

# Optimizing Thyroid Hormone Replacement

Shawn Needham R. Ph.

# Disclosure

- Shawn Needham is a compounding pharmacist and does have interest in a compounding pharmacy
- Compounded pharmaceuticals are not FDA approved

# Synthetic vs. Natural vs. Bio-identical

## \* “Synthetic” Hormones:

- Made in a laboratory
- Not natural to our bodies
- Not natural to the earth

# Biosynthesis of hormones

- Principal steroid secretory glands are the ovaries and adrenals and thyroid
- Adrenals
  - Synthesis of glucocorticoids and mineralocorticoids
  - Synthesis of some androgens (DHEA)
- Ovaries and Testes responsible for sex hormones

# Thyroid Hormones

- Levothyroxine (T4)- Inactive form (less potent) of thyroid hormone. It must be converted to Liothyronine to be active in the body, more potent
- Liothyronine (T3)- Active form of thyroid. Short half life in body.
- L-Tyrosine and Iodine

# Low Thyroid Symptoms

- Depression
- Weight Gain
- Hair Loss
- Decreased Libido
- Brittle Nails
- Constipation
- Increased sensitivity to cold
- Fatigue
- High Cholesterol

# Commercially Available Thyroid

- Synthroid is levothyroxine. Many generics available
- Cytomel is Liothyronine- generics available  
Not sustained release.
- Armour thyroid- Isolated from pigs thyroid glands. It stinks. It is standardized to a specific T4/T3 combination/ratio. It is getting more difficult to source.  
Antibodies?

# Thyroid glandulars

- Thyroid extracts
- USP Dessicated Thyroid Porcine 1934
- From pigs
- 1 grain is 38mcg T4 and 9mcg T3
- Set ratio of T4/T3



# Porcine Thyroid

- Literally ground up pig's thyroid
- Contains T1, Iodine....
- Immune reaction, Hashimotos
- Strict vegans and or Kosher patients
- Not sustained release

# Levothyroxine

- Thyroxine T4, L-Thyroxine
- Isolated in 1914
- Synthesized in 1927
- Became standard over Porcine thyroid in the 1960's
- Most commonly prescribed medication in 2016
- Half life 4-6 days
- Standard therapy with hypothyroidism

# Liothyronine

- 4 times more potent than Levothyroxine, active thyroid hormone
- Shorter half life 3-8 hours
- Does not affect TSH
- Commercially available products immediate release
- Isolated in 1953
- Approved for use in 1956

# Poor Thyroid Function

- Decreased conversion of T4-T3
- Conversion of T3 to rT3
- Increased binding
- Hormone not working at receptor
- Hashimoto's- body produces antibodies to thyroid gland

# Conversion factor or increase in binding

- Factors that decrease the conversion of T4-T3 include

Nutrient deficiencies- Iodine, selenium, iron, copper, vitamin a, vitamin B2, B6, B12 and Vitamin D3

Increase TBG- estrogens, birth control pills, prednisone and others

# Conversion of T4-T3

- Other factors that negatively effect the conversion

Aging

Alcohol

Stress- Cortisol- Adrenal glands

# History of thyroid testing

- Iodine
- TSH, sensitive TSH
- Symptoms and history
- No tests

# History of thyroid testing

- Total T4 and T3 1960's
- First generation TSH 1960's
- TBG (Thyroid Binding Globulin)
- Free T3 and Free T4 to follow a few years later



# TSH the gold standard

- Pituitary hormone
- Negative Feedback Loop
- First generation test in the 1960's
- More sensitive test in the 1980's
- One missed dose can affect level

# When to consider replacing T3

- TSH labs are normal (optimal)
- Patient still has symptoms
- Free T3 is low or less than optimal

# Compounded Thyroid Hormone

- Allows dosing of both hormones in one capsule
- Sustained Release- Slowly release hormone throughout the day
- Allows individualized dosing
- Not restricted to set T4/T3 ratio

# Adrenal Function

- The hormone symphony
- Adrenals produce DHEA and cortisol along with other hormones in response to stress.
- Too much cortisol causes weight gain, hot flashes, muscle wasting and many other problems
- Too little cortisol can cause chronic fatigue.
- The adrenals must be supported to fix thyroid and other hormone problems.

# Vitamin D Deficiency Disease Links

- Osteoporosis
- Inflammatory bowel disease
- Infertility
- MS
- Breast Cancer
- Prostate Cancer
- Depression
- Chronic Pain
- Hypothyroidism

# Testing Thyroid Function

- Need complete thyroid panel which includes Free T4 Free T3 and TSH at the least.
- TPO and rT3 can helpful.
- TPO test for thyroid antibodies
- rT3 is reverse T3- Some T3 is converted into rT3 (hibernation).
- TSH is good indicator of T4 levels only

# Role of Iodine

- Too much
- Too little

Questions?

Shawn Needham R.Ph.

(509)764-2314

[www.mlrx.com](http://www.mlrx.com)

[shawnneedham@mlrx.com](mailto:shawnneedham@mlrx.com)