>L. acidophilus</i> NCFB 1748, <i>L. plantarum</i> DSM 12028, <i>L. gasseri</i> NCFB 2233, and <i>Lactococcus lactis</i> NCIMB 66 plus glucomannan hydrolysates of <i>Amorphophallus konjac</i>
Lopes [121].	In vitro	Several <i>Bifidobacterium</i> and <i>Lactobacillus</i> strains
Chae [122].	In vitro	<i>L. plantarum</i> APsulloc 331261 and APsulloc 331266
Espinoza-Monje [123].	In vitro and murine model	<i>Weissella viridescens</i> UCO_SMC3
Siver [124].	Clinical trial	<i>L. acidophilus</i> and <i>L. bulgaricus</i> (oral)
Jung [127].	RCT, open-label	<i>L. acidophilus</i> (5×10^9 CFU/capsule), <i>L. bulgaricus</i> (5×10^9 CFU/capsule) and <i>B. bifidum</i> (20×10^9 CFU/capsule) (oral); two capsules/day
Fabbrocini [128].	RCT, double-blinded, placebo-controlled	Liquid supplement containing <i>Lactobacillus rhamnosus</i> SP1 at a dose of 3×10^9 CFU/day (oral)

CFU: colony-forming units; RCT: randomized clinical trial.

Top used probiotics in my practice (for acne)

- Megasporebiotic by Microbiome Labs
- Serene Skin by Microbiome Labs
- Lactobacillus Rhamnosus– various brands
- Lactobacillus Reuteri – Bio Gaia
- Lactobacillus Plantarum – various brands

"NATALIE"



- many topicals, chemical peels, lasers
- spironolactone, accutane, birth control
- Strict food eliminations
- Gut protocols
- Detoxes
- acupuncture
- many supplements

"NATALIE"

Normal Bacterial Flora

	Result		Normal
<i>Bacteroides fragilis</i>	9.28e9		1.60e9 - 2.50e11
<i>Bifidobacterium spp.</i>	2.14e8		>6.70e7
<i>Enterococcus spp.</i>	3.72e3	Low	1.9e5 - 2.00e8
<i>Escherichia spp.</i>	8.45e3	Low	3.70e6 - 3.80e9
<i>Lactobacillus spp.</i>	1.94e7		8.6e5 - 6.20e8
<i>Clostridia (class)</i>	1.26e6	Low	5.00e6 - 5.00e7
<i>Enterobacter spp.</i>	2.15e5	Low	1.00e6 - 5.00e7
<i>Akkermansia muciniphila</i>	→ <dl		1.00e1 - 5.00e4
<i>Faecalibacterium prausnitzii</i>	→ 1.48e4		1.00e3 - 5.00e8

Phyla Microbiota

	Result		Normal
<i>Bacteroidetes</i>	8.00e10	Low	8.61e11 - 3.31e12
<i>Firmicutes</i>	1.39e10	Low	5.70e10 - 3.04e11
<i>Firmicutes:Bacteroidetes Ratio</i>	0.17		<1.00

"NATALIE"



Immune Response	Result		Normal
Secretory IgA	423	Low	510 - 2010 ug/g
Anti-gliadin IgA	59		0 - 157 U/L

"NATALIE"



<u>Urine Halides</u>		<i>Reference Range</i>
Iodine/Iodide		
24 hour excretion:	28.70mg	0-50mg/24 hour
% excretion/24 hr:	57%	Iodine body sufficiency is achieved when the 24 hour urine collection contains 90% or more of the amount of iodine/iodide ingested*.

"NATALIE"

- Increased total food intake
 - snacks + bulking up meals, expanded diet variety
- **PREbiotic therapy**
 - Sunfiber, potato starch, veggies
- **Probiotics**– Megasporebiotic by Microbiome labs
- **Red polyphenol focus**
- 2–3 mineral drinks/day (potassium, sodium, mag)
- Iodine prep & higher dose supplementation
- Beef liver, Vitamin E
- BIG discussions on stress/nervous system
- She also transitioned jobs for less stress
- Topicals – no new recs



1. Re-inoculate the gut
2. Re-mineralize
3. Re-lax (*nervous system*)

"NATALIE"



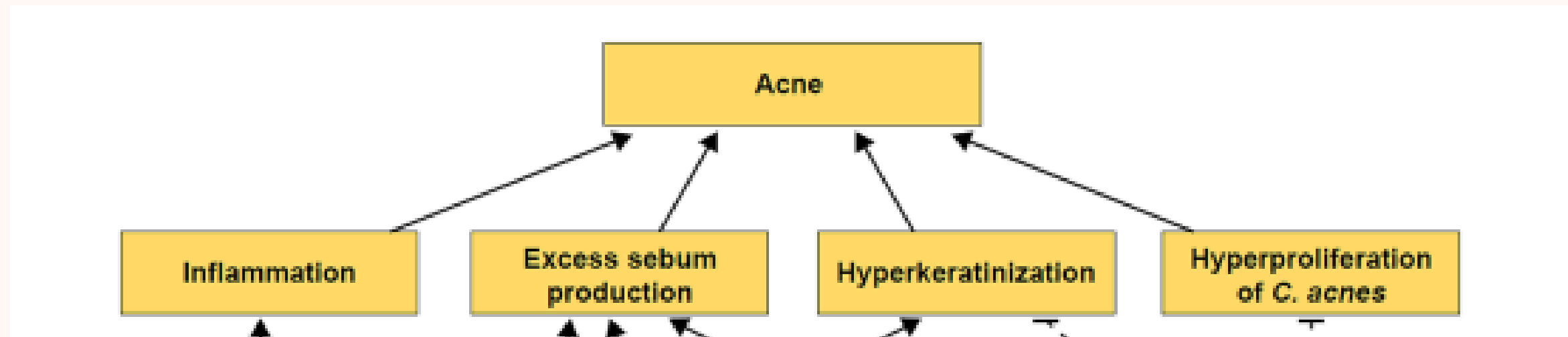
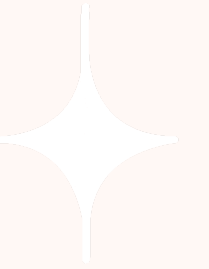
2 months in

Misconceptions that fail our clients



1. Extreme Elimination Diets
2. Silver bullet supplementation protocols
3. Topical only approaches

GET TO KNOW THE SKIN IN FRONT OF YOU



BEYOND THE HORMONES

CONSIDERATIONS

- Metabolic health
- Nervous System health
- Nutrition foundation
- Nutrient status
- Gut health
- Stress load



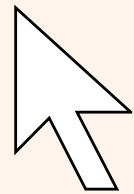
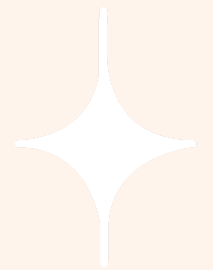
STARTERS:

1. Re-inoculate the gut
2. Re-mineralize
3. Re-lax (*your nervous system*)

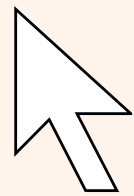
STAY CONNECTED



@nutritionbyrobyn

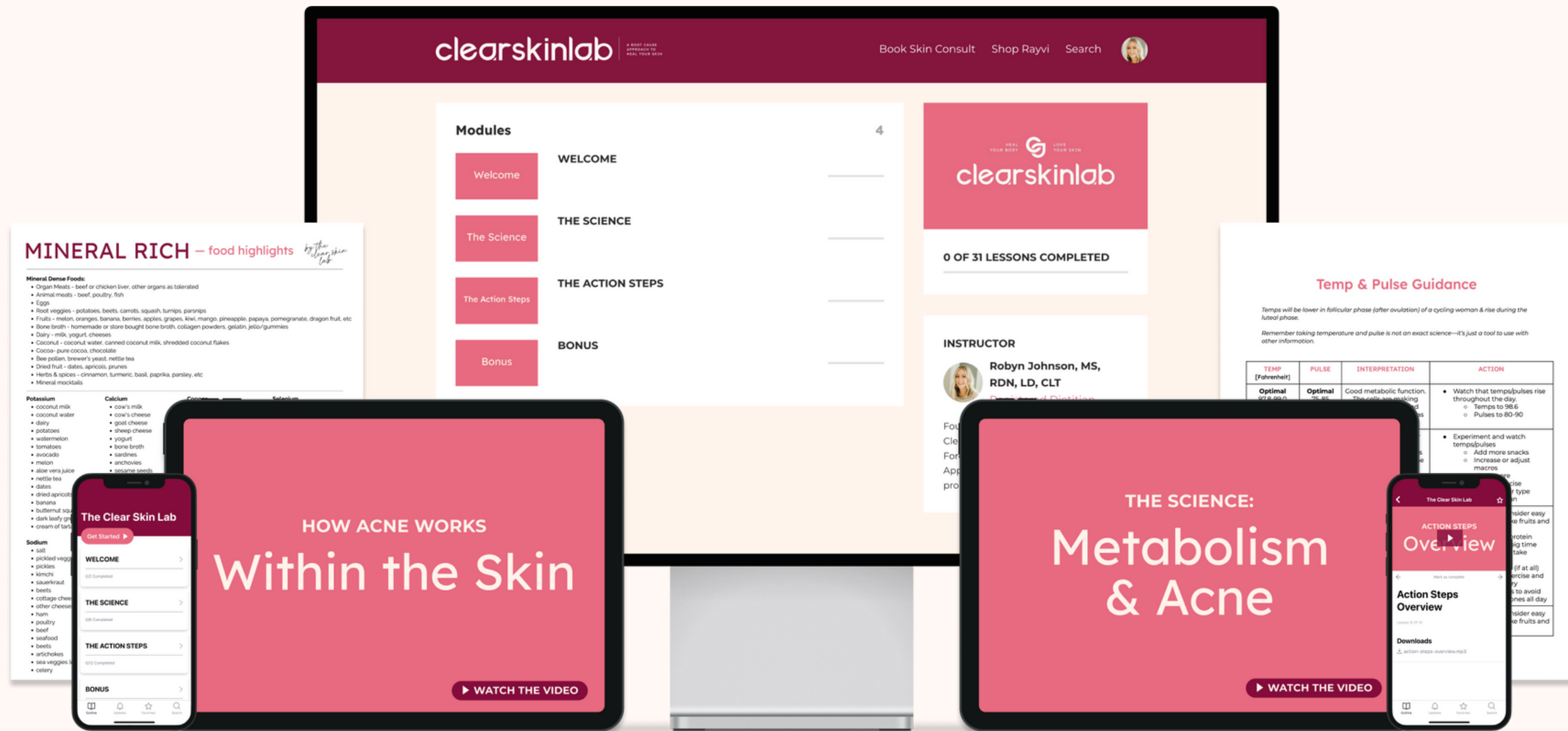


nutritionbyrobyn.com



theclearskinlab

THE CLEAR SKIN LAB





Rayvi



@rayvishop



rayvishop.com