
# Our Panel

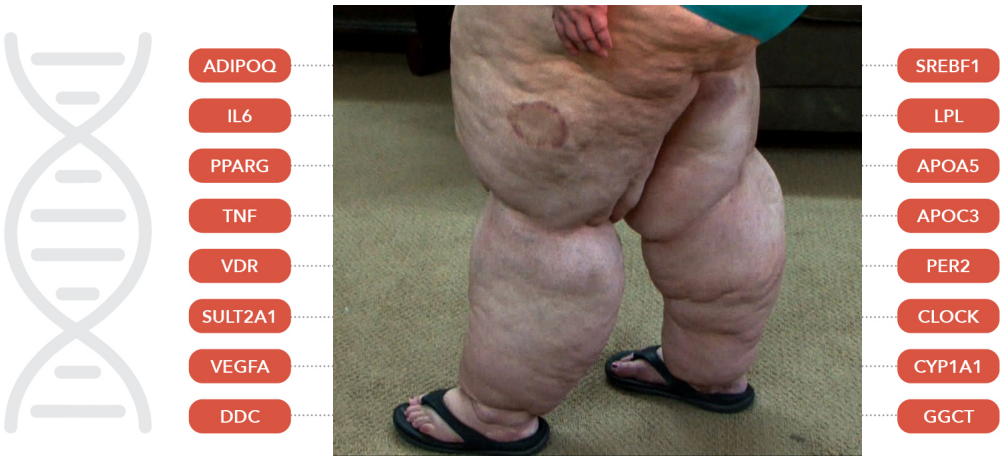
**Presenter | Dr Oscar Coetzee, Clinical Nutritionist, Associate Professor**

Motivated by his desire to reverse the chronic illness epidemic, Dr Coetzee continues to be a pioneer in the field of nutritional science.
Born and raised in South Africa, where he completed his military schooling and earned bachelor's degrees in criminology and psychology, Dr Coetzee also earned a masters degree in Human Nutrition from University of Bridgeport (USA).
He went on to receive a PhD in holistic nutrition from Clayton College of New Hampshire (USA), and a Doctorate of Clinical Nutrition (DCN). Dr Coetzee finished his second doctorate from Maryland University of Integrative Health, with a specialisation in nutrigenomics.
His key areas of interest are metabolic syndrome, intestinal permeability, type 2 diabetes, sports performance, and most chronic inflammatory diseases.

**Host | Lea McIntyre ND**

Lea McIntyre is Technical Marketing Manager at Designs for Health Australia.
She has 19 years experience as a qualified naturopath, herbalist and nutritionist.
In her clinical practice, she has a special interest in paediatric health and gut health and the relationship between inflammation and neurological conditions.
Lea provides direct support for DFH Practitioners – and frequently provides guidance on GI Map Test reports.

# MetS/Lipedema: Modern Face of Obesity






# Kinds of Obesity

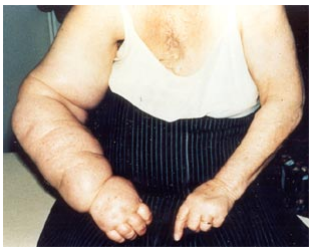
- **Hypertrophic obesity:**
  Increase in the size of the fat cells, where the number of fat cells stay approx. the same
- **Hyperplastic obesity:**
  Increase in the number of fat cells, where the size of the fat cells stay approx. the same
- **Hypertrophic/Hyperplastic obesity:**
  Where both occur at the same time

# Lipedema: The Face of Modern Obesity

- Mostly females
- Grossly misdiagnosed
- Very progressive over the age of 35
- Not classified in the IDC until recent
- "Painful fat syndrome" (Stallworth, 1974)



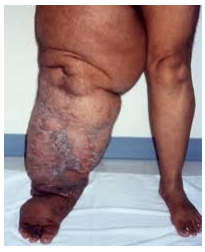
# Lymphedema



Breast cancer lymphedema
Courtesy of: www.medscape.com – Breast Cancer Lymphedema

Breast cancer lymphedema
Courtesy of: www.medscape.com – Breast Cancer Lymphedema

Parasite called Filariasis. It affects well over a 170 million people living in the tropics, it is transmitted through mosquito bites.
Courtesy of: www.globalnetwork.org – Lymphatic Filariasis



When the vessels are damaged, the flow of lymphatic fluid is compromised
Courtesy of: www.lymphedemblog.com
Secondary Lymphedema

## Phases of Lipedema

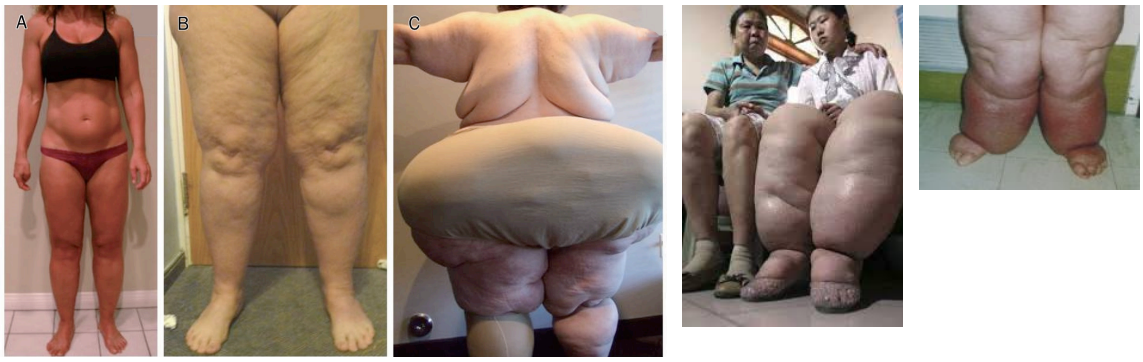
Lipedema is broken down into the progression of these five phases (Shingale, 2003):

- **Phase 1:** Adipose tissue increases on **thighs, pelvis and buttocks** (saddlebags)
- **Phase 2:** Fat pads are developed on the **inner side of the knees**
- **Phase 3:** Total lipedema from **hips to ankles, bilateral**
- **Phase 4: Arms and legs get affected**, bilateral
- **Phase 5:** Lipolymphedema aka **"elephantiasis"** a disfigurement



## Phases of Lipedema

Phase 1 Phase 2 Phase 3 Phase 4 & 5



## Current Treatments

1. **Decongestive Lymphatic Therapy (DLT)** – massage technique called "manual lymph drainage"
2. **Liposuction** – but could damage lymphatics even more (Stutz, 2009)
3. **Tumescent Liposuction** – less damaging (Schmeller, 2012)
4. **Beta-adrenergic agonists** (Moore 2009) – female 20kg (WLR)
5. **Diuretics** contraindicated/**Selenium** positive (600-800 ug/day) (Bruns, 2003)
6. **Low calorie** and **deprivation** diets no effect (Cornely, 2006)



## Physiology and Pathophysiology of Lipedema

- **Lymph stasis** (Ryan 1995) and **fluid leakage** from lymph vessels promote fat accumulation.

## GALT – Gut Associated Lymphoid Tissue

**Intraepithelial Lymphocytes:** Located between the cells of the epithelial layer of the small intestines, and located between the **tight junctions**.



## VEFG – Vascular Endothelial Growth Factor

**Macrophages** in adipose tissue secrete **signaling factors** including **VEGF** which trigger the formation of leaky lymphatic vessels leading to further swelling, inflammation and obesity (Jones et al. 2011). Lipidema patients had a **fourfold increase** in **VEGF** over controls (Szolnosky 2012).
**Macrophages secrete** growth factors **VEGF** and they are implicated in the potential trigger for lymphangiogenesis (Cursiefen et al. 2004).

## Macrophages

- **Adipose tissue** also hosts a significant amount of **macrophages** and it is indicated that **as fat increases** so do the macrophages (Schaffler et al. 2005).
- These macrophages like adipocytes can store fat and glycogen and clearly rely on this nutrient supply to keep this going.
- All organs drained by lymphatic vessels **contain macrophages**, they are heavily **implicated** in **obesity induced inflammation** (Wellen et al. 2003).



## MPS – Mononuclear Phagocyte System Cells

MPS cells seems to be the **monitoring agent** and complete regulator of the **electrolyte balance** in the fatty tissue fluid.

With **high sodium diets** it seems that **abnormal capillary growth** in the skin results in another form of cellular hyperplasia (McCray et al. 2011). High sodium diets seem to **stimulate the production in Th-17**, a highly pro-inflammatory agent (IL-17 produce CD4 helper T-cells).

## Chyle

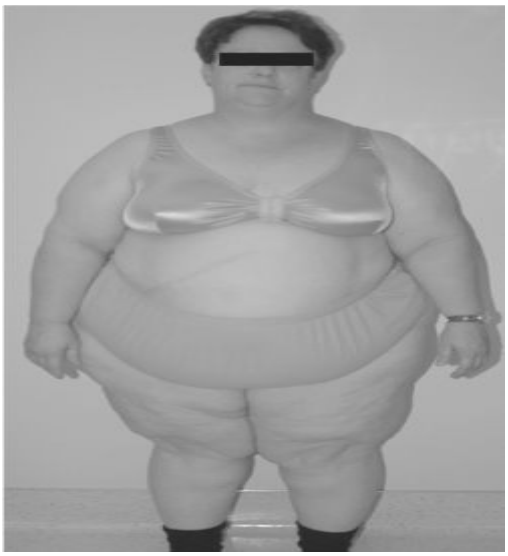
- The **intestinal villi** assists in the absorption of fats and contain vessels inside called **"lacteals"** where they are converted into a liquid called **"chyle".**
- Eating a very high fat diet **can add two liters of fluid** to the lymphatic system daily due to excess chyle (McCray et al. 2011).
- Failure in the process above to properly transport and emulsify exogenous fats and chyle could trigger ***subcutaneous edema, chylous ascites*** or ***chylothorax*** (Jones et al. 2011).



## Hypertrophic, Hyperplastic Obesity

- "Lymph makes you fat" in culture when lymph is placed on adipocytes it induces robust growth (Schneider, 2005).
- Lipedema the **fat cells are bigger** in size and seem to have a **shorter cell lifespan**.
- **Microanuerysms** start appearing in Lipedema as the condition progresses, which **causes the leaking** this seems to stimulate the hyperplasia and hypertrophy of fat cells. (Suga, 2009)
- **Microlymphatics** become severely compromised in Lipedema leading to a **backflow of lymph resulting in edema, increased venous congestion, increasing hydrostatic pressure resulting in severe pain in tissue** (Harwood, 1996).

# Lipedema = hypertrophy and hyperplasia of adipocytes



Courtesy of:
www.Medicaldictionary.thefreedictionary.com – Hypertrophic/Hyperplastic Obesity



# Food to Fuel Lipedema

- These fat cells stimulate the recruitment of carbohydrates in specific ***hyaluronic acid***. This long sugar structure is found in abundance in most living organisms and it likes to bind water.
- The hyaluronic acids gives the lipedema **fat a quality similar to gelatin**, making the **body feel heavy**.
- Hyaluronic acid is also one of the reasons the WBC are attracted to the area, as it potentially causes an inflammatory response due to all the trapped water inside of the cell.

# Nutritional Intervention

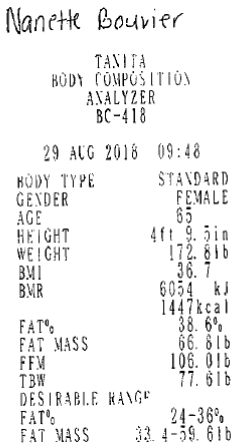
- Li promotes the following VEGF inhibiting foods, which could play a role in the reduction of inflammation and the stagnation of lymphedema and lipedema (2012).
- Green tea catechins
- Genistein in soy beans
- Lycopene in tomatoes, watermelon and other bright red fruits
- Omega 3 fatty acids
- Glucosinolates, Isothiocyanates, Indole-Carbinol 3, DIM, basically cruciferous vegetables
- Flavonoids in spinach, onions, parsley, beets and thyme
- Polyphenolic flavonoids in lettuce, chicory, arugula and red lettuce
- Proanthocyanidins in cacao, cinnamon, cranberry, apples, grapes, black current, persimmon and choke berry
- Anthocyanidins in berries, grapes and red wine
- Curcumin, turmeric
- Vit. K2 and fermented foods, pre-biotics
- Beta-cryptoxanthin in bright orange, red or yellow foods
- Pomegranate, berries of all kinds, walnuts, pecans, red grapes
- Salt intake – reduced
- Long chain fatty acids reduced – especially hydrogenated versions



# CASE STUDIES

LIPEDEMA CASE STUDY

# Case Study – Nanette Bouvier

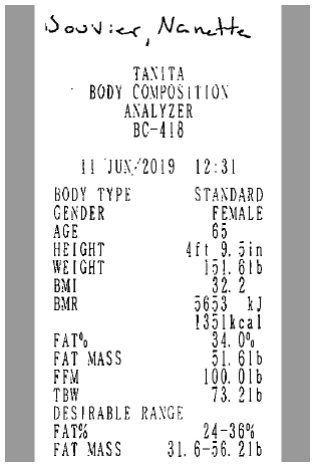


Nanette Bouvier

TANITA
BODY COMPOSITION
ANALYZER
BC-418

29 AUG 2018 09:48

| | |
|---|---|
| BODY TYPE | STANDARD |
| GENDER | FEMALE |
| AGE | 65 |
| HEIGHT | 4ft 9.5in |
| WEIGHT | 172.8lb |
| BMI | 36.7 |
| BMR | 6054 kJ |
| | 1447kcal |
| FAT% | 38.6% |
| FAT MASS | 66.8lb |
| FFM | 106.0lb |
| TBW | 77.6lb |
| DESIRABLE RANGE | |
| FAT% | 24-36% |
| FAT MASS | 33.4-59.6lb |



Souvier, Nanette

TANITA
BODY COMPOSITION
ANALYZER
BC-418

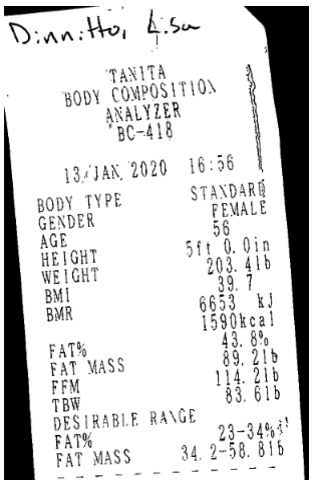
11 JUN 2019 12:31

| | |
|---|---|
| BODY TYPE | STANDARD |
| GENDER | FEMALE |
| AGE | 65 |
| HEIGHT | 4ft 9.5in |
| WEIGHT | 151.6lb |
| BMI | 32.2 |
| BMR | 5653 kJ |
| | 1351kcal |
| FAT% | 34.0% |
| FAT MASS | 51.6lb |
| FFM | 100.0lb |
| TBW | 73.2lb |
| DESIRABLE RANGE | |
| FAT% | 24-36% |
| FAT MASS | 31.6-56.2lb |



LIPEDEMA CASE STUDY

# Case Study – Lisa Dinnitto



Dinnitto, Lisa

TANITA
BODY COMPOSITION
ANALYZER
BC-418

13 JAN 2020 16:56

| | |
|---|---|
| BODY TYPE | STANDARD |
| GENDER | FEMALE |
| AGE | 56 |
| HEIGHT | 5ft 0.0in |
| WEIGHT | 203.4lb |
| BMI | 39.7 |
| BMR | 6653 kJ |
| | 1590kcal |
| FAT% | 43.8% |
| FAT MASS | 89.2lb |
| FFM | 114.2lb |
| TBW | 83.6lb |
| DESIRABLE RANGE | |
| FAT% | 23-34% |
| FAT MASS | 34.2-58.8lb |

TANITA
BODY COMPOSITION
ANALYZER
BC-418

18 AUG 2020 13:02

| | |
|---|---|
| BODY TYPE | STANDARD |
| GENDER | FEMALE |
| AGE | 56 |
| HEIGHT | 5ft 0.0in |
| WEIGHT | 167.0lb |
| BMI | 32.6 |
| BMR | 6050 kJ |
| | 1446kcal |
| FAT% | 36.4% |
| FAT MASS | 60.8lb |
| FFM | 106.2lb |
| TBW | 77.8lb |
| DESIRABLE RANGE | |
| FAT% | 23-34% |
| FAT MASS | 31.8-54.6lb |

LIPEDEMA CASE STUDY

## Interventions in Trial

1. **Glycemic Control** – Lipedema Specific
2. **AIP** – Lipedema Specific
3. **Supplementation** – 2 to 3 X recommended functional dosing
4. **5R** – Lipedema Specific
5. **Lifestyle** – Sleep (Major), Destress, Addiction/Self/Image



LIPEDEMA CASE STUDY

## Adipocytokine Signaling

ADIPOQ

**Label:** adiponectin, C1Q and collagen domain containing
**Aliases:** ACDC,ACRP30,ADIPQTL1,ADPN,APM-1,APM1,GBP28
**Location:** 3q27

Adiponectin (AdipoQ) is a protein which in humans is encoded by the ADIPOQ gene. **It is involved in regulating glucose levels as well as fatty acid breakdown**. Adiponectin is a protein hormone that modulates a number of metabolic processes, including glucose regulation and fatty acid oxidation. **Adiponectin is exclusively secreted from adipose tissue** (and also from the placenta in pregnancy ) into the bloodstream and is very abundant in plasma relative to many hormones. **Levels of the hormone are inversely correlated with body fat percentage in adults**. Adiponectin exerts some of its weight reduction effects via the brain. This is similar to the action of leptin, but the two hormones perform complementary actions, and can have synergistic effects.

LIPEDEMA CASE STUDY

# Adipocytokine Signaling

PPARG

**Label:** peroxisome proliferator-activated receptor gamma
**Aliases:** CIMT1,GLM1,NR1C3,PPARG1,PPARG2,PPARgamma
**Location:** 3p25

**This gene encodes a member of the peroxisome proliferator-activated receptor (PPAR) subfamily of nuclear receptors.**

- **The protein encoded by this gene is PPAR-gamma and is a regulator of adipocyte differentiation.**
- Additionally, **PPAR-gamma** has been implicated in the pathology of numerous **diseases including obesity, diabetes, atherosclerosis and cancer**. Alternatively spliced transcript variants that encode different isoforms have been described.



LIPEDEMA CASE STUDY

# Adipocytokine Signaling

IL6

**Label:** interleukin 6 (interferon, beta 2)
**Aliases:** BSF-2,BSF2,CDF,HGF,HSF,IFN-beta-2,IFNB2,IL-6
**Location:**7p21

**The protein is primarily produced at sites of acute and chronic inflammation, where it is secreted into the serum and induces a transcriptional inflammatory response through interleukin 6 receptor, alpha. The functioning of this gene is implicated in a wide variety of inflammation-associated disease states.**

LIPEDEMA CASE STUDY

# Adipocytokine Signaling

TNF

**Label:** tumor necrosis factor
**Aliases:** DIF,TNF-alpha,TNFA,TNFSF2,TNLG1F
**Location:** 6p21.3

**This gene encodes a pro-inflammatory protein that is mainly secreted by macrophages, the scavengers of the immune system**. This protein is involved in a wide spectrum of biological processes including **cell proliferation, differentiation, lipid metabolism, coagulation, and cell death**. This protein has been implicated in a variety of diseases, including **autoimmune disease, insulin resistance**, and cancer.



LIPEDEMA CASE STUDY

# Vit D

VDR

**Label**: vitamin D (1,25- dihydroxyvitamin D3) receptor
**Aliases:** NR1I1,PPP1R163
**Location:** 12q13.11

Targets of Vitamin D Receptor (VDR) are principally involved in **mineral metabolism** though the receptor regulates a wide variety of other metabolic pathways by expression and repression of many genes.

LIPEDEMA CASE STUDY

# Lipedema Case Study

SULT2A1

**Label:** sulfotransferase family, cytosolic, 2A, dehydroepiandrosterone (DHEA)-preferring, member 1
**Aliases**: DHEA-ST,DHEAS,HST,ST2,ST2A1,ST2A3,STD,hSTa
**Location:**19q13.3

**SULT2A1 can convert a number of procarcinogens (such as heterocyclic amines from cooked meats) into highly reactive intermediates** which may act as chemical carcinogens and mutagens.



LIPEDEMA CASE STUDY

# Angiogenesis

VEGFA

**Label:** vascular endothelial growth factor A
**Aliases:** MVCD1,VEGF,VPF
**Location:** 6p12

**VEGFA encodes a protein that is responsible for increasing blood vessel permeability, stimulating new blood vessel growth, promoting cell migration, and inhibiting cell death.**

LIPEDEMA CASE STUDY

# Androgen Receptor Pathway

DDC

**Label:** dopa decarboxylase (aromatic L-amino acid decarboxylase)
**Aliases:** AADC
**Location:**7p12.2

**Defects in this gene are the cause of aromatic L-amino-acid decarboxylase deficiency** (AADCD). AADCD deficiency is an inborn error in neurotransmitter metabolism that leads to **combined serotonin and catecholamine deficiency**.



LIPEDEMA CASE STUDY

# CVD / MetS

LPL

**Label:** lipoprotein lipase
**Aliases:** HDLCQ11,LIPD
**Location:** 8p22

**The LPL gene provides instructions for making an enzyme called lipoprotein lipase.**

As a result, triglycerides attached to lipoproteins accumulate in the blood and tissues, leading to inflammation of the pancreas (pancreatitis), enlarged liver and spleen (hepatosplenomegaly), **fatty deposits in the skin (eruptive xanthomas),** and the other signs and symptoms of familial lipoprotein lipase deficiency.

LIPEDEMA CASE STUDY

# CVD / MetS

APOA5

**Label:** apolipoprotein A-V
**Aliases:** APOAV,RAP3
**Location:** 11q23

**The protein coded for by APOA5 is an apolipoprotein that plays an important role in regulating the plasma triglyceride levels**, a major risk factor for coronary artery disease.

- Mutations in this gene have been associated with hypertriglyceridemia (high triglycerides) and hyperlipoproteinemia. **Obesity and metabolic syndrome are both closely related to plasma triglyceride levels**.



LIPEDEMA CASE STUDY

# Circadian

ARNTL

**Label:** aryl hydrocarbon receptor nuclear translocator-like
**Aliases:** BMAL1,BMAL1c,JAP3,MOP3,PASD3,TIC,bHLHe5
**Location:** 11p15

**The protein encoded by this gene combines the protein from CLOCK to help regulate circadian rhythms**. Defects in this gene have been linked to infertility, problems with glucose and fat metabolism and altered sleep patterns.

LIPEDEMA CASE STUDY

# Circadian

CLOCK

**Label:** clock homolog (mouse)
**Aliases:** KAT13D,bHLHe8
**Location:** 4q12

**The protein encoded by CLOCK plays a central role in the regulation of circadian rhythms.** Polymorphisms in this gene may be associated with behavioral changes in certain populations and with obesity and metabolic syndrome.



LIPEDEMA CASE STUDY

# Detoxification

NAT2

**Label:** N-acetyltransferase 2 (arylamine N-acetyltransferase)
**Aliases:** AAC2,NAT-2,PNAT
**Location:** 8p22

**Carcinogens resulting from grilled and barbequed foods are processed by NAT2 and compromised NAT2 function affords a higher risk for colorectal cancer in those eating well-cooked meats.**

LIPEDEMA CASE STUDY

# Detoxification

CYP11B2

**Label:** cytochrome P450, family 11, subfamily B, polypeptide 2
**Aliases:** ALDOS,CPN2,CYP11B,CYP11BL,CYPXIB2,P-450C18, P450C18,P450aldo
**Location:** 8q21-q22

**CYP11B2 (aldosterone synthase)** is a phase I detoxifying/ synthesizing enzyme. The enzyme is involved in the synthesize of aldosterone. **Aldosterone is a steroid hormone produced by adrenal gland**. It plays a central role in the regulation of blood pressure mainly by increasing reabsorption of ions (sodium and potassium) and water in the kidney. **When out of balance, too much aldosterone which can lead to an increase in water retention, and an increase in blood pressure and blood volume.**



LIPEDEMA CASE STUDY

# Metabolism

COMT

**Label:** catechol-O-methyltransferase
**Aliases:** HEL-S-98n
**Location:** 22q11.21-q11.23/22q11.21

**Catechol-O-methyltransferase (COMT) gene helps break down the neurotransmitters dopamine and norepinephrine**. A defect due to certain variants in COMT will cause higher levels of dopamine due to slower breakdown, which can contribute to **anxiety and insomnia**. COMT is implicated in ADD/ADHD and bipolar disorders. A functioning FOKI SNP in the VDR gene and/or supplementing with **vitamin D enhances dopamine formation**.

LIPEDEMA CASE STUDY

# GSH

GGCT

**Label:** gamma-glutamylcyclotransferase
**Aliases:** C7orf24,CRF21,GCTG,GGC
**Location:** 7p15-p14

The protein encoded by this gene catalyzes the formation of **5-oxoproline** from gamma-glutamyl dipeptides, the penultimate step in glutathione catabolism, and may play a **critical role in glutathione homeostasis.**



LIPEDEMA CASE STUDY

# Metabolism

DDC

**Label:** dopa decarboxylase (aromatic L-amino acid decarboxylase)
**Aliases:** AADC
**Location:** 7p12.2

The DDC gene provides instructions for making the aromatic l-amino acid decarboxylase (AADC) enzyme, which is important in the brain and nervous system. This enzyme takes part in the pathway that produces dopamine and serotonin, which are chemical messengers that transmit signals between nerve cells (neurotransmitters). DDC is responsible for the synthesis of **dopamine and serotonin** from L-DOPA and L-5-hydroxytryptophan, respectively.

LIPEDEMA CASE STUDY

# Detoxification

ALDH2

**Label:** aldehyde dehydrogenase 2 family (mitochondrial)
**Aliases:** ALDH-E2,ALDHI,ALDM
**Location:** 12q24.2

**Aldehyde dehydrogenase is the second enzyme of the major metabolic pathway of alcohol metabolism.**



LIPEDEMA CASE STUDY

# Lipedema Case Study

LEP

**Label:** aldehyde dehydrogenase 2 family (mitochondrial)
**Aliases:** ALDH-E2,ALDHI,ALDM
**Location:** 12q24.2

Leptin (from Greek λεπτός leptos, "thin"), the **"satiety hormone,"** is a hormone made by adipose cells that helps to regulate energy balance by inhibiting hunger. Leptin is opposed by the actions of the hormone ghrelin, the "hunger hormone". Both hormones act on receptors in the arcuate nucleus of the hypothalamus to regulate appetite to achieve energy homeostasis. In obesity, a decreased sensitivity to leptin occurs, resulting in an inability to detect satiety despite high energy stores. Dieters who lose weight, particularly those with an overabundance of fat cells, experience a drop in levels of circulating leptin. **Although leptin reduces appetite as a circulating signal, obese individuals generally exhibit a higher circulating concentration of leptin than normal weight individuals due to their higher percentage body fat.** These people show resistance to leptin, similar to resistance of insulin in type 2 diabetes, with the elevated levels failing to control hunger and modulate their weight. **The consumption of a high fructose diet from birth has been associated with a reduction in leptin levels**.

- This gene encodes a protein, leptin, that is secreted by white adipocytes, and which plays a major role in **the regulation of body weight**. This protein, which acts through the leptin receptor, functions as part of a signaling pathway that can inhibit food intake and/or regulate energy expenditure to maintain constancy of the adipose mass. **This protein also has several endocrine functions, and is involved in the regulation of immune and inflammatory responses, hematopoiesis, angiogenesis and wound healing.** Mutations in this gene and/or its regulatory **regions cause severe obesity**, and morbid obesity with hypogonadism. This gene has also been linked to type 2 diabetes mellitus development.

designs for health Australia
WEBINAR: Lipedema: The Modern Face of Obesity

LIPEDEMA CASE STUDY

# Lipedema Case Study

TLR4

**Label:** toll-like receptor 4
**Aliases:** ARMD10,CD284,TLR-4,TOLL
**Location:** 9q33.1

The protein encoded by this gene is a member of the Toll-like receptor (TLR) family which plays a fundamental role in pathogen recognition and activation of innate immunity. TLRs are highly conserved from Drosophila to humans and share structural and functional similarities. **They recognize pathogen-associated molecular patterns** that are expressed on infectious agents, and mediate the production of cytokines necessary for the development of effective immunity. The various TLRs exhibit different patterns of expression. **This receptor has been implicated in signal transduction events induced by lipopolysaccharide (LPS) found in most gram-negative bacteria**. Mutations in this gene have been associated with **differences in LPS responsiveness**. Multiple transcript variants encoding different isoforms have been found for this gene. [provided by RefSeq, Jan 2012]



LIPEDEMA CASE STUDY

# Lipedema Case Study

FOXO1

**Label:** forkhead box O1
**Aliases:** FKH1,FKHR,FOXO1A
**Location:** 13q14.1

FOXO1 is a transcription factor that plays an **important role in how much insulin is taken up by cells, how much glucose is made in the body, and is also an important factor in helping cells decide to become adipocytes, or fat cells**.

LIPEDEMA CASE STUDY

# Lipedema Case Study

CETP

**Label:** cholesteryl ester transfer protein, plasma
**Aliases:** BPIFF,HDLCQ10
**Location:** 16q21

Cholesteryl ester transfer protein (CETP), also called plasma lipid transfer protein, **assists the transport of cholesterol components and triglycerides between the lipoproteins**. It collects triglycerides from very-low-density (VLDL) or low-density lipoproteins (LDL) and exchanges them for cholesterol components from high-density lipoproteins (HDL), and vice versa.



LIPEDEMA CASE STUDY

# Lipedema Case Study

TPH1

**Label:** tryptophan hydroxylase 1
**Aliases:** TPRH,TRPH
**Location:** 11p15.3-p14

The TPH2 gene provides instructions for making a protein that enables the **first step in the biosynthesis of serotonin**, an important hormone and neurotransmitter. This step is also rate-limiting, which means that any reduction in efficiency of TPH1 will affect the rate of production of serotonin. Variants in this gene have been associated with an increased risk for a variety of diseases and disorders, **including schizophrenia, somatic anxiety, anger-related traits, bipolar disorder, suicidal behavior, addictions, and others**.

LIPEDEMA CASE STUDY

# Lipedema Case Study

TPH2

**Label:** tryptophan hydroxylase 2
**Aliases:** ADHD7,NTPH
**Location:**12q21.1

- The TPH2 gene provides instructions for making a protein that enables the first step in the biosynthesis of serotonin, an important hormone and neurotransmitter. **This step is also rate-limiting, which means that any reduction in efficiency of TPH2 will affect the rate of production of serotonin.** TPH2 is primarily found in the neurons of the brain which are serotonergic, that is, the nerve cells which have nerve ending that release and are stimulated by serotonin.
- Drugs that alter serotonin levels are used in treating depression, generalized anxiety disorder and social phobia. Depletion of serotonin is common between disorders such as obsessive-compulsive disorder, depression and anxiety.



Natural Healthcare Center
10 West End Ct
Long Branch, NJ 07740 U.S.A.

**Date Received** 01/31/2020
**Date Reported** 02/06/2020

| Analyte | Result | Unit per Creatinine | L | WRI | H | Reference Interval |
|---|---|---|---|---|---|---|
| Serotonin | 68.2 | µg/g | | | | 60 – 125 |
| Dopamine | 160 | µg/g | | | | 125 – 250 |
| Norepinephrine | 16.8 | µg/g | | | | 22 – 50 |
| Epinephrine | 0.6 | µg/g | | | | 1.6 – 8.3 |
| Norepinephrine / Epinephrine ratio | 28.0 | | | | | < 13 |
| Glutamate | 11 | µmol/g | | | | 12.0 – 45.0 |
| Gamma-aminobutyrate (GABA) | 3.9 | µmol/g | | | | 2.0 – 5.6 |
| Glycine | 750 | µmol/g | | | | 450 – 2200 |
| Histamine | 12 | µg/g | | | | 14 – 44 |
| Phenethylamine (PEA) | 50 | nmol/g | | | | 32 – 84 |
| Creatinine | 89.7 | mg/dL | | | | 30 – 225 |

## Neurotransmitter Comments:

- Urinary neurotransmitter levels provide an overall assessment of the body's ability to make and break down neurotransmitters and are representative of whole body levels. Neurotransmitters are secreted all through the body, in neurons of both the central and peripheral nervous systems. The enzymes, cofactors and precursors in neurotransmitter metabolism in general are the same in the periphery and in the central nervous system. Therefore, alterations in urinary neurotransmitter levels assessed in urine provide important clinical information, and may be associated with many symptoms including cognitive and mood concerns, diminished drive, fatigue and sleep difficulties, cravings, addictions and pain.
- Low range serotonin may contribute to mood concerns including anxiety, OCD, depression, anger and a sense of discontentment. Low range serotonin may also be associated with poor sleep quality and appetite changes. as well as chronic fatigue, rheumatoid arthritis, and over-all lassitude. Failure to regenerate tetrahydrobiopterin [BH4], an essential cofactor for serotonin synthesis, may decrease serotonin levels, and could be reflected in urine. BH4 regeneration may be supported by folates, vitamin B3, C, molybdenum and zinc. Additionally, production of serotonin requires vitamin D, iron and vitamin B6. Tryptophan is the essential precursor of serotonin. 5-HTP may increase serotonin, and L-theanine may affect serotonin function.
- Low norepinephrine and low epinephrine may be associated with depression and mood changes as well as fatigue, difficulty concentrating, decreased ability to stay focused on tasks and diminished sense of personal/professional drive. Norepinephrine is converted from dopamine requiring vitamin C, copper and niacin (B3). L-tyrosine, L-theanine and Mucuna pruriens influence this pathway.
- Elevated N/E ratio is consistent with poor conversion of norepinephrine to epinephrine. This conversion is driven by the phenylethanolamine N-methyltransferase (PNMT) enzyme that requires SAMe, magnesium and cortisol (adequate HPA axis function) as cofactors. Suggest interpretation in context of cortisol levels/HPA axis function, with subsequent optimization of HPA axis function when clinically warranted.
- Low glutamate may be associated with depression, increased addictive tendencies including food seeking behaviors, and can contribute to mental fatigue and diminished mental stimulation. L-glutamine is a precursor amino acid.
- Low histamine may affect digestion and appetite control, learning, memory, and mood, and may result in drowsiness. Histamine has been noted to modulate neurotransmitter release from neurons. Histamine levels may be supported by consumption of high-protein foods and whole grains, as well as L-histidine supplementation. Vitamin B6 is a cofactor for histamine synthesis.
- Considerations to address the demonstrated imbalances beyond the identified co-factors and amino acid precursors may include dosage adjustments if indicated, as well as nervine and adaptogenic herbs, methylation support, vitamin D, and gastrointestinal health optimization.



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# PANEL DISCUSSION

## Live Q & A

## INGREDIENTS TO CONSIDER

### PROBIOTICS

- Live microorganisms work to grow and maintain a healthy gut
- Assists in normal gut functioning
- Assist gut – immune interface

### MAGNESIUM

- Regulates nerve, muscle and blood pressure function
- Hormone secretion
- Involved in making bone, proteins and DNA
- Improves mitochondrial function
- Helps energy production

### VITAMIN D

- Works with calcium to build strong bones
- Muscle movement
- Nerve communication
- Bolster immunity
- Cellular building material
- Mood stabilization

### VITAMIN C

- Powerful antioxidant
- Required to make collagen
- Bolsters immunity
- Helps to absorb iron from foods
- Promotes the healing of wounds

**AVAILABLE AS A DOWNLOADABLE RESOURCE**

### CURCUMIN

- Reduces inflammation
- Supports liver health
- Antimicrobial

### VITAMIN B12

- Preserves blood and nerve cell health
- Helps DNA maintenance
- Improves mitochondrial function
- Supports energy production

### FISH OIL

- Reduces levels of triglycerides
- Reduces inflammation

# DFH products to consider for your Lipedema patients


Zymegest™ 50
60 Hard Capsules


Liposomal
Glutathione
100 ml


Annato-E™ 150
30 Hard Capsules


Curcum-Evail™
60 Soft Capsules

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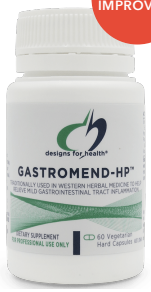


Gastromend-HP™
60 Hard Capsules


GI-Revive™
225g Oral Powder

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WEBINAR: Lipedema: The Modern Face of Obesity

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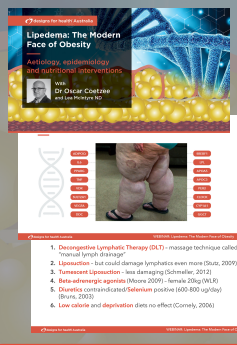
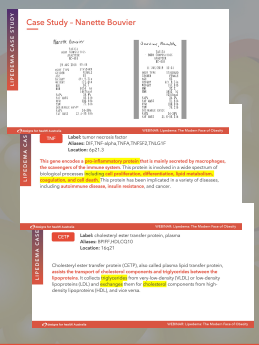
## Resources & Downloads

### PRESENTATION SLIDES




### CASE STUDIES




### INGREDIENTS REFERENCE


### CERTIFICATE OF ATTENDANCE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