**Methylation**

**WHAT IS METHYLATION?**

Methylation is a vital metabolic process that happens in every cell and every organ of the human body, taking place a million times a second. Life would simply not exist without it. Think of billions of little on/off switches inside your body that control everything from your stress response and how your body makes energy from food, to your brain chemistry and detoxification. That’s methylation.

Methylation is the transfer of a methyl group (1 Carbon atom & 3 Hydrogen atoms) onto amino acids, proteins, enzymes and DNA. The addition of a methyl group onto these molecules facilitates biochemical reactions vital to critical functions in our body such as: thinking, repairing DNA, turning on and off genes, fighting infections and detoxification (especially in the liver). It is also important for the proper functioning of the Hypothalamic-Pituitary-Adrenal (HPA) axis and critical for the synthesis of all neurotransmitters and histamine; for example, the enzyme that converts norepinephrine to epinephrine is dependent on methylation for activation.

**Why should we be concerned about Methylation?**

Methylation is involved in the following:
- 400 + enzymatic & cellular reactions
- DNA synthesis & repair
- Cell replication & repair
- Neurotransmitter synthesis & metabolism
- Energy production/metabolism
- Hormone regulation
- Detoxification
- Epigenetics – gene expression/regulation
- Telomere Integrity

**Methylation turns genes on and off**

When a molecule receives a methyl group, this "starts" a reaction (such as turning a gene on or activating an enzyme). For example molecules receiving methyl groups "turn on" detox reactions that detox the body of chemicals, including phenols. So if you are phenol sensitive, and increase your methylation, then theoretically your body can process more phenols and you can eat high phenol containing fruits without enzymes!

Another example is molecules receiving methyl groups "turn on" serotonin, and thus melatonin, production. Therefore, if you are an under-methylator, you can increase your methylation and have higher levels of serotonin and melatonin. This may mean reducing SSRIs, or having improved sleep.

When the methyl group is "lost" or removed, or if we are short of methyl groups, the reaction stops. When we are short of methyl groups our body cannot respond to the nutrients, vitamins, minerals or herbs we ingest, affecting many biological reactions in the body.
There are four cornerstones to the methylation cycle – Methionine, (SAMe), S-adenosylhomocysteine, Homocysteine. There are important co-factors that allow the methylation cycle to function including the B vitamins i.e. folate, B12 and B6. These B vitamins have to be in their activated form, namely Methylcobalamin, Folinic acid, 5 MTHF and Pyridoxyl-5-Phosphate.

WHY DOES OUR METHYLATION CYCLE NOT FUNCTION PROPERLY?

Our methyl groups e.g. choline, methionine, MTHF, B6 and B12 may not be working properly due to:
- A genetic mutation e.g. MTHFR.
- Shortage of methyl groups – from environmental pollutants like Bisphenol A in plastics, chemicals & heavy metals such as lead, mercury, cadmium (from smoking).
- Diet – humans ingest approximately 50 mmol of methyl groups per day; 60% of them are derived from choline. When they are deprived of choline, they use more methyl groups from folate, increasing dietary folate requirements. Conversely, when they are depleted of folate, they use more methyl groups from choline, increasing the dietary requirement for choline.
- Stress – if the stress response is using up the methyl groups then this shortage will affect other organs like the brain, thyroid, adrenals & pancreas.
- Aging – methyl groups decline with age. So cognitive decline can be greater if we have a decrease of methyl groups.
- Infections – viruses/bacteria, fungi.
- Alcohol – the ethanol in alcohol inhibits methylation.
- Medications e.g. antacids, methotrexate – can hinder the methylation pathway.

METHYL-RELATED FOODS

- Folate – strawberries, citrus fruits & leafy green vegetables.
- Vitamin B12 – fish, meat, milk & eggs.
- Choline oxidizes to form a source of methyl called Betaine – which is found in beef liver, toasted wheat germ, eggs, cod, beef, brussel sprouts, broccoli, shrimp & salmon. Two large eggs contain 252mg choline, nearly half of the recommended 550mg per day for men.

WHAT IS MTHFR?

- An enzyme that adds a methyl group to folic acid to make it usable by the body.
- The MTHFR gene produces this enzyme that is necessary for properly converting folic acid to its active form 5MTHF. This enzyme is also important for converting homocysteine into methionine.
- Activated folate (5MTHF) goes on to give its methyl group to other nutrients & substances – “methylation.”
- 5MTHF is required for the creation of every cell in our body, and also used to create neurotransmitters (serotonin, epinephrine, norepinephrine & dopamine); create immune cells; process hormones (i.e estrogen); as well as to produce energy & detoxify chemicals.

MTHFR GENE MUTATION

- Those with a defective MTHFR gene have an impaired ability to produce the MTHFR enzyme (estimates range from 20%-70% or more). This can make it more difficult to break down and eliminate substances like heavy metals.
- Individuals with the MTHFR gene mutation have difficulties processing B9 in the form of folic acid (commonly present in supplements and added to processed foods). This type of B9 may even cause a build-up in the body leading to toxicity which can raise levels of homocysteine.
- Elevated homocysteine levels are associated with a higher risk of heart disease, inflammation, birth defects, difficult pregnancies, and potentially an impaired ability to detoxify. This also affects the conversion to glutathione, which the body needs to remove waste and which is a potent antioxidant.
- Many factors can contribute to the expression of the MTHFR mutation including; our environment, foods, chemical exposure & stress.
The reason for the types of mutations is variations in the specific genes passed on from each parent. In other words, if both parents pass on a healthy gene, a person won’t have a mutation at all. If one parent passes on a healthy gene but the other passes on a mutated gene, several variations can occur. If both parents pass on a mutated form, there are many more scenarios that can occur.

The two most problematic mutations in the MTHFR gene that can occur are the following SNP’s: C677T and A1298C. While a ‘normal’ MTHFR gene would be C 677C (c= cytosine), a mutation has made the gene C 677T (t= thymine). The letter represents the nucleotide base and the number refers to the location of the mutation on the gene.

The most common forms of MTHFR mutation involve various combinations of these genes being passed on from each parent:

- **Homozygous**: the same gene passed on from both parents – can occur if both pass on the 677 mutation or the 1298 mutation.
- **Heterozygous**: one parent passed on the 677 mutation or the 1298 mutation but the other parent passed on a normal gene.
- **Compound Heterozygous**: one parent passed on the 677 mutation and the other passed on the 1298 mutation.

When the methylation cycle does its job it supports a wide range of bodily functions. But when SNPs are present in key places in the cycle, they can cause an over or underproduction of certain chemicals, undermining the task of methylation.

SNPs (Single Nucleotide Polymorphisms) are the most common type of genetic variation among people. Each SNP represents a difference in a single DNA building block, called a nucleotide. For example, a SNP may replace the nucleotide cytosine (C) with the nucleotide thymine (T) in a certain stretch of DNA. Commonly tested SNPs include; MTHFR C677T & MTHFR A1298C.

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**WHAT IS A SNP?**

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**EDUCATIONAL RESOURCES TO FURTHER YOUR LEARNING**

Order your audio CD recording and notes of FxMed’s recent seminar with Carolyn Ledowsky ‘Methylation & Mitochondrial Health’ for only $35 by e-mailing support@fxmed.co.nz with your Name and FxMed Account Number.

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**SPECIFIC SUPPLEMENTS FOR METHYLATION & MTHFR SUPPORT**

**ATP Fuel by Researched Nutritional**

> Formulated to promote healthy mitochondrial membrane function and maximize the Krebs cycle’s production of cellular energy.

Contains:

- **NT Factor® Energy** – a unique phospholipid (choline, serine & other lipids) delivery system which nurtures the body’s mitochondrial membrane repair process, promoting healthy mitochondrial function & healthier oxidative stress levels. It also maximises ATP production by regulating fatty acid build up.
- **NADH** – the reduced coenzyme form of vitamin B3 that is critical in the process of converting food into cellular energy. This “reducing” power is what drives ATP production – one unit of NADH drives three units of ATP (the body’s energy fuel).
- **CoQ10** – the mitochondrial energizer that helps to recharge the energy system in the heart and other body cells. It is involved in preventing LDL’s from becoming oxidized, which helps protect the arteries, promotes healthy cardiovascular function & is a potent antioxidant.

**Supplement Facts**

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<tr>
<td><strong>Amount Per Serving</strong></td>
<td>% Daily Value**</td>
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<td>Vitamin E (as d-alpha tocopheryl) succinate, mixed tocopherol</td>
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<td>Magnesium (from Mitochondrial Pro Regulator® Blend)</td>
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<td>NADH</td>
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<td>CoQ10</td>
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<td>Krebs Cycle Glucose Absorb™</td>
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**Other Ingredients:** Gelatin, calcium palmitate, rice flour. Product contains ingredients derived from soy.

**ORDER NOW!**

> ATP Fuel 150c: Pract. Price $52.20, RRP $78.30, Promo $41.76
Kerry is FxMed’s Auckland and Northland Practitioner Consultant. She is particularly passionate about nutrition, with a keen interest in food and ways to nourish the body.

We are all busy these days, and it is often our nutrition that suffers because of it. Eating well is a cornerstone to good health and it really doesn’t need to be complicated or take up too much of your time!

Here is some Good Fast Food- easy weeknight dinner recipes that are nourishing, quick to make, taste good and can easily be made for one person or the whole family (by adjusting the quantities).

They have good protein, good fat, are low carb and can be made in under 15 minutes! Easy!
Steak and Veggies:
1x piece Steak (e.g Scotch Fillet)
2x Handfuls Salad Leaves (e.g Baby Spinach Leaves)
½ Avocado
1x cup Broccoli and Green Beans
Fresh or Frozen veggies

• Pour a little coconut oil in a pan and fry steak for about 4 minutes each side (according to preference).
• Place salad leaves on the plate.
• Mash the avocado, season with salt and pepper and add to the plate.
• Lightly steam the broccoli and green beans, and add to the plate with salad leaves and avocado.
• Place the steak on top.

Salmon with Strawberry Salsa:
1x Salmon Fillet
2x Handfuls Salad Leaves (e.g Watercress)
½ Avocado

Salsa:
3x Strawberries, diced
3x Basil Leaves, finely sliced
3x Mint Leaves, finely sliced
1x tablespoon Red Onion, diced
1x teaspoon Red Wine Vinegar
1x teaspoon Olive Oil

• Prepare the salsa by combining all the ingredients.
• Pour a little coconut oil in a pan and fry the Salmon Fillet for a few minutes each side (according to preference).
• Prepare the plate by placing the salad leaves on the plate and adding the mashed avocado.
• Add the cooked salmon and top with the strawberry salsa.

Cheese and Tomato Omelette:
2x Eggs (add a little water or milk and beat)
1x Tomato, sliced
½ cup Cheese
2 Handfuls Salad Greens (e.g Watercress)

• Heat the grill in the oven. Pour a little coconut oil in a small frying pan.
• Add the sliced tomato.
• Pour the egg mixture over the top.
• Let the egg set a little and then place in the oven under the grill.
• Once the egg is completely set, add the cheese and return under the grill till melted.

Tuna Salad:
1x Can Tuna
2x Handfuls Salad Leaves (e.g Mixed salad leaves)
½ Avocado
½ cup Peas, lightly steamed
Harissa
Mayonnaise

• Arrange the salad leaves on a plate and add the lightly steamed peas, avocado and tuna.
• Top with harissa and good quality mayonnaise.

Halloumi Salad:
100g Halloumi Cheese
2x Handfuls Salad Greens (e.g Baby Spinach)
½ Tomato, sliced
6x slices Cucumber
1x slice Red Onion
1 Handful Walnuts
Balsamic Glaze

• Prepare the salad leaves, tomato, cucumber and walnuts on a plate.
• Pour a little coconut oil in a frying pan and fry the halloumi cheese until golden on each side.
• Add to the plate and drizzle with Balsamic Glaze.
NEW PRODUCTS

Gaia Herbs  ‘HPA Axis’ Suite – 3 great products.

Patients taking HPA Axis Daytime Maintenance can add HPA Axis Sleep Cycle to their daily regimen for nighttime support. Patients needing to revive adrenal function can take HPA Axis Homeostasis for 6-8 weeks, and then use HPA Axis Daytime Maintenance for ongoing daily support.


PRODUCT DELETIONS:

- Calcium Magnesium CitraMate 90c by Thorne Research – Still available in 240c or Pure Encapsulations have 180c available.
- Algae Omega 60sg by Nordic Naturals – Nordic Naturals retail Algae caps can be sent as an alternative on request, same strength, slightly different packaging.
- Arctic Cod Liver Oil Plain & Lemon 237ml by Nordic Naturals – Alternative flavours available are orange or strawberry.
- RegeneMax 60c by Xymogen – Suggested alternative: RegeneMax Liquid 60ml.
- Maca Powder 227g by Gaia Herbs – Suggested alternative: Maca-3 60c by Pure Encapsulations.

PRODUCT CHANGES & UPGRADES:

- Basic Prenatal – by Thorne Research – Slight increase in the amount of B Vitamins and many of the ingredients have been upgraded to more absorbable forms. Lutein has been removed from the formulation to make room for this. Please contact your Practitioner Consultant or Customer Services for a full comparison chart.
- Reformulation of AR-Encap – by Thorne Research – Now includes 50mg of Bromelain per capsule instead of 50mg of Devil’s Claw.
- Buffered C Powder – by Thorne Research – Slightly larger scoop size, new scoop provides same dose as old scoop did. Container size is now 231g to still provide 42 serves per container.
- Sacro-B – by Thorne Research – Now in a glass bottle and has Silicon Dioxide added as a filler.
- Transfer Factor LymPlus – by Researched Nutritional – Name change, now ‘Transfer Factor L-Plus’. Same great formula.
Menopause spells the end of ovarian estrogen production and of reproductive capabilities, and although the sometimes debilitating hot flashes take center stage, many other symptoms and ailments occur as a consequence of estrogen deficiency.

Estrogen is the master of metabolic homeostasis – the regulator of fat and sugar metabolism, the protector of the brain, and of the Master Clock of the body, which controls the coordination of all organs through the Circadian Rhythm. The loss of ovarian estrogen production signals the onset of a host of medical issues for peri and menopausal women.

The presentation will provide a comprehensive overview of the many critical roles which estrogen plays, along with it's relationship with the Circadian Rhythm as well, case studies will be presented and practical and effective protocols will be discussed, allowing one to implement the highest level of functional and integrative medical care to your women patients ... the very next day!

What you'll learn:

• You will gain a thorough understanding of the many critically important roles played by estrogen, apart from its role in reproduction.
• The fundamentals of the Circadian Rhythm, and how estrogen controls the Master Clock, located atop the optic nerves, and how the Master Clock orchestrates a harmonious synchrony between all the organs of the body.
• How hormonal therapy, especially when replaced in a physiological manner, can work with the female body to maintain body functions at an optimal level.
• Protocols to easily grasp the natural approach to menopausal care. Gain practical insight and the ability to apply these easy and effective protocols to your practice the very next day.

PRESENTER: Felice L Gersh, MD
Award winning Felice L Gersh, MD is one of a small number of Board Certified OB/GYN physicians who is also a graduate of the prestigious two year Fellowship in Integrative Medicine at the University of Arizona School of Medicine. She is also the Medical Director for the Integrative Medical Group of Irvine, California, where she works alongside her team of lifestyle and holistic practitioners to promote the optimal care of their patients.

VENUE: Hotel Sofitel Auckland, New Zealand
DATE: Wednesday, 2nd November
COST: $65 – Early-bird $45 until 14th October
Students $45
TIMES: 5:30pm – Arrival & Registration
6:00 - 9:15pm – Seminar & Dinner
9:15 - 9:30pm – Q & A

For more details and to register, visit: http://fxmed.co.nz/education/upcoming-events/

PURE ENCAPSULATIONS WEBINAR

PureSynapse
FREE Webinar • Date: Wednesday 16th November, 2016 • Times: Live at 10:00-11:00am AEDT or Recording available from 3:00pm

Join us for the upcoming free Pure Encapsulations ‘PureSynapse’ Webinar - presented by Kelly C Heim, Ph.D.

Presented by Kelly C. Heim, Ph.D.
Kelly C. Heim is a Nutritional Pharmacologist in Research and Development at Pure Encapsulations. He is a graduate of Dartmouth Medical School, where he studied molecular pharmacology, epigenetics and functional genomics. His publications and lectures have highlighted evolving concepts in polyphenol biochemistry, nutritional endocrinology and nutrigenomics.

For more details and to register, visit: http://fxmed.co.nz/education/upcoming-events/

GAIA HERBS WEBINARS

Immune Support Herbs: Historical Uses and Modern Science with Tori Hudson, ND
FREE Webinar
Date: Wednesday, 12th OCTOBER • Time: 7:00-8:00am AEDT

The Better Health Win-Win; An Overview Highlighting Patient & Practitioner Benefits with Ashley Koff, RD
FREE Webinar
Date: Wednesday, 26th OCTOBER • Time: 7:00-8:00am AEDT

To find out more and register for these Gaia Herbs webinars, visit: http://fxmed.co.nz/education/upcoming-events/
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<td>Folate 400 provides L-5-MTHF, the naturally occurring, universally metabolized form of folate.</td>
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<td>An essential amino acid that is required to convert homocysteine (a risk factor for Cardiovascular Disease excess) back into methionine, as part of the methylation cycle.</td>
<td>100c</td>
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<td>NAC 600mg</td>
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<td>N-Acetyl Cysteine is beneficial in detoxification pathways and hepatic function.</td>
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<td>SAME 200mg</td>
<td>20% off</td>
<td>An important methyl donor which is required for numerous reactions in the methylation cycle.</td>
<td>60c</td>
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<td>Taurine 500mg</td>
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<td>An important methyl donor required in the methylation cycle. It also protects against glutamate toxicity and aids in magnesium intracellular transport.</td>
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<td>Xymogen</td>
<td>B Activ</td>
<td>20% off</td>
<td>Contains the entire spectrum of B vitamins to support adrenal, neurological, and stress-related functions</td>
<td>90c</td>
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<td>Researched Nutritional</td>
<td>ATP Fuel</td>
<td>20% off</td>
<td>Designed to support the Krebs Cycle &amp; cellular energy production.</td>
<td>150c</td>
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<td>Tri-Fortify Original</td>
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<td>A potent anti oxidant that is critical in the methylation cycle as it promotes detoxification.</td>
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<td>Omega 3's contribute to cell membrane structure and integrity having a positive affect on DNA methylation, single nucleotide polymorphisms (SNPs) and gene expression.</td>
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<td>ReadiSorb</td>
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