What the Endocrinologist Wants You to Know...

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NDAND 2020 Nutrition Symposium

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Objectives

- Understand the complexity of the Endocrine System and the available tools for diagnosis of monitoring of endocrinopathies.
- Understand the true impact of endocrinopathies and weight gain.
- Recognize the relevance of dietary interventions on specific endocrinopathies such as diabetes mellitus.
- Understand some the available data regarding dietary interventions and thyroid disease.

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Endocrinology

- Diabetes Mellitus
- Thyroid Disease
- Pituitary Disorders
- Adrenal Disorders
- Gonadal Disorders
- Calcium/Bone
- Transgender Medicine
- Lipids
- Nutrition/Obesity

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Tools

- Clinical Findings
  - Objective data
  - Physical findings
- Laboratory tests
  - Inherent Coefficient of Variability
  - Influence of time and other endogenous factors
  - Influence of external factors
- Imaging Studies
  - i.e DEXA, Ultrasounds

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Our Knowledge of Nutritional and Dietary Interventions is limited…..

- Fellowship Training Programs include 1-2 months of a Nutrition Rotation.
- Shared with Gastroenterology and Internal Medicine
- Your role is very important!

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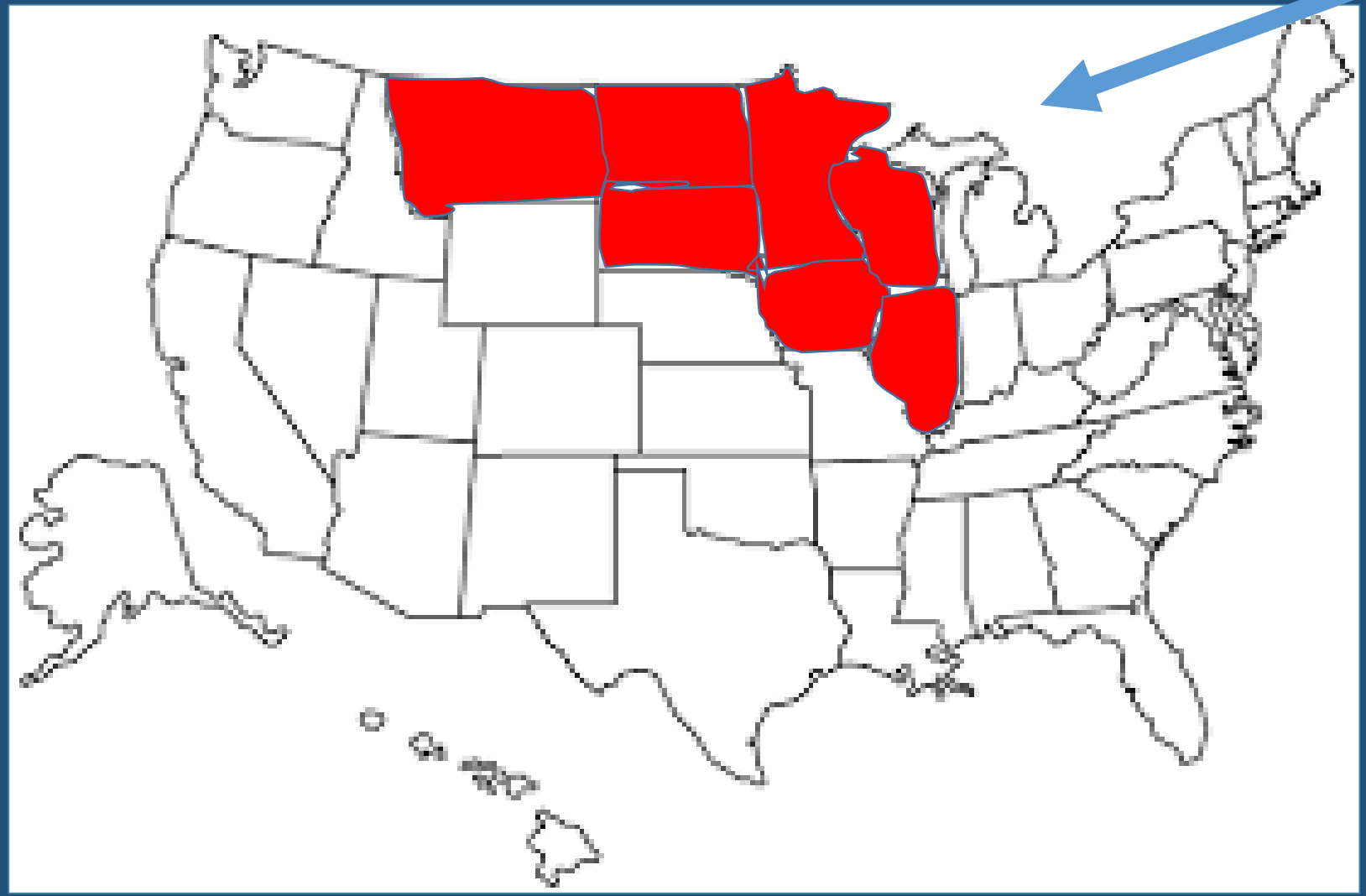
Diabetes Prevalence in the U.S



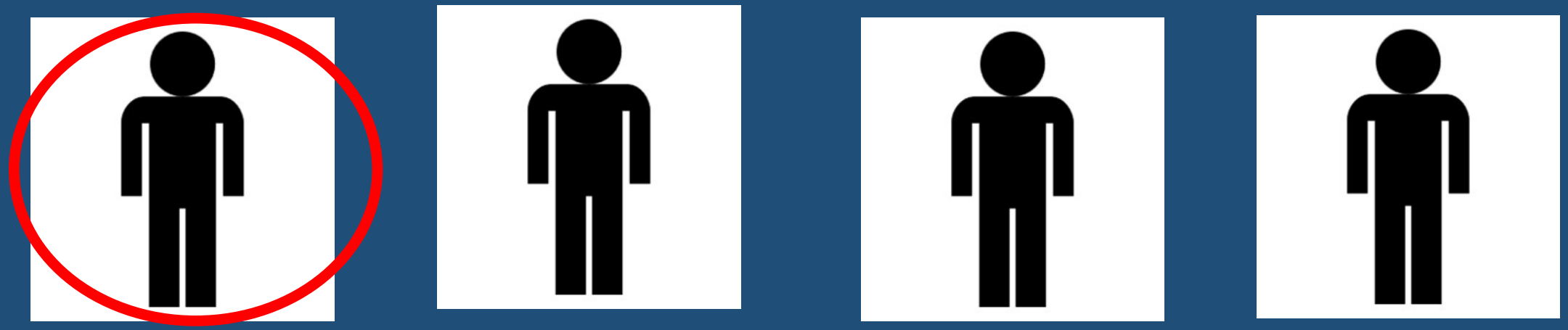
Equivalent to the population of these states.

34.2 million people in the U.S

*7.3 million are undiagnosed

National Diabetes Statistics Report, 2020.

Diabetes Prevalence in Older Adults in the U.S



26.8 % (65 years or older)

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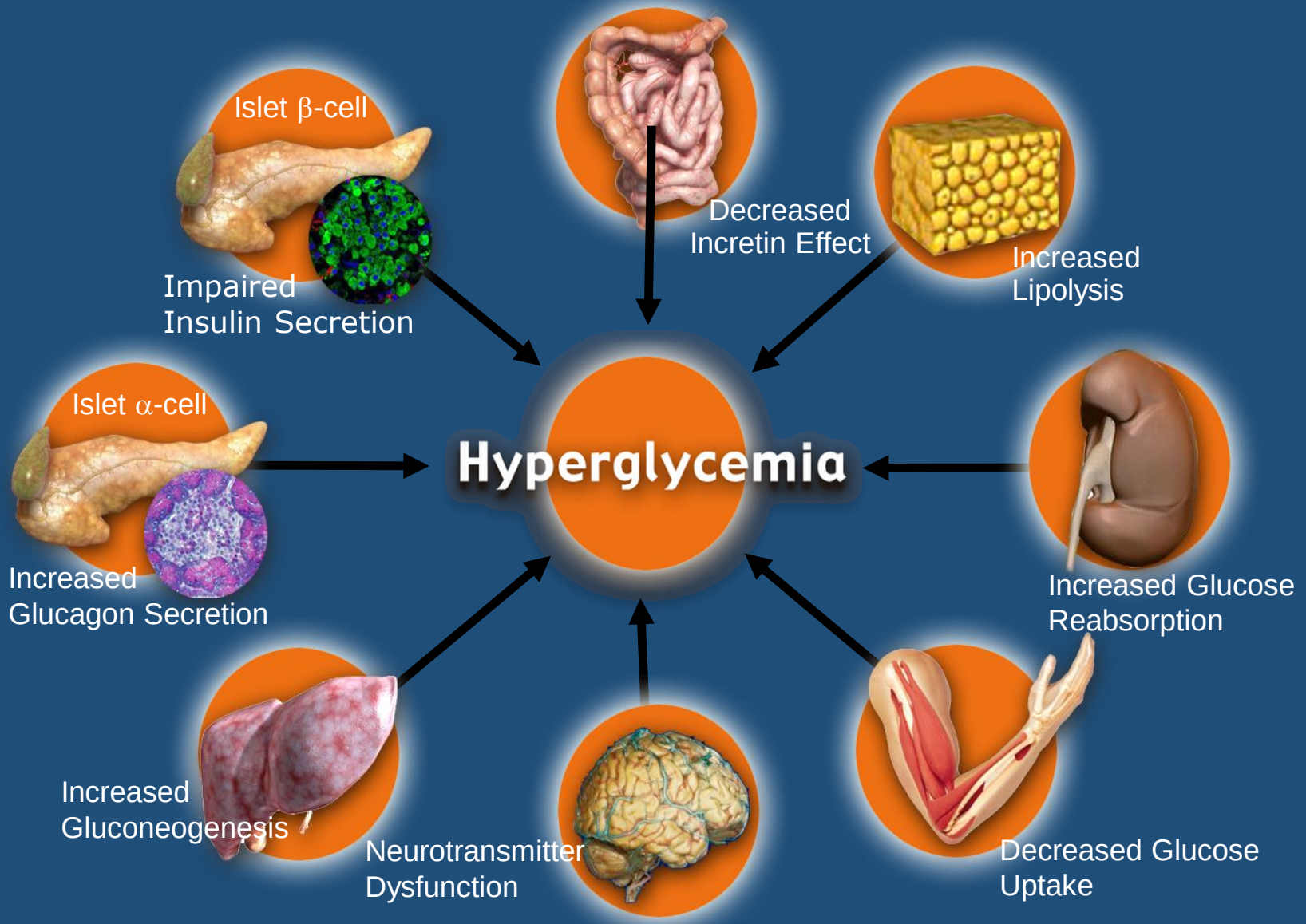
National Diabetes Statistics Report, 2020.

Type 2 Diabetes has a complex pathophysiology.



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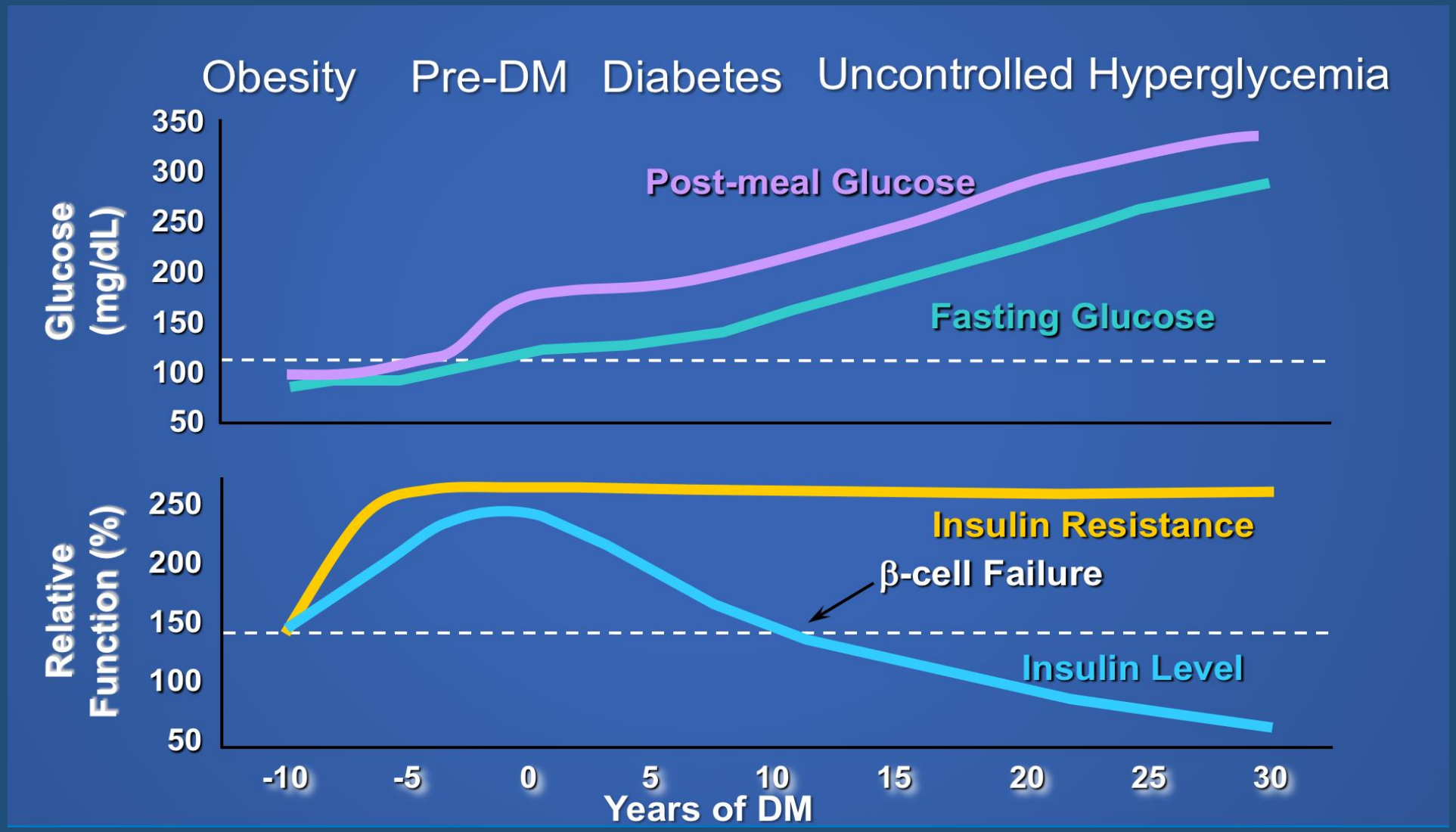
Adapted from: DeFronzo RA. Banting Lecture 2008. "From the triumvirate to the ominous octet: a new paradigm for the treatment of type 2 diabetes mellitus."

Type 2 Diabetes is a progressive condition.



Adapted from Ferrannini E. ADA Washington. 2006 and Ramlo-Halsted et al. Prim Care. 1999.

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Medical Nutrition Therapy (MNT) Provided RD/RDNs - Impact on Diabetes.

Study/Authors	Population/Duration	RDN encounters	*A1c change
Laitinen et al, 1993	Type 2 Diabetes/15 months	3 Initial, 6 f/u sessions	Decrease of 0.6%
UKPDS, 1990	Type 2 Diabetes	3 initial, 6 f/u sessions	Decrease of 2% at 15 mo.
DCCT, 2000	Type 1 Diabtes/6.5y	Monthly visits	Decrease of 2.5% at 6.5y
Davis et al, 2000	Type 2 Diabtes/12m	Diabetes Telecare, 3inital, 4 f/u	Decrease of 0.6%

* Versus conventional

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Franz et al. Academy of Nutrition and Dietetics. 2017

Effect of Intervention on A1c

Medication/Intervention	A1c (%) Reduction	Route
Medical Nutrition Therapy (RD/RDN)	1-1.9 Type 1 0.3-2.0 Type 2	In person/Telemed
Older Agents		
Metformin	1.5-2.0	Oral
Sulfonylureas	1.5-2.0	Oral
Thiazolidinediones	0.8-1.0	Oral
Newer Agents		
DPP IV Inhibitors	0.5-0.9	Oral
GLP-1 analogs	0.6-1.0	Injectable
SGLT-2 Inhibitors	0.4-1.0	Oral

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Sherifali et al. Diabetes Care. 2010
Vasilakou D et al.Ann Intern Med.2013

American Diabetes Association (ADA) Recommendations regarding MNT

- All patients with diabetes should be referred for individualized MNT provided by a registered dietitian nutritionist (RD/RDN).

- Nutritional issues for consideration in all patients with type 2 diabetes include: consistency with carbohydrate intake and meal timing, macronutrient content of meals, avoidance of hypoglycemia, and dietary compliance.

- There is not a “one-size-fits-all” eating pattern for patients with diabetes.

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ADA.Standards of Care.2020

ADA Recommendations regarding MNT

- For patients with type 2 diabetes who are overweight or obese, initial recommendations for weight loss is to lose 5 to 10 percent of initial body weight.

- Several meal planning strategies may accomplish a low-calorie diet. (Counting calories and grams of fat, use of meal replacements, and a detailed exchange system for meal planning. The relative effectiveness of each of these options has not been adequately studied.

- A variety of eating patterns (Mediterranean, low fat, low carbohydrate, vegetarian) are acceptable.

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ADA.Standards of Care.2020

ADA Recommendations regarding MNT

- Patients should be encouraged to substitute lean meats, fish, eggs, beans, peas, soy products, and nuts and seeds for red meat.
- Fiber intake should be at least 14 grams per 1000 calories daily; higher fiber intake may improve glycemic control
- A diet that includes carbohydrates from fruits, vegetables, whole grains, legumes, and low-fat milk is encouraged.
- Meal content, quantity, and timing are particularly important for patients who are treated with secretagoges or insulin.
- Carbohydrate consistency is helpful for patients with erratic blood glucose patterns, including hypoglycemia.

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ADA.Standards of Care.2020

ADA Recommendations regarding Supplements

- In some randomized trials, Chromium supplementation improved glycemic control, However, there is insufficient evidence to recommend such supplements.

- Cinnamon supplementation: Meta-analysis have shown conflicting results.

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ADA.Standards of Care.2020

ADA Recommendations regarding Nonnutritive Sweeteners

- Do not appear to have a significant effect on glycemic management, they can reduce overall calorie and carbohydrate intake.
- Most systematic reviews and meta-analyses show benefits for nonnutritive sweetener use in weight loss; however, some research suggests an association with weight gain.
- Should be counseled to avoid compensating with intake of additional calories from other food sources .
- For those who consume sugar-sweetened beverages regularly, a low-calorie or nonnutritive-sweetened beverage may serve as a short-term replacement strategy.

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ADA.Standards of Care.2020

Clinical Research | Published: 15 October 2010

Prevalence of Endocrine Diseases in Morbidly Obese Patients Scheduled for Bariatric Surgery: Beyond Diabetes

Paola Fierabracci ✉, Aldo Pinchera, Silvia Martinelli, Giovanna Scartabelli, Guido Salvetti, Monica Giannetti, Andrea Pucci, Giulia Galli, Ilaria Ricco, Giorgia Querci, Teresa Rago, Claudio Di Salvo, Marco Anselmino, Paolo Vitti & Ferruccio Santini

- The prevalence of primary hypothyroidism was 18.1%; pituitary disease was observed in 1.9%, Cushing syndrome in 0.8%, while other diseases were found in less than 1% of subjects.

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Endocrinopathies associated to weight gain

- Hypothalamic Obesity
- Cushing's Syndrome
- Hypothyroidism
- Polycystic Ovarian Syndrome
- Growth Hormone Deficiency

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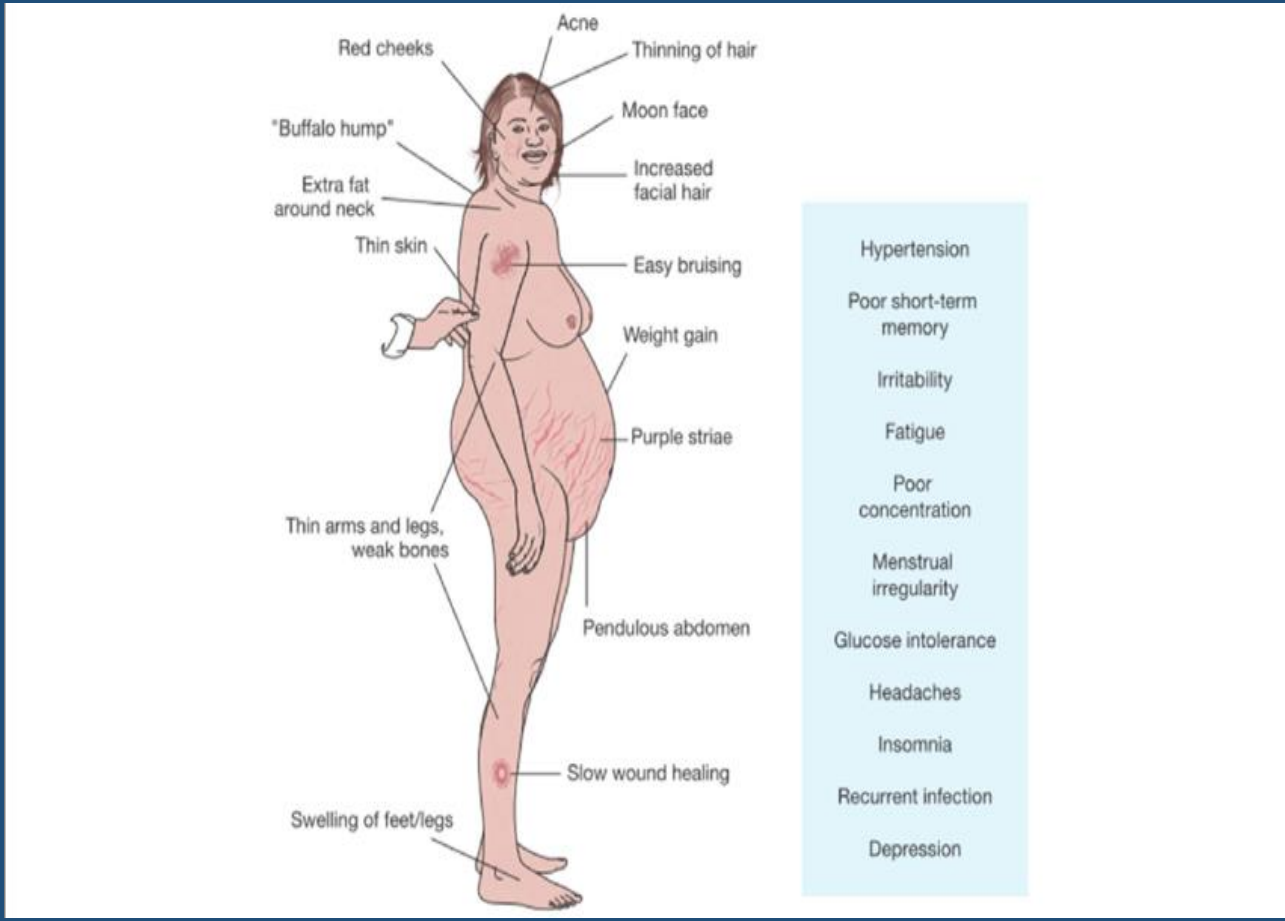
Cushing's Syndrome



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Polycystic Ovarian Syndrome

- 50% of women with PCOS are obese.
- Even 5-10% reduction in body weight has been associated with an improvement in metabolic status, reduction in serum androgen,resumption of ovulation and improved pregnancy rates.
- There is no good evidence that one type of diet is superior to another for women with PCOS. Low-carbohydrate diets are very popular for women with PCOS, based upon the notion that less carbohydrate leads to less hyperinsulinemia and therefore less insulin resistance.

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Pasquali et al.JCEM.1989

Growth Hormone Deficiency

- GHD leads to decreased lean body mass, bone mineral density, quality of life.
- GHD leads to Increase in fat mass, fracture rates, cardiovascular disease and mortality.
- Improvement in body composition is probably the best-documented effect of GH treatment in adults with hypopituitarism.
  - Subcutaneous adipose tissue decreases by 13%, visceral adipose tissue decreased by 30% and muscle mass increased by 5% by 6 months.

Salomon et al. NEJM. 1989
Bengtsson et al. JCEM.1993

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Hashimoto's Thyroiditis

- Genetically Predisposed
- Autoimmune attack on the thyroid only
- TPO and TG antibodies can be measured in blood
- Thyroid becomes enlarged and irregular
- Thyroid underactive --> failure (Hypothyroidism)

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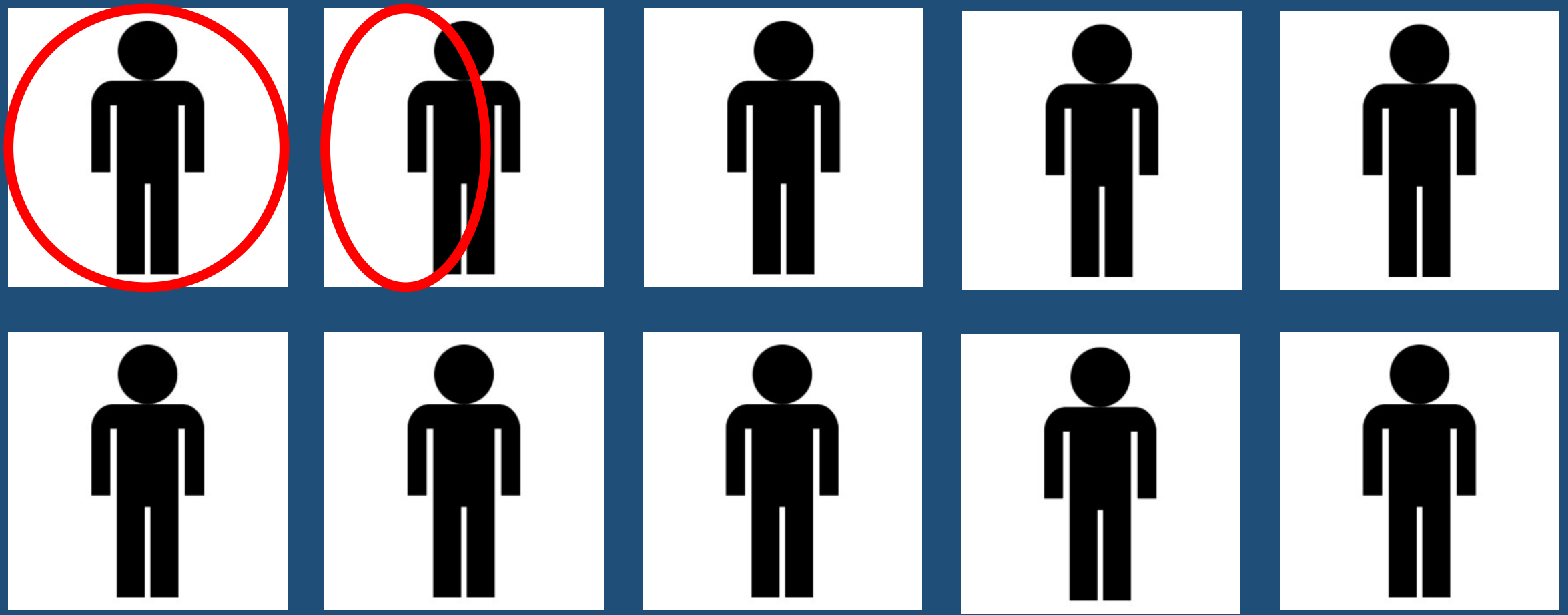
Jonklaas, Bianco, et al. Thyroid. 2014



Prevalence of Hashimoto’s Thyroiditis in the U.S.

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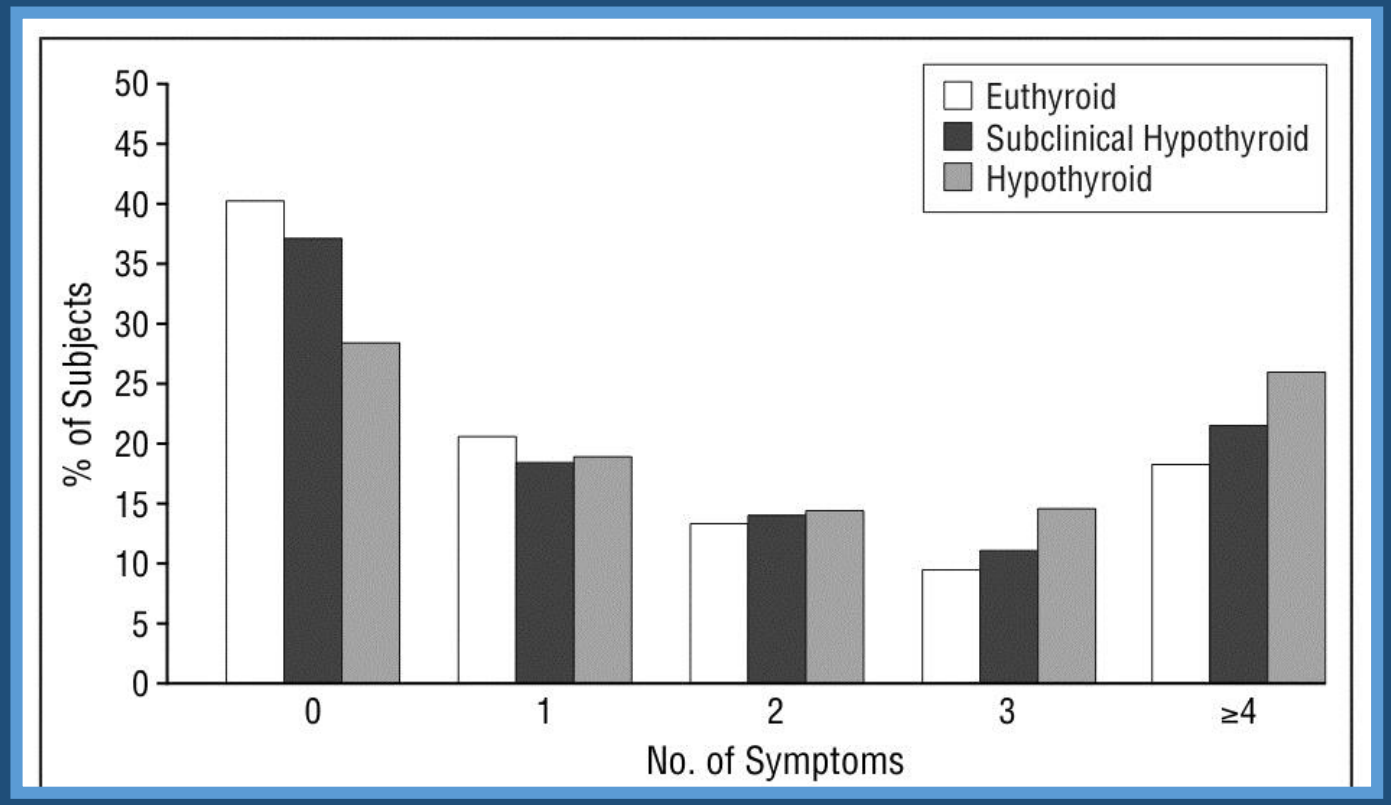
American Thyroid Association

Symptoms on Euthyroid, Subclinical and Hypothyroid Patients

-60% euthyroid have ≥ 1 symptom suggestive of hypothyroidism.

-15% ≥ euthyroid patients have 4 symptoms



Canaris et al. Arch Intern Med. 2000

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TSH and Weight Changes

TABLE 3. Clinical parameters (descriptive mean ± SEM) analyzed by treatment (T_4 dosage) and by serum TSH at the end of treatment periods

	T_4 dosage				TSH (mU/liter)			
	Low (n = 52)	Middle (n = 52)	High (n = 52)	*P* value	2.0–4.8 (n = 23)	0.3–1.99 (n = 47)	<0.3 (n = 37)	*P* value
Weight (kg)	73.4 ± 2.0	73.4 ± 2.0	72.8 ± 2.1	0.97	75.2 ± 2.8	71.0 ± 1.8	71.5 ± 2.3	0.44
Pulse rate (beats/min)	66 ± 1	66 ± 1	68 ± 1	0.08	65 ± 1	66 ± 1	68 ± 1	0.21
Systolic BP (mm Hg)	121 ± 2	123 ± 2	122 ± 2	0.70	123 ± 3	123 ± 2	118 ± 3	0.38
Diastolic BP (mm Hg)	73 ± 2	74 ± 2	73 ± 2	0.54	77 ± 2	73 ± 2	71 ± 2	0.07
Ankle jerk relaxation time (msec)	363 ± 7	357 ± 7	343 ± 7	<0.001[a]	360 ± 11	361 ± 7	343 ± 7	0.18
Zulewski score	2.9 ± 0.2	3.0 ± 0.2	2.9 ± 0.2	0.96	2.3 ± 0.4	3.1 ± 0.3	3.0 ± 0.3	0.23

P values are derived from mixed models and are adjusted for baseline values, treatment sequence, and period effects. BP, Blood pressure.
[a] *Post hoc* testing using the Scheffe procedure showed that middle and high doses were significantly different from low dose ($P < 0.01$).

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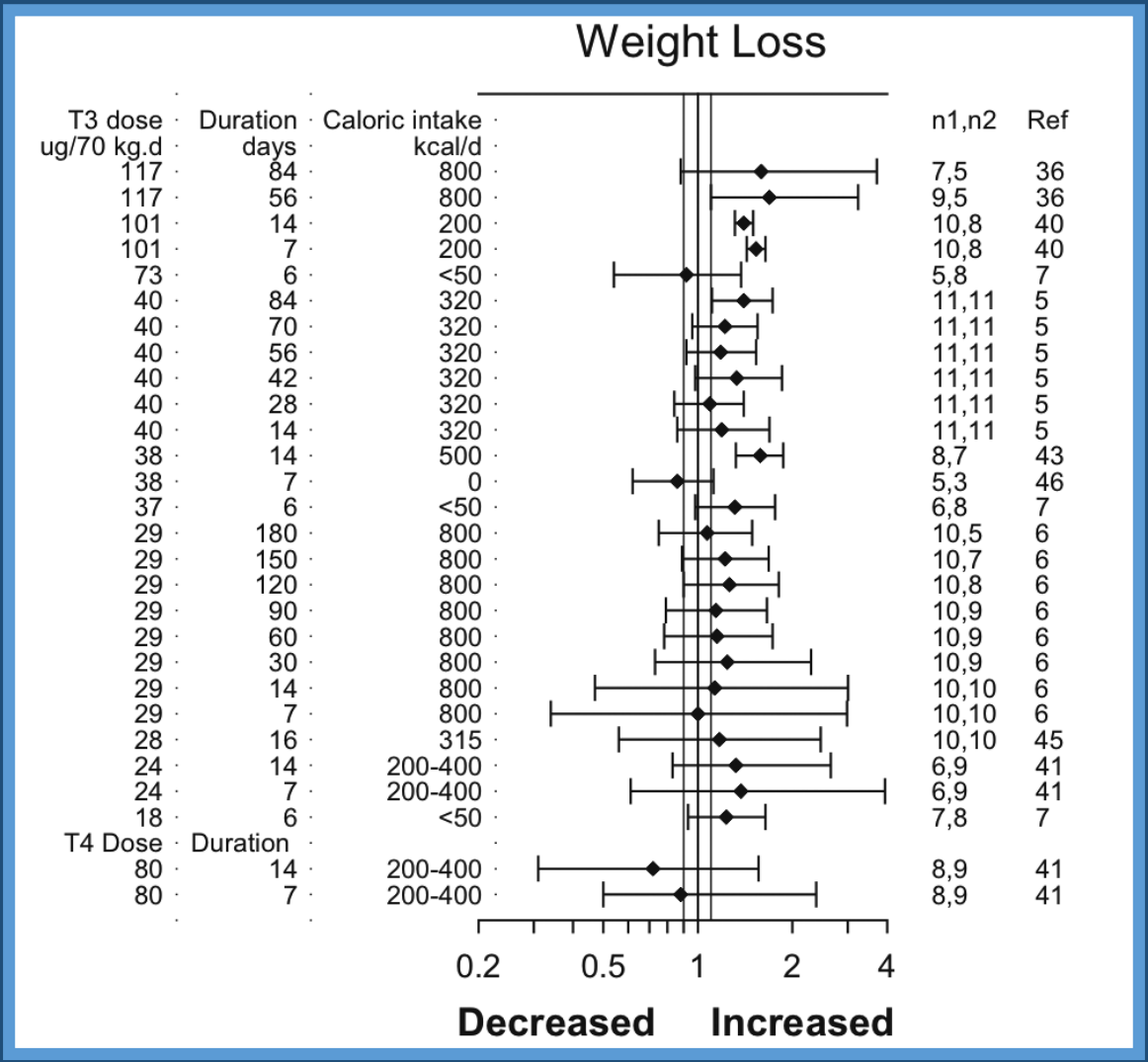
Walsh JP, et al. *JCEM*. 2006

Thyroid hormone impact on weight in Euthyroid patients



Kaptein.JCEM.2009

What is the best nutritional plan for Hypothyroidism/Hashimoto's?

- There is no "hypothyroidism diet".
- No strong clinical evidence that eating or avoiding certain foods will improve thyroid function in people with hypothyroidism.
- Adequate dietary iodine is essential for normal thyroid function.
- Eating a balanced diet makes taking supplemental iodine unnecessary.

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Selenium and the Thyroid

- Required for metabolism of thyroid hormones.
- Recommended daily allowance: 55 mcg/day.
- Dietary selenium intake in the U.S: 93-134 mcg per day.
- Deficiency decreases functions of the iodothyroinine deiodinases.
- Studies have shown they decrease TPO antibodies without changing TFTs.
- CATALYST (Selenium Supplementation in Autoimmune Thyroiditis) Trial.

Ventura M. et al. Int J Endocrinol. 2016

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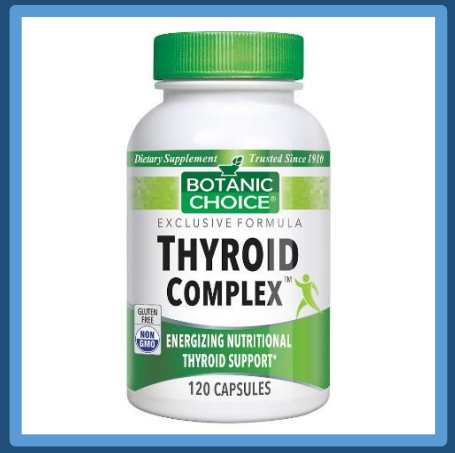
Counsel Patients Taking Alternative Therapies About Potential Side Effects and Hazards

- Many “thyroid support” products have sympathomimetic amines and excess iodine and significant amount of thyroid hormone.

- These are not needed and may cause thyroid problems in some patients.



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Biotin

- Essential Co-factor for fatty acid synthesis and energy production
- RDI 30-70 mcg per day
- Popular for hair and nails in high doses
- Does not affect the thyroid
- Affects accuracy of the immunoassay
- Stop taking 5 days prior to test

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Calcium Intake

- The optimal intake of calcium in non-osteoporotic patients is uncertain.
- Premenopausal women or in men 1000 mg of calcium (total of diet and supplement) is generally suggested.
- Recommendations for Postmenopausal women with osteoporosis
  - 1200 mg of calcium (total of diet and supplements)
  - Rough estimate by multiplying dairy serving per day by 300 mg.
- Calcium citrate preferred in those taking PPI, H2 blockers, or after gastric bypass.
- In the majority of patients, calcium and vitamin D alone are insufficient to prevent fracture.

American Geriatrics Society Consensus Statiment.JAGS.2014

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Calcium Intake

- Calcium supplementation in excess of 500 mg/day should be given in divided doses.

- The effect of calcium supplementation on risk of cardiovascular disease (CVD), particularly myocardial infarction (MI), is controversial However, neither calcium supplements (up to 1000 mg daily) or increased dietary intake of calcium have been shown to increase all-cause or cardiovascular mortality.

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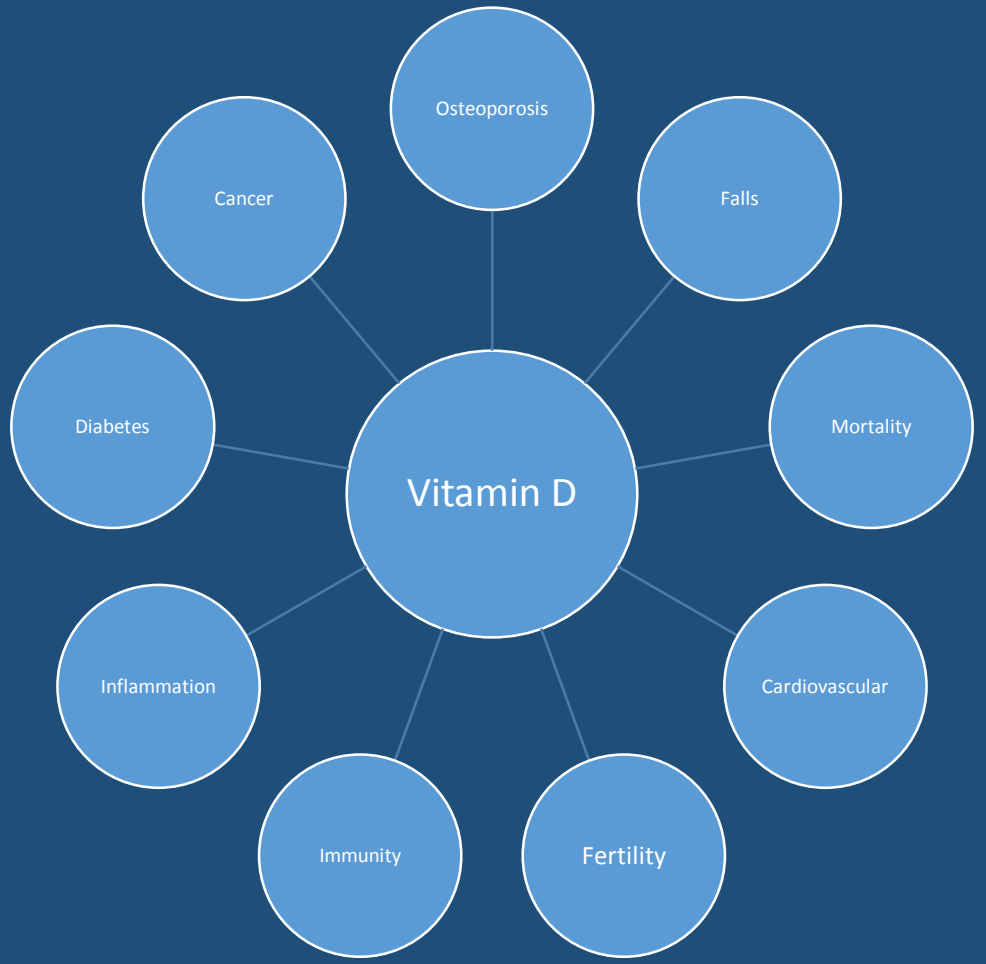
Hsia et al. Circulation.2007
Chung M et al.AIM.2016

Vitamin D Associations



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Vitamin D Deficiency

- ≤ 20 ng/mL vs ≤ 30 ng mL

TABLE 4. **Mayo Medical Laboratories Reference Ranges for Total Serum 25-hydroxyvitamin D [25(OH)D][a]**

Severe deficiency[b]	<10 ng/mL
Mild to moderate deficiency[c]	10-24 ng/mL
Optimal[d]	25-80 ng/mL
Possible toxicity	>80 ng/mL

[a] SI conversion factor: To convert 25(OH)D values to nmol/L, multiply by 2.496.
[b] Could be associated with osteomalacia or rickets.
[c] May be associated with secondary hyperparathyroidism and/or osteoporosis.
[d] Levels present in healthy populations.

Postmenopausal: 800 I.U daily

Premenopausal: 600 I.U daily

- 25-50% of patients commonly encountered in clinical practice.

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Post-Gastric Bypass Hypoglycemia

- Hypoglycemia 1-4 hours after meal ingestion (high carbohydrate).
- Most patients respond to nutrition modification.
- Frequent (every three hours) small meals or snacks, consuming foods high in fiber, avoiding foods high in sugar.
- Acarbose and somatostatin have been empirically associated with improvement of symptoms in some patients, but the primary modality of treatment of these patients is still nutrition intervention.

Singh E et al.DiabetesSpectrum.2012

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Thank you.