Improving Patient Outcomes:

Identifying Common Methylation Polymorphisms

by Benjamin Lynch, ND
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I consult for Iverson Genetics.

I am President and CEO of Seeking Health, LLC

I am founder of MTHFR.Net

I am not promoting any products or programs for any financial gain.

Who is Benjamin Lynch?

- Cell & Molecular Biology, BS from University of Washington
- Doctorate in Naturopathic Medicine from Bastyr University
- Licensed Naturopathic Physician in the State of Washington.
- Founder of www.MTHFR.Net – a website dedicated towards increasing awareness of the MTHFR defect and providing resources around it.
- President & CEO of Seeking Health, LLC – providing a pure line of lifestyle products and nutrients to the general consumer market and physicians. Focused on disease prevention and health promotion.

Background

- *Before educating you how on methylation defects, I want to share my experience:*
- Clinical focus: Environmental medicine, nutritional biochemistry, gastroenterology, nutrigenomics
- Worked with 100's of individuals with MTHFR defects and methylation dysfunction.
- Extensively research and compile scientific data from Medline on a daily basis.

Purpose of this Presentation

- Provide general overview on methylation

Expand awareness of genetic defects which affect methylation

Improve ‘difficult’ patient outcomes

Reduce lifelong suffering of various chronic diseases and conditions by identifying genetic mutations early on

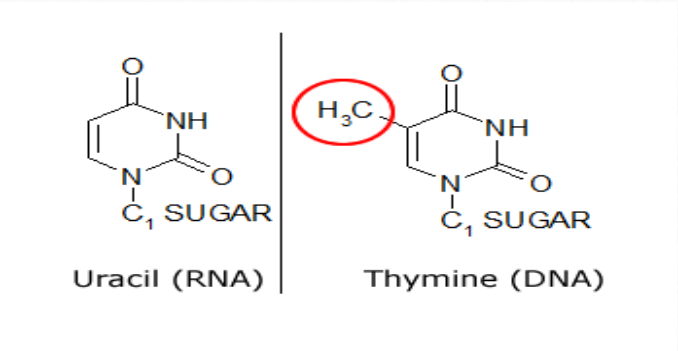
NOTE: We have 1 hour to cover a topic which demands a full week of presentations. Please be aware this presentation covers the basics of methylation and why methylation testing is important.

Overview of this Presentation

- What is Methylation? What functions does it serve?
- What inhibits and supports Methylation?
- Multifaceted approach to optimizing health
- Screening for Methylation Testing
- When, why and how to order genetic testing?
- What to do with test results?

Methylation. What is it?

- Methylation uses the process of donating ‘Methyl Groups’ to a substrate.
  - A Methyl Group = 1 Carbon bound to 3 Hydrogens = CH3
  - Methyl groups substrates are commonly, but not limited to:
    - DNA and RNA,
    - chemicals,
    - Neurotransmitters and hormones,
    - immune cells,
    - nerves.



Fairly important!

Functions of Methylation

Functions of Methylation:

1. Turn on and off genes (gene regulation)
2. Process chemicals and toxins (biotransformation)
3. Build neurotransmitters (dopamine, serotonin, epinephrine)
4. Process hormones (estrogen)
5. Build immune cells (T cells, NK cells)
6. DNA and RNA synthesis (Thymine aka 5-methyluracil)
7. Produce energy (CoQ10, carnitine, ATP)
8. Produce protective coating on nerves (myelination)

How is Methylation Regulated?

Methylation is regulated by Enzymes and Substrate (end product)

1. Many enzymes require cofactors to activate
    - Cofactors are derived from minerals or vitamins.
2. Cofactors are required to complete methylation
3. Cofactors are required to turn off methylation
4. Excessive substrates may turn off methylation (feedback inhibition)

How is Methylation Disturbed?

Methylation is often disturbed by various mechanisms

1. Lack of cofactors driving methylation forward (zinc, magnesium, B6)
2. Medications (antacids)
3. Specific nutrients depleting methyl groups (niacin)
4. Environmental toxicity, heavy metals, chemicals (acetylaldehyde, arsenic, mercury)
5. Excessive substrate (feedback inhibition)
6. Genetic mutations

Ever Seen These Conditions?

- Diabetes
- Cancer
- Pulmonary Embolisms
- Cleft Palette
- Spina Bifida
- Autism
- Parkinson's
- Neural Tube Defects
- Atherosclerosis
- Immune Deficiency
- ADD/ADHD
- Multiple Sclerosis
- Alzheimer's
- Dementia
- Chemical Sensitivity
- Congenital Heart Defects
- Fibromyalgia
- Chronic Fatigue Syndrome
- Depression
- Alcoholism
- Addictive Behaviors
- Insomnia
- Down's Syndrome
- Chronic Viral Infection
- Thyroid Dysfunction
- Neuropathy
- Recurrent Miscarriages
- Infertility
- Anxiety
- Schizophrenia
- Bipolar
- Allergies

Why are all these conditions so prevalent?

- **Industrialized Farming (and Ranching):** poor nutrition, chemical exposure

Increased Stressors: longer work hours, less sleep, more demands, faster society

Chemicals Pervasive in the Environment: schools, home, food, water, work, air, soil, products

- **Standardized Healthcare**: symptomatic treatment vs identifying underlying causes

Lack of Education: unaware of common every day harmful exposures

Lobbyists: protecting big business

What do these causal factors of disease have in common?

- Industrialized Farming (and Ranching): poor nutrition, chemical exposure

Increased Stressors: longer work hours, less exercise, less sleep, more demands, faster society

Symptomatic Treatment vs Identifying Underlying Causes

Chemicals Pervasive in the Environment: schools, home, food, water, work, air, soil, products

Decreased Methylation

What do you do about the causal factor of disease?

- A **Multifaceted** approach is needed to restore health and prevent disease – ie. Balance methylation

- The current multifaceted approach to balancing methylation:
  1. Lifestyle
  2. Diet
  3. Environment
  4. Mental Outlook
  5. Nutrition

- This approach is demanding, requires patient education, is difficult to achieve, hard to maintain and takes time…but…

Balancing Methylation is Required.

Current Approach is Not Enough: Must Adapt and Evolve

- The Multifaceted approach is not enough for a significant portion of the population.

- 'Difficult' chronic disease patients are still not improving – yet they attempt change in all these areas:
  1. Lifestyle
  2. Diet
  3. Environment
  4. Mental Outlook
  5. Nutrition

Genetics is the missing factor in helping identify underlying causes of decreased methylation.

Which ‘new’ Genes to Screen for?

MTHFR is primary and may be ordered solo. Order this first.
Spectracell has best rates for MTHFR (and tests for both A1298C and C677T)

Patient not improving after addressing MTHFR? Consider further genetic testing:

- COMT and MAO A: processes neurotransmitter catabolism and estrogens
- CBS: processes homocysteine and if upregulated, depletes methyl groups, increases taurine
- MTR/MTRR: recycles B12 and processes B12 for methionine production
  GSTM1 and SOD: major detoxification enzymes
- GAD: transforms glutamate to GABA
- HNMT: processes histamine (secondary enzyme for histamine; primary is DAO)
- QDPR: recycles BH4
- NOS: processes ammonia, forms nitric oxide from arginine
- SUOX: processs sulfites/sulfur and this mutation is made worse from CBS upreg

Who to Screen for MTHFR Mutations?

- Pre-Conception Care
- Newborn
- Mental Dysfunction
- 'Syndromes'
- Neurological Disorders
- Cancer
- Cervical Dysplasia
- Cardiovascular Risk
- Birth Defects
- Drug Sensitivities
- Supplement Sensitivities
- Chronic Pain
- Elevated Histamine
- Elevated Cobalamin

- Diabetes
- Cancer
- Pulmonary Embolisms
- Cleft Palette
- Spina Bifida
- Autism
- Parkinson's
- Neural Tube Defects
- Atherosclerosis
- Immune Deficiency
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- Fibromyalgia
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- Down's Syndrome
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- Thyroid Dysfunction
- Neuropathy
- Recurrent Miscarriages
- Infertility
- Anxiety
- Schizophrenia
- Bipolar
- Allergies

EVERYONE!

The MTHFR SNP is most critical to identify first. Why?

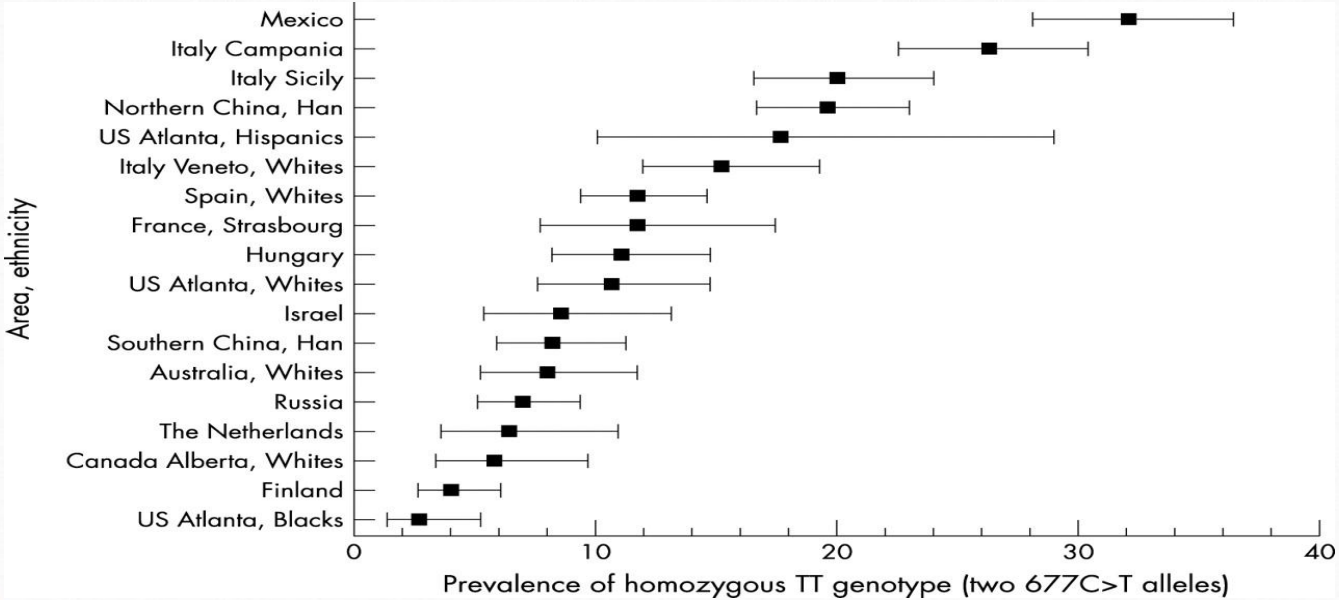
Group	One C677T Variant	Two C677T Variants	One C282Y and One A1298C Variant	Two A1298C Variants
White — Europe and North America	25-45%	8-18%	15-20%	4-12%
Hispanic — U.S.	42%	21%	Not known	4-5%
Black — U.S.	14%	About 1%	Not known	2-4%
Asian	35% (Japanese)	11% (Japanese)	Not known	1-4%

Having two MTHFR variants is much more common than having high homocysteine or any health conditions linked to high homocysteine. Therefore, **MTHFR variant is not all about high homocysteine .**

Source from <https://atlantichealth.dnadirect.com/grc/patient-site/mthfr-thrombophilia/who-is-at-risk-for-high-homocysteine.html>

Screening Patients: Identifying Candidates for Methylation SNP Testing

Prevalence of homozygous TT genotype (two 677C>T alleles) among newborns by area and ethnic background, ICBDMS 2003



Wilcken B et al. J Med Genet 2003;40:619-625

Table 1 Allele and genotype frequency of the 677C>T allele of the *MTHFR* gene by area and ethnic origin

		Genotype (No)*			Genotype (%)				Allele frequency
					CC	CT	TT		T
Area	Sample No	CC	CT	TT	(%)	(%)	(%)	95% CI	(%)
Europe									
Italy, Sicily	468	138	236	94	29	50	**20.1**	16.7 to 24.0	**45.3**
Italy, Campania	500	172	196	132	34	39	**26.4**	22.7 to 30.4	**46.0**
Italy, Veneto									
Italian whites	385	128	198	59	33	51	**15.3**	12.1 to 19.3	**41.0**
Others	47	27	15	5	57	32	**10.6**	4.6 to 22.6	**26.6**
Spain, multicentre									
Spanish whites	601	265	265	71	44	44	**11.8**	9.5 to 14.6	**33.9**
Others	51	24	20	7	47	39	**13.7**	6.8 to 25.7	**33.3**
France, Strasbourg	178	72	85	21	40	48	**11.8**	7.8 to 17.4	**35.7**
The Netherlands	188	97	79	12	52	42	**6.4**	3.7 to 10.9	**27.4**
Finland, Helsinki	545	293	230	22	54	42	**4.0**	2.7 to 6.0	**25.1**
Hungary	378	165	171	42	44	45	**11.1**	8.3 to 14.7	**33.7**
Russia	587	312	234	41	53	40	**7.0**	5.2 to 9.3	**26.9**
Middle East									
Israel	210	120	72	18	57	34	**8.6**	5.5 to 13.1	**25.7**
China									
North, Han ethnicity	643	201	315	127	31	49	**19.8**	16.9 to 23.0	**44.2**
South, Han ethnicity	430	167	228	35	39	53	**8.1**	5.9 to 11.1	**34.7**
Oceania									
Australia									
Whites	288	146	119	23	51	41	**8.0**	5.4 to 11.7	**28.6**
Others	75	40	27	8	53	36	**10.7**	5.5 to 19.7	**28.7**
Americas									
Mexico	500	91	248	161	18	50	**32.2**	28.3 to 36.4	**57.0**
USA, Atlanta									
Whites	300	142	126	32	47	42	**10.7**	7.7 to 14.7	**31.7**
Blacks	298	231	59	8	78	20	**2.7**	1.4 to 5.2	**12.6**
Hispanics	62	22	29	11	35	47	**17.7**	10.2 to 29.0	**41.1**
Asian	26	16	9	1	62	35	**3.8**	0.7 to 18.9	**21.2**
Other, unknown	100	63	32	5	63	32	**5.0**	2.2 to 11.2	**21.0**
Canada, Alberta									
Whites	240	136	90	14	57	38	**5.8**	3.5 to 9.6	**24.6**
Others	30	17	13	0	57	43	**0.0**	0.0 to 11.4	**21.7**
Total	**7130**								

*TT, two 677C>T alleles; CT, one 677C>T allele; CC, no 677C>T allele.

Prevalence of Neural Tube Defects Consistent with Prevalence of Mutation

- "….data are consistent for Mexico and northern China, which not only have a very high frequency of the TT genotype but also high rates of neural tube defect."

  "…In the United States, the rates of neural tube defects historically have been higher among Hispanics, intermediate among non-Hispanic whites, and lower among African-Americans, a trend that follows the relative frequency of the TT homozygous genotype."

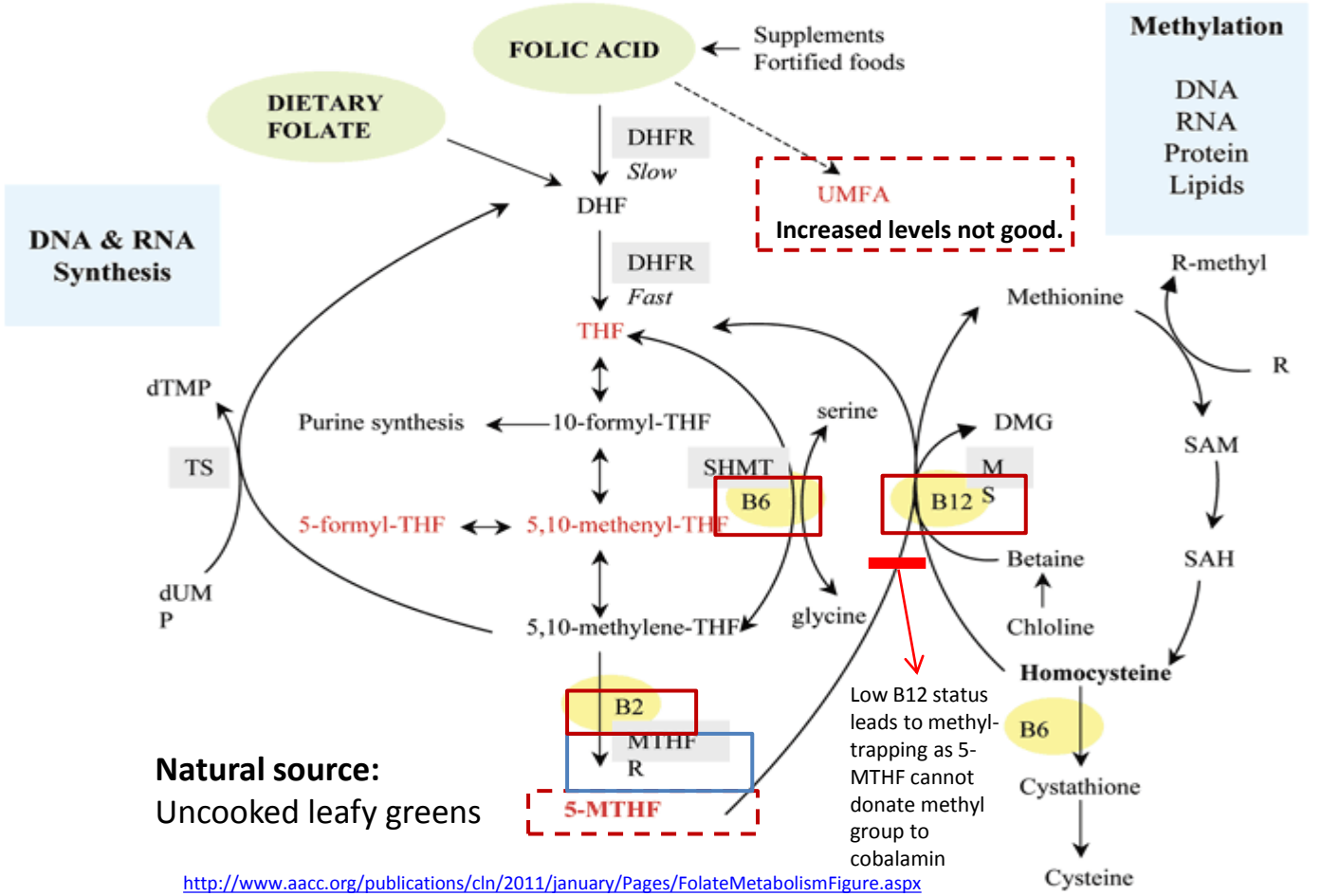
- **There are, however, notable exceptions**.

  "In southern Italy, the TT genotype is common, but the rate of neural tube defects is not particularly high. Nevertheless, such exceptions are not entirely unexpected, because ***environmental and nutritional factors are likely to modulate considerably the genetic risk.***"

MTHFR Variants and Effects

MTHFR C677T (A222V, rs1801133)	**MTHFR A1298C** (E429A, rs1801131)
• Cardiovascular • Homocysteine • DNA Regulation • Glutathione Production • Low Methylfolate levels • 1 copy = 40% loss of function • 2 copies = 70% loss of function Cytosine switched to Thymine Wildtype = 677CC	• Neurological • Neurotransmitters • Nitric Oxide • Controversial • Low BH4 levels • Normal Methylfolate levels? • % Loss of Function? Adenine switched to Cytosine Wildtype = 1298AA

How MTHFR 677 is linked to numerous conditions

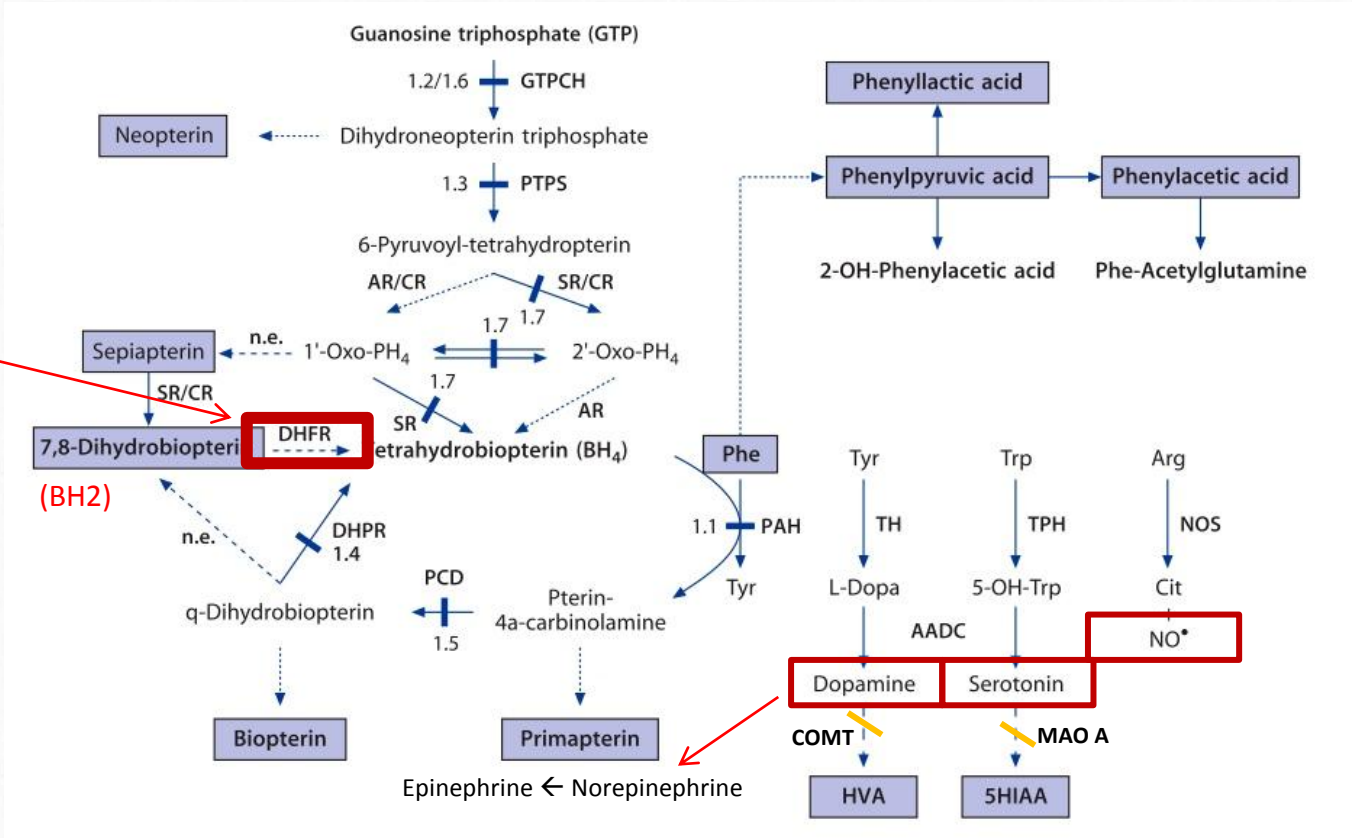


Natural source:
Uncooked leafy greens

http://www.aacc.org/publications/cln/2011/january/Pages/FolateMetabolismFigure.aspx

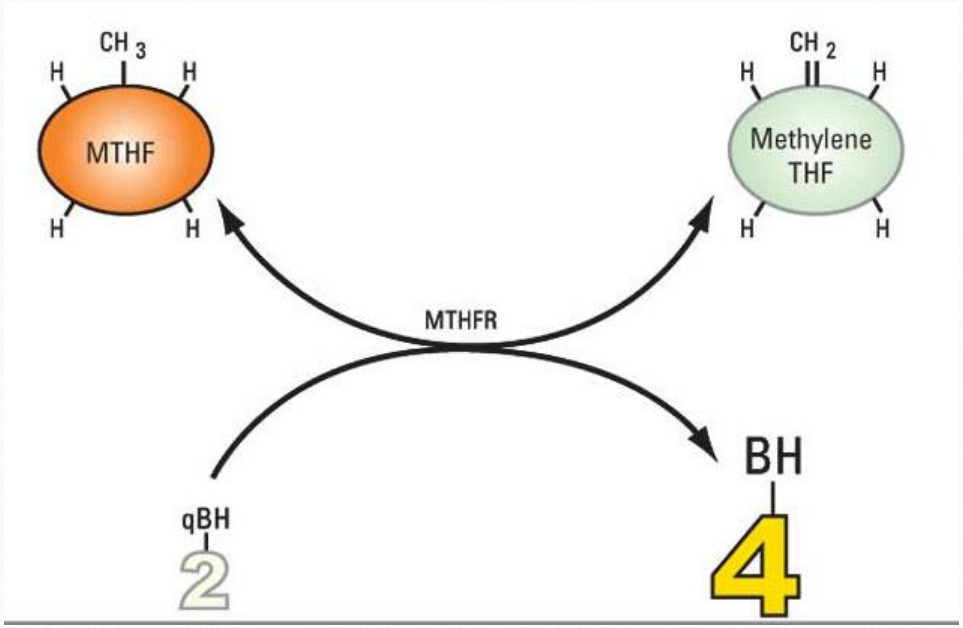
How MTHFR 1298 is linked to mental dysfunction, addictions and syndromes

Requires methylfolate



http://humanbodydisease.com/phenilalanine-and-tetrahydrobiopterin-disorders-50.html

Methylfolate and BH4: Not Folinic Acid

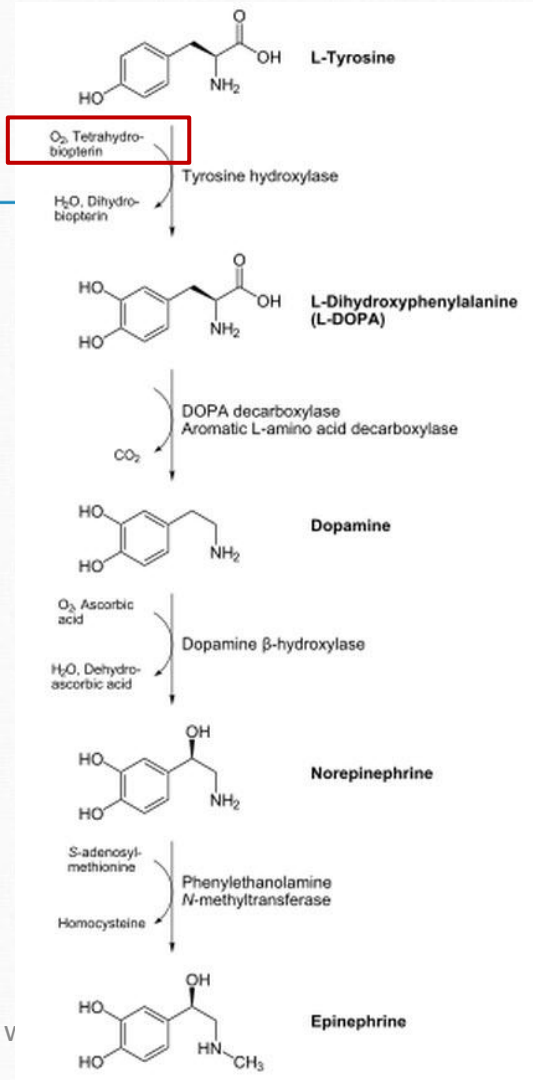


Source: http://www.cnsspectrums.com/aspx/articledetail.aspx?articleid=1267

Many diagrams state Folinic acid is required for this step. I disagree. Appears that MTHF is required.

Folinic acid may be able to convert to MTHF is MTHFR 677TT is not present.

Importance of 1298 and BH4

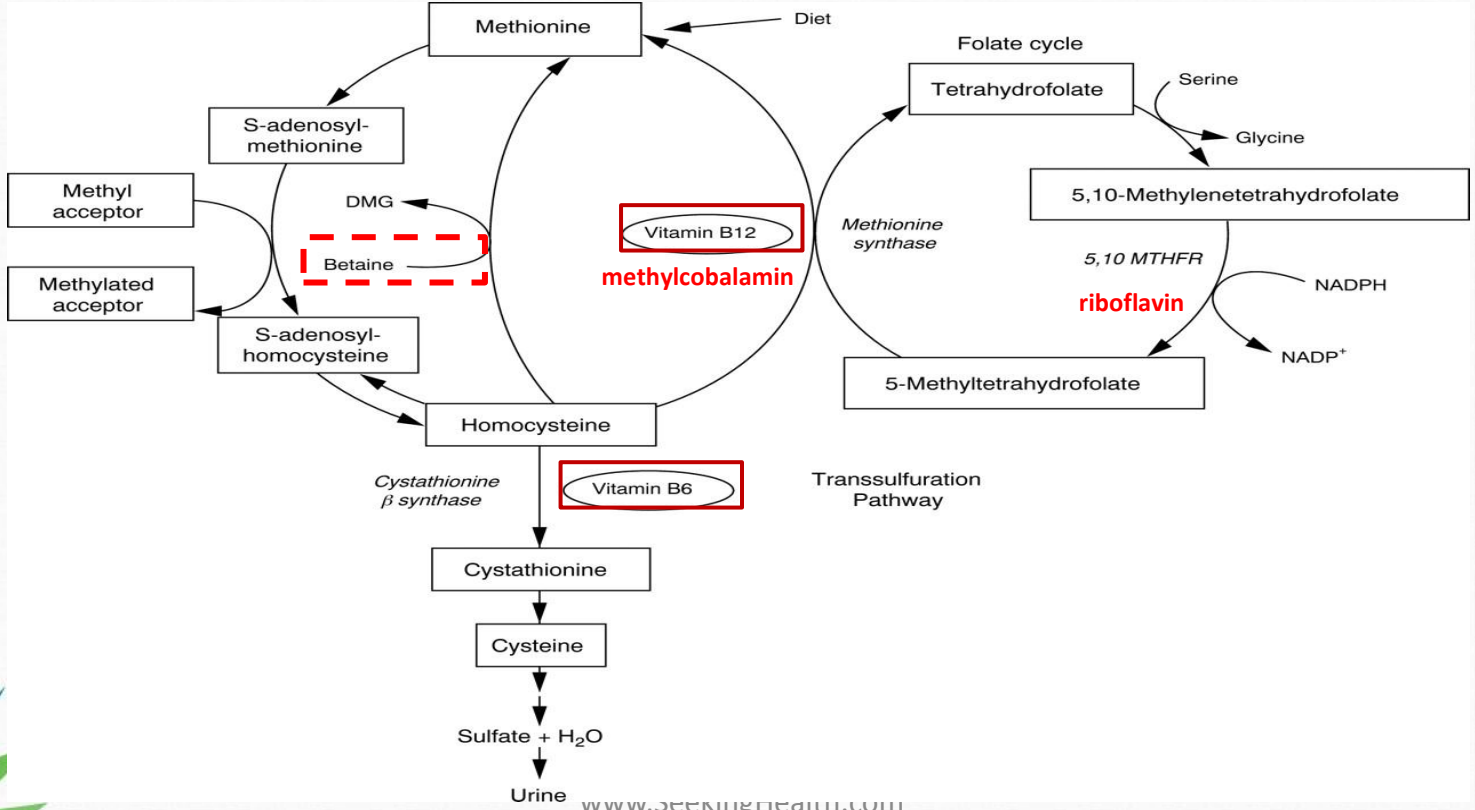


Critically important production line of neurotransmitters starting from the cofactor of MTHF

Remember, BH4 recycling is performed by MTHF.

If no MTHF, then there is low BH4; therefore, deficiency in various neurotransmitters.

MTHFR is more than Elevated Homocysteine: Four ways to lower Hcy



Additional Labs to Consider

Functional Lab Testing

- Histamine (Vitamin Diagnostics)
- Biopterin and Neopterin (Metametrix)
- MMA (Vitamin Diagnostics)
- UMFA (Vitamin Diagnostics)
- Folic Acid (Vitamin Diagnostics)
- Folinic Acid (Vitamin Diagnostics)
- 5-MTHF (Vitamin Diagnostics)
- Ammonia (Vitamin Diagnostics)
- Amino Acids (Doctor's Data 24 hr urine – longer term measure vs blood)
- Nitrotyrosine (Vitamin Diagnostics)
- Nitric Oxide (Vitamin Diagnostics)
- Glutathione – reduced and oxidized (Vitamin Diagnostics)
- SAMe (Vitamin Diagnostics)
- SAH (Vitamin Diagnostics)
- Homocysteine (Vitamin Diagnostics)
- Urea Breath Test (Metsol)
- CDSA (Doctor's Data)
- Minerals – zinc, copper, molybdenum, selenium, magnesium, calcium
- Pyroluria
- CBC with Chem Panel (noting potassium)

Lab Values often seen with MTHFR

Common Lab Results

- Elevated Histamine (Vitamin Diagnostics)
- Low Biopterin and Elevated Neopterin (Metametrix)
- Normal to High MMA (Vitamin Diagnostics)
- Elevated UMFA (Vitamin Diagnostics)
- Elevated Folic Acid (Vitamin Diagnostics)
- Elevated Folinic Acid (Vitamin Diagnostics)
- Low 5-MTHF (Vitamin Diagnostics)
- Normal to High Ammonia (Vitamin Diagnostics)
- Normal to High Taurine (Doctor's Data 24 hr urine – longer term measure vs blood)
- Elevated Nitrotyrosine (Vitamin Diagnostics)
- Elevated Nitric Oxide (Vitamin Diagnostics)
- Low Glutathione – reduced and oxidized (Vitamin Diagnostics)
- Low SAMe (Vitamin Diagnostics)
- Normal to Elevated SAH (Vitamin Diagnostics)
- Normal to Elevated Homocysteine (Vitamin Diagnostics)
- Normal to Elevated Urea Breath Test (Metsol)
- Problems with CDSA (Doctor's Data)
- Decreased 5-HIAA – Serotonin (Doctor's Data)
- Decreased Homovanillate – Dopamine (Doctor's Data)
- Decreased Histidine (Doctor's Data)
- Elevated FIGLU (Doctor's Data, Metametrix)

Homocysteine Lab Test Preparation

Get Accurate Homocysteine Levels

- Do not do Home Homocysteine Tests!
- High Methionine Foods can falsely elevate homocysteine. Limit them day before test.
- Fast 12 hours prior to having blood drawn
- Schedule blood draw in morning
- Get blood drawn
- Lab Tech must spin out red blood cells immediately to prevent false elevation of homocysteine
- If not spinning down immediately, then must put blood on ice until centrifuged – then spin out RBC later.
- Send sample by overnight mail to lab

Source: http://mthfr.net/elevated-homocysteine-level-or-laboratory-error/2012/03/02/

Drugs to Avoid with MTHFR

Common Drugs to Avoid with MTHFR

- Antacids (deplete B12)
- Cholestyramine (deplete cobalamin and folate absorption) – common in gallbladder issues during pregnancy!
- Colestipol (decrease cobalamin and folate absorption)
- Methotrexate (inhibits DHFR)
- Nitrous Oxide (inactivates MS)
- Niacin (depletes SAMe and limits pyridoxal kinase = active B6) → useful during times of over-methylation
- Theophylline (limits pyridoxal kinase = active B6)
- Cyclosporin A (decreases renal function and increases Hcy)
- Metformin (decreases cobalamin absorption)
- Phenytoin (folate antagonist)
- Carbamazepine (folate antagonist)
- Oral Contraceptives (deplete folate)
- Antimalarials JPC-2056, Pyrimethamine, Proguanil (inhibits DHFR)
- Antibiotic Trimethoprim (inhibits DHFR)
- Ethanol
- Bactrim (inhibits DHFR)
- Sulfasalazine (inhibits DHFR)
- Triamterene (inhibits DHFR)

Source: Fischbach, Laboratory Diagnosis and BMJ http://heart.bmj.com/content/83/2/127/T1.expansion.html

Common Meds to use for MTHFR

Common Meds used with MTHFR

- Cerefolin
- CerefolinNAC
- Neevo
- NeevoDHA
- Metanx → personal favorite out of all of them but still don't like it
- Deplin
- Folbee
- Folplex
- Folgard
- Foltx
- FABB

Common 'Other Ingredients' in MTHFR Meds

Dibasic Calcium Phosphate Dihydrate, Microcrystalline Cellulose 90, Microcrystalline Cellulose HD 90, Pyridoxal-5´-Phosphate, Opadry II Purple 40L10045 (Polydextrose, Titanium Dioxide, Hypromellose 3cP, Hypromellose 6cP, Glycerol Triacetate, Hypromellose 50cP, FD&C Blue #2, FD&C Red #40, Polyglycol 800), Microcrystalline Cellulose 50, Opadry II Clear Y-19-7483 (Hypromellose 6cP, Maltodextrin, Hypromellose 3cP, Polyglycol 400, Hypromellose 50cP), Lmethylfolate Calcium, Magnesium Stearate, Methylcobalamin, and Carnauba Wax.

Source: http://mthfr.net/comparison-of-homocysteine-support-products/2011/09/13/

Which Methylfolate to use for MTHFR?

Quality forms of Methylfolate

- L-5-MTHF (L is important to avoid racemic R forms)
- Quatrefolic (glucosamine form)
- Metafolin (calcium form)
- L-Methylfolate
- (6S)-5-Methylfolate

Issues to Understand about Methylfolate

1. Maximum of 1,000 mcg of L-Methylfolate may be used solo
2. Maximum of 800 mcg of L-Methylfolate may be used in a formula
3. If no ‘L’ or (6S) or Quatrefolic or Metafolin is used on the label, avoid it!

Source: http://mthfr.net/l-methylfolate-methylfolate-5-mthf/2012/04/05/

Which Supplements to use for MTHFR?

Main Support Nutrients for MTHFR

- L-Methylfolate (good forms)
- Sublingual Methylcobalamin and/or Hydroxycobalamin
- Vitamin E
- Krill Oil
- Fish Oil
- Silymarin
- Selenium
- Zinc
- NAC, MSM, SAMe, Methionine, Inositol, TMG, CoQ10, Alpha Lipoic Acid, L-Carnitine, Ribose
- Glutathione
- Probiotics (strong – consider GAPS compliant)
- Multivitamin with minerals and complete B's (if patient can handle it)
- Vitamin D3
- Vitamin C
- Electrolytes
- Magnesium
- Adaptogens (Ashwagandha)
- Digestive Repair
- Potassium

Source: http://mthfr.net/l-methylfolate-methylfolate-5-mthf/2012/04/05/

Starting MTHFR Protocol

History! Lifestyle! Diet!

Must start with foundational health first – ideally. If not, then side effects are likely.

- Dietary intake? Switch them to GAPS or Paleo
- Toxin and Chemical Exposure? Reduce it
- Digestion? Improve it
- Bowel Movements? Two a Day or more well formed
- Meds? Look for folic acid antagonists
- Supplements? Which making them worse? Reduce the load!
- Eating? Chew you water, drink your food.

Testing?

Depends. Money a factor? Enough work to do with foundational steps first?

Starting MTHFR Protocol (cont'd)

Which MTHFR Mutation present?

677TT	677CT	1298CC	1298AC	677T/1298C
SL Methylcobalamin (1,000 mcg q 3 days)	SL Methylcobalamin (1,000 mcg q 3 days)	SL Methylcobalamin (1,000 mcg q 3 days)	SL Methylcobalamin (1,000 mcg q 3 days)	SL Methylcobalamin (1,000 mcg q 3 days)
SL Methylcobalamin w/ Methylfolate (500 mcg MB12 + 400 mcg MTHF q 3 days)	SL Methylcobalamin w/ Methylfolate (500 mcg MB12 + 400 mcg MTHF q 3 days)	SL Methylcobalamin w/ Methylfolate (500 mcg MB12 + 400 mcg MTHF q 3 days)	SL Methylcobalamin w/ Methylfolate (500 mcg MB12 + 400 mcg MTHF)	SL Methylcobalamin w/ Methylfolate (500 mcg MB12 + 400 mcg MTHF q 3 days)
Multi w/ MTHF	Multi w/ MTHF	Multi w/ MTHF	Multi w/ MTHF	Multi w/ MTHF
Vitamin C + Electrolytes + K (MTHFRade)	Vitamin C + Electrolytes + K (MTHFRade)	Vitamin C + Electrolytes + K (MTHFRade)	Vitamin C + Electrolytes + K (MTHFRade)	Vitamin C + Electrolytes + K (MTHFRade)
Add in B6, B2, TMG – one at a time q 3 days	Add in B6, B2, TMG – one at a time q 3 days			Add in B6, B2, TMG – one at a time q 3 days
Nattokinase, Baby Aspirin, Warfarin, Lovenox	Vitamin E and Fish Oil	Hydroxycobalamin?	Hydroxycobalamin?	Vitamin E and Fish Oil

ONE NUTRIENT AT A TIME – SMALL AMOUNT – EVERY 3 DAYS

If side effect or feeling ill, cease that supplement or back dose off.

Common Side Effects with Methylfolate

Side Effects to Look For When Starting Methylfolate Meds or Supplements

- Muscle Pain
- Irritability
- Anxiety
- Depression
- Joint Pain
- Nausea
- Headache
- Insomnia
- Seizures
- Vomiting
- Stomach Pain
- Sweating
- 'Herxheimer Reaction'
- Rash
- Palpitations

Source: http://mthfr.net/methylfolate-side-effects/2012/03/01/

Dealing with Side Effects from Methylfolate

Neutralize Side Effects from Methylfolate ASAP

There are two things to quickly quench most of the methylfolate side effects:

1. Consider 50 to 100 mg of time-released niacin.
    - Why? Niacin is broken down through methylation – by SAMe. This means that excessive methylation is quenched by taking niacin. Niacin also helps break down glutamate and therefore increase GABA.

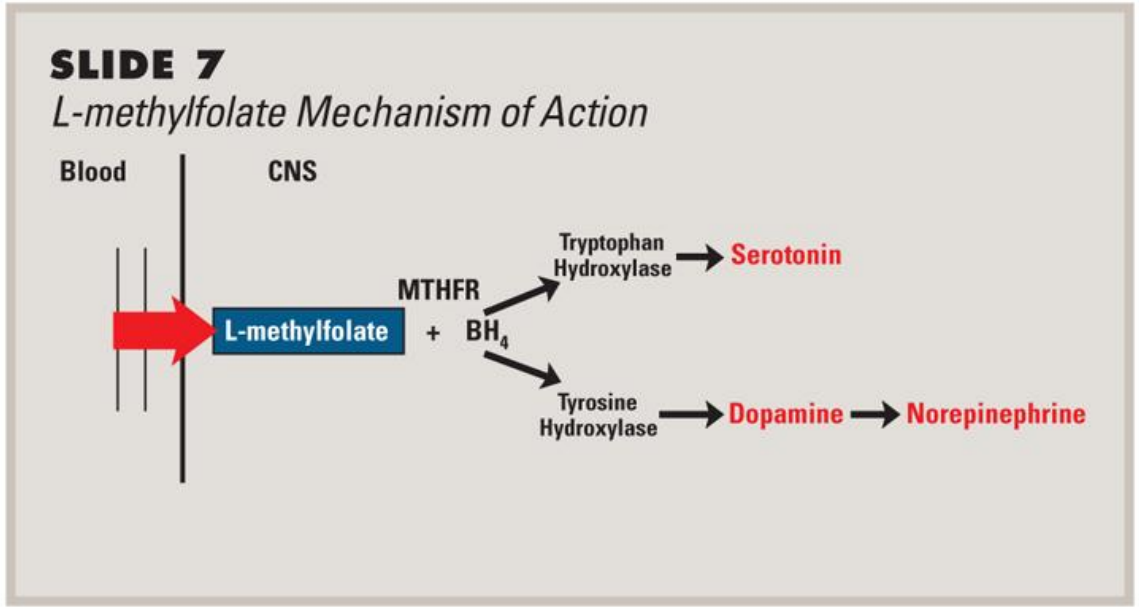
    NOTE of CAUTION: One may experience flushing for 20 to 30 minutes. This is not harmful and is a result of histamine release. Since you are likely overmethylated, your histamine flush will likely be minimal – especially as this is time-released niacin.

2. Consider 1 to 2 capsules of 250 mg of liposomal curcumin to help quench inflammation. If one takes methylfolate before inflammation is controlled, the methylfolate will worsen it. One may consider taking 2 capsules of liposomal curcumin three times a day during times of inflammation.

3. Consider evaluating potassium levels. Commonly low in those experiencing 'detox reactions'. Start low with potassium supplements such as 125 mg capsules and/or supplement with high potassium foods (apricots, avocados, dates, carrot juice, almonds, baked beans, lima beans, potatoes)

Source: http://mthfr.net/methylfolate-side-effects/2012/03/01/ and http://www.whfoods.com/genpage.php?tname=nutrient&dbid=90

Importance of Not Taking Too Much Methylfolate



Theory:
Excessive Methylfolate + BH4 can increase Norepi and Epi levels – causing increased anxiety, palpitations and fits of anger/rage

Excessive Methylfolate may also utilize BH4 thereby causing an increase in peroxynitrite and nitric oxide. These cause pain, headaches, soreness.

Niacin works so well due to it being catabolized by SAMe; methyl groups used up so less methylfolate is used to produce neurotransmitters

Source: http://www.primarypsychiatry.com/aspx/articledetail.aspx?articleid=1938

Zero Tolerance to Methylcobalamin or Methylfolate?

Zero Tolerance to Methylfolate?

Not ready to take it yet. Stop.

- Heal the gut
- Change diet
- Do foundational steps first
- Check for H Pylori
- Consider further genetic testing for: COMT, CBS, MAO A
- Do lab testing as mentioned in Slide 26

Zero Tolerance to Methylcobalamin?

- Switch to Hydroxycobalamin – start low and work up.
- Heal the gut
- Change diet
- Do foundational steps first
- Check for H Pylori
- Consider further genetic testing for: COMT, CBS, MAO A
- Do lab testing as mentioned in Slide 26

List of Don'ts

Avoid Doing These!

- Prescribing high dose methylfolate without tapering up
  - ❖ Massive side effect potential or hospitalization
- Giving methylfolate first instead of methylcobalamin (or hydroxycobalamin)
  - ❖ Methyl-trapping
- Being aggressive
  - ❖ Prescribing multiple supplements to have them start the same day
  - ❖ Performing potent therapies such as coffee enemas, sauna, epsom salt baths without foundational work in place
- Guessing after foundational work is done
  - ❖ Working without laboratory testing
- Blame everything on MTHFR (especially in recurrent miscarriage)
  - ❖ Patients (and docs) ready to blame all symptoms and signs on MTHFR yet may be totally unrelated. Clarify this
- Measuring Homocysteine as a guide to 'therapeutic guide post'
  - ❖ Totally inaccurate marker as has four other routes to reduce its levels

Which Therapies to use for MTHFR?

Main Therapies for MTHFR

- Colonics
- Sauna (low temperature as long as tolerable then get out)
- Castor Oil Packs
- Coffee Enemas (once feeling better – then begin – very strong)
- Epsom Salt Baths
- Rebounding
- Dry Skin Brushing
- Hot Yoga
- Breath Therapy
- Mindful Eating
- Paleo or GAPS with focus on uncooked leafy greens, grass fed beef, vegetables, seeds
- Detox Your Home (air purifier, water purifier, wood floor, tile, dust mite covers, bathroom fans, natural soaps/cleaners
- Limit Folic Acid (fortified foods)
- Avoid Vaccinations (screening newborns)

Source: http://mthfr.net/mthfr-c677t-mutation-basic-protocol/2012/02/24/

Overall Picture

Lifestyle, Diet, Genetics and Supplementation

Treating disease and dysfunction from all angles is a must.

Leaving one aspect out = ineffective treatment outcomes

Lot to Learn Still

Nutrigenomics is a new field and biochemistry is constantly evolving – as are laboratory tests.

Keep researching and staying as current as possible.

Source: http://mthfr.net/mthfr-c677t-mutation-basic-protocol/2012/02/24/

Additional Presentations to get MTHFR Education Out There!

Consideration for Further Presentations at Conferences

- If you believe this presentation was valuable, please let the AANP know and other associations.
- I am happy to provide this valuable information to other physicians, schools, large clinics, health centers, addiction centers ….

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Thank You!

A referral is the best compliment ☺