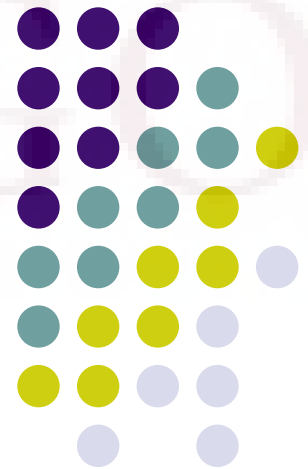




73 year-old Female with Hypercalcemia

Katie O'Sullivan, M.D.
Fellow, Adult/Pediatric Endocrinology
University of Chicago
Thursday, December 19th, 2013

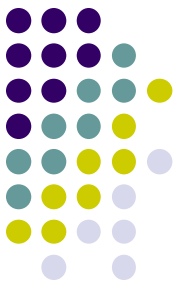




Chief Complaint

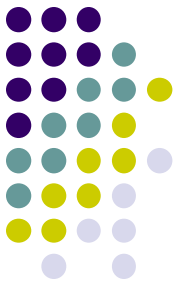
73 year-old female who presents for further evaluation of hypercalcemia.

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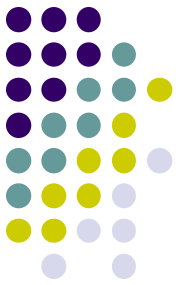
History of Present Illness

- 73 year-old female with no significant past medical history
- Generally feeling “unwell” for 1 year
 - Generalized weakness
 - Dizziness, light-headedness
 - Poor appetite, 15-lb weight loss over past 10 months
 - Forgetful x 1 month
 - Polydipsia, “dehydrated”
 - Urinary frequency/incontinence for past 2 years
 - Intermittent bone pain/low back pain



Past Medical History

- Depression/Anxiety
 - Acutely worsen 10 months ago following a life-threatening injury to daughter-in-law
 - Panic attacks
 - Receiving psychotherapy, no medical management



- Follows regularly with internist at U of C for several years
- Established care with an alternative health care provider in NYC 7 months ago
 - Several \$1000's discounts applied
 - Several therapies offered -> excellent compliance with therapies



Services and Tests

Brain Health Assessments

[BEAM – \(Brain Electrical Activity Map\);](#)

[TOVA – \(Test of Variables of Attention\)](#)

[Memory Scales – Weschler and Randt Memory Scales](#)

[CNSVS – \(Central Nervous Systems – Vital Signs Test\)](#)

[MBTI – \(Type and Temperament Personality Testing\)](#)

[WMS-III \(Wechsler Memory Scale\)](#)

[MILLON: Clinical Multiaxial Inventory-III](#)

Additional Brain Health Assessment Tests

[MMSE, GAMA, SPIN, P300](#)

Head-to Toe Ultrasounds

[Transcranial](#)

[Carotid](#)

[Echo Cardiogram](#)

[Breast](#)

[Abdominal](#)

[Renal](#)

[Pelvic](#)

[Prostate](#)

[Scrotal](#)

Neuromuscular-Skeletal Review

[Bone Density/DEXA Scan](#)

Laboratory/Blood Test Analysis

[Medical and Aging Markers](#)

Alternative Medicine

[Allergy Testing](#)

[Biofeedback](#)

[Chiropractic](#)

[Acupuncture](#)

[Orthotics](#)

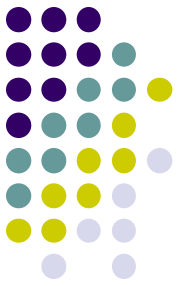
[Nutrition](#)

[Exercise](#)

Adjunct Services

[PET scan, MRI, CT angiogram](#)

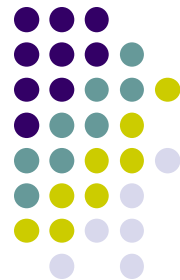




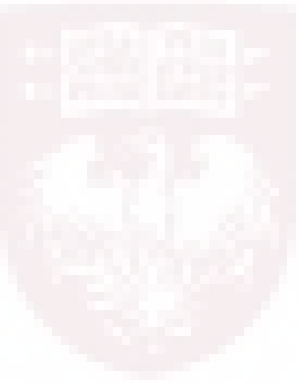
Supplements/Therapies

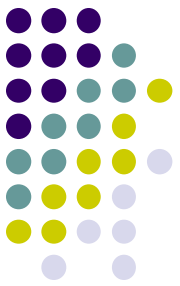
- Ergocalciferol 50,000 units weekly
- Cholecalciferol 5,000 units daily
- Forteo x 1 dose (could not afford more)
- Magnesium 470mg daily
- Strontium daily
- “Thyroid hormone” 15mg daily

Pharmacy	Town	State	Phone	Fax					
NT#	SUPPLEMENTS				B	L	D	Bed	NT#
	Brain Formulas & Single Products								
	Brain Care: PM Brain Calm Cream								
	Brain Energy: AM Brain Energy Cream								
	Brain Memory								
	Brain Mood: Anytime Brain Mood Cream								
	Inositol Caps Powder								
	Phosphatidyl Choline Powder (Teaspoon)								
	Phosphatidyl Serine 100mg								
	SAMe								
	Multi Vitamin Formulas								
	Daily Four								
	Age-Less Pak								
	Osteo Pak HOLD CALCIUM								
	Cholesterol 340mg								
	Cholesterol & Heart Support								
	Antioxidant Caps								
	Cholesterol 600mg								
	CoQ10 100mg 200mg								
	Heart Formula								
	Homocysteine Protector								
	L-Carnitine 500mg								
	Nacin 600mg (flaming expectorant)								
	Policosanol 10mg Syntrol								
	Omega-3 (EPA/DHA) 750mg								
	Omega-6 (GLA) 240mg								
	Resveratrol 10mg 200mg								
	L-Citrin 200mg								
	Male & Female Products								
	AM 140mg								
	L-Arginine 932mg								
	Menopause Support								
	Prostate Formula Ultra Prostate Support								
	Super Meatballs								
	Trazo 250mg								
	Herbs & Specialty Products								
	ASP Support (COX-2 / 5-LOX inhibitor)								
	AsFo (respiratory support)								
	Alpha Lipoic Acid 250mg								
	Boswellin/Curcumin 250mg								
	Glucosamine & Chondroitin 675mg								
	Glucosylglycy 200mg (chromium +)								
	Lutein 250mg Lycopene 10mg								
	Mg-Rose								
	NAC (N-Acetyl) Cysteine 800mg								
	Synthol (ink 800) 300mg								
	Vital Max								
	Tasty Greens								
	Digestion Aids								
	Acidophilus & Bifidus 2 billion								
	Cellulose (acidophilic gut)								
	Ultracell (cellulose)								
	SUPPLEMENTS								
	Weight Loss & Fiber								
	Carnax & Chromium (750mg & 100mcg)								
	CLA (conjugated linoleic acid) 800mg								
	Integra-Lean 150mg Liptin Buster								
	Slim Fiber (multi fiber complex)								
	Slim Pak (chromium, CLA, fiber)								
	Sleep Aids								
	CES (TENS) Device								
	Melatonin 3mg 3mg as needed								
	Sleep Formula								
	Tryptophan 500mg (1 hour before) PHN								
	Vitamins & Minerals								
	B-50 Caps								
	Biotin 5,000mg								
	C-500 Complex + Bioflavonoids								
	E-400 + Selenium 400IU/100mcg								
	Vitamin D-5,000IU								
	Vitamin D-50,000IU								
	Calcium 200mg HO-CALCIUM								
	Iodrat (iodine/iodide) 150mg								
	Iron Complex 27mg								
	Magnesium 479mg								
	Potassium Citrate 5mg 99mg								
	Selenium 200mcg								
	Zinc Complex 20mg								
	Telomerase Program TA-65								
	Hormones								
	Calcitonin nasal								
	DHEA 10mg 25mg 50mg								
	Testosterone 100mg 200mg 300mg								
	Testosterone 100mg 200mg 300mg								
	Testosterone 50mg 100mg 200mg 300mg								
	Progesterone 25mg 100mg								
	Testosterone 100mg 200mg 300mg								
	10.05mg 0.075mg 0.1mg								
	Testosterone 0.25 10.05 0.1 0.25 0.5 1.0								
	M-Ex 0.25% 0.75% 0.95%								
	Prescriptions								
	Ketolopin 0.25mg as needed (sleep)								
	L-Ethion 0.075 (thyroid cream) 1gm								
	Aprazolan 0.25mg as needed								
	Aprazolan 0.7								
	L-Lysine (cold sores)								



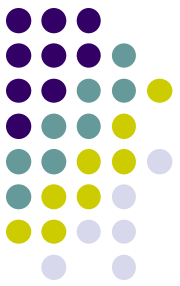
TY OF
GO





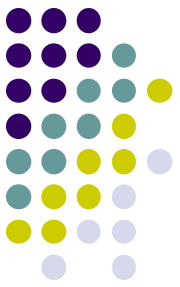
Rest of History

- **PMHx:**
 - Multiple Thyroid Nodules: stable over 1 year
 - Glaucoma
 - Osteoporosis: 6/2013
- **OB/Gyne History:**
 - Periods of infertility
- **Medications:**
 - Aspirin 81mg daily
 - Multivitamin daily
 - Brimonidine tartrate 0.1% eye gtt
- **Social History:**
 - Widow
 - Holds several advanced degrees
- **Family History:**
 - Post-menopausal sister with fragility fracture
 - No history of hypercalcemia, osteoporosis, or hyperparathyroidism



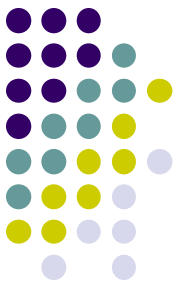
Review of Systems – Page 1

- Constitutional: No fevers. No night sweats. **Weight loss - 15# since 1/2013. Polydipsia.**
- Psychiatric: **Depression/Anxiety.**
- Eyes: **Glaucoma.**
- Nose/Mouth/Throat: No congestion. No rhinorrhea. No sore throat.
- Neck: No neck swelling or pain. No hoarseness. No dysphagia.
- Cardiovascular: No chest pain. **Palpitations.** No lower extremity edema.



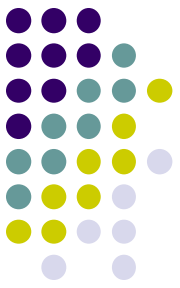
Review of System – Page 2

- Respiratory: **Dyspnea on exertion x 1 year with anxiety.** No orthopnea. No cough.
- Gastrointestinal: **Poor appetite.** No abdominal pain. No diarrhea. No constipation. No nausea. No vomiting.
- Genitourinary: **Frequency. Nocturia twice/night. Incontinence - worse in last 2 years.**
- Skin: **Rash on left arm.**
- Neurologic: No tremor. Headache - rare. **Weakness. Intermittent lightheadedness. Dizziness.**
- Musculoskeletal: **Bone pain in the right knee, worse with dancing. Intermittent midline low back pain.** No history of fractures.

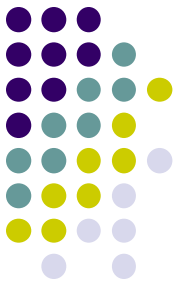


Physical Examination

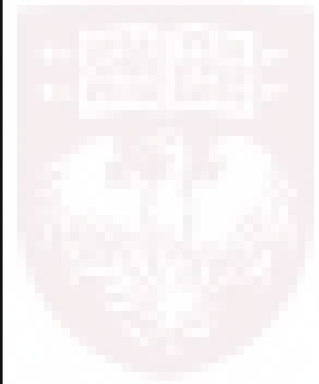
- Vitals: **P 103**, BP 107/69, Wt 50.4kg, Ht 142.4 cm, BMI 24.9.
- General: **Appears thin, frail, older than stated age. Scattered historian.**
- Eyes: Conjunctiva and extra-ocular movements normal. PERRL.
- Mouth/Throat: **Dry mucous membranes.** Oropharynx is clear
- Neck: Supple, no adenopathy. **Mild symmetrically-enlarged thyroid.** No thyroid nodules appreciated
- Cardiovascular: **Tachycardic.** No murmur. Radial pulse 2+. No lower extremity edema.



- Pulmonary: Lungs CTAB
- Abdomen: Soft, normal bowel sounds, non-tender, non-distended. No masses or HSM.
- MSK: FROM, No tenderness. **Mild kyphosis.**
- Neurological: Alert and oriented. **Patellar reflex 1+ bilaterally.** Normal muscle tone.
- Skin: No rash. No alopecia. **+Mild hirsutism with hair on chin**
- Psychiatric: **Anxious. Tearful, especially went recounting her family member's injury.**



Differential Diagnosis?



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Differential Diagnosis of Hypercalcemia

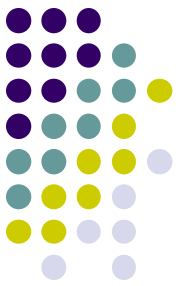


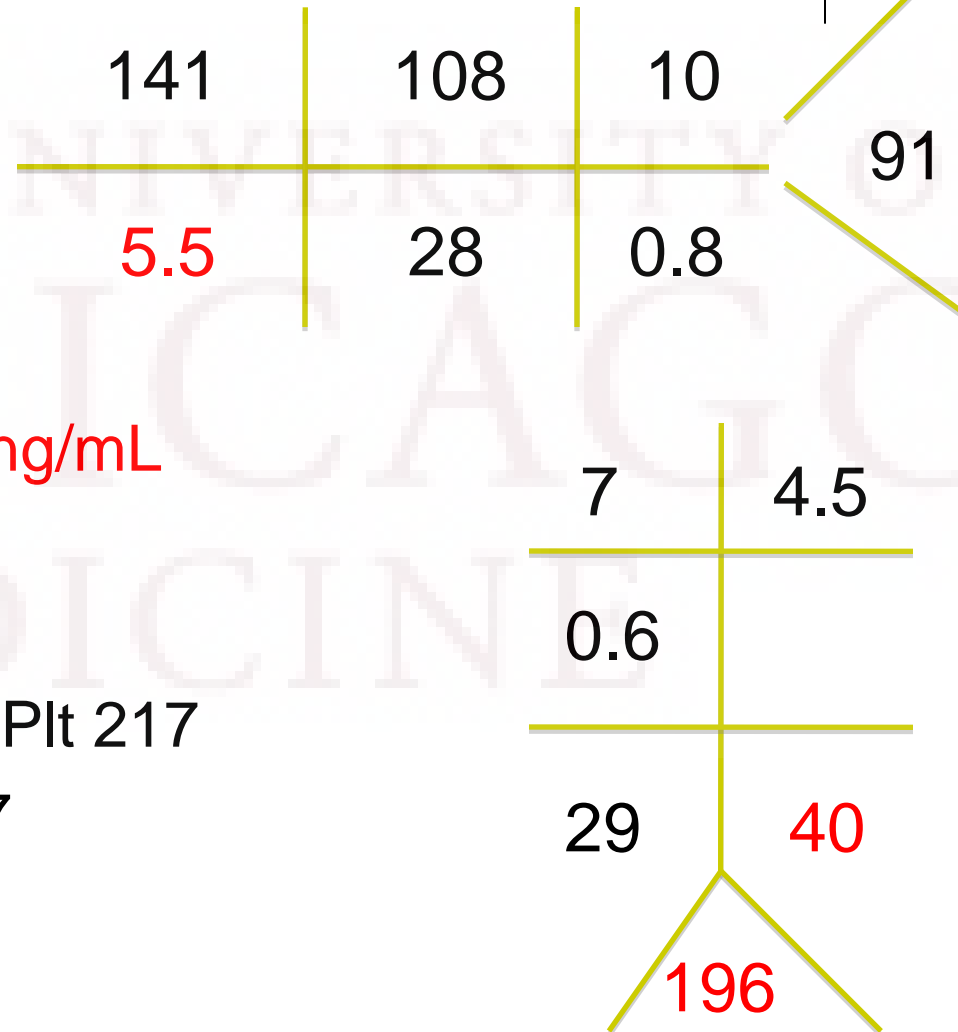
Table 46-1 Causes of Hypercalcemia

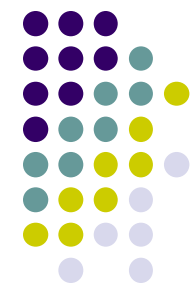
Excessive PTH production
Primary hyperparathyroidism (adenoma, hyperplasia, rarely carcinoma)
Tertiary hyperparathyroidism (long-term stimulation of PTH secretion in renal insufficiency)
Ectopic PTH secretion (very rare)
Inactivating mutations in the CaSR (FHH)
Alterations in CaSR function (lithium therapy)
Hypercalcemia of malignancy
Overproduction of PTHrP (many solid tumors)
Lytic skeletal metastases (breast, myeloma)
Excessive 1,25(OH) ₂ D production
Granulomatous diseases (sarcoidosis, tuberculosis, silicosis)
Lymphomas
Vitamin D intoxication
Primary increase in bone resorption
Hyperthyroidism
Immobilization
Excessive calcium intake
Milk-alkali syndrome
Total parenteral nutrition
Other causes
Endocrine disorders (adrenal insufficiency, pheochromocytoma, VIPoma)
Medications (thiazides, vitamin A, antiestrogens)

Current Laboratory Studies

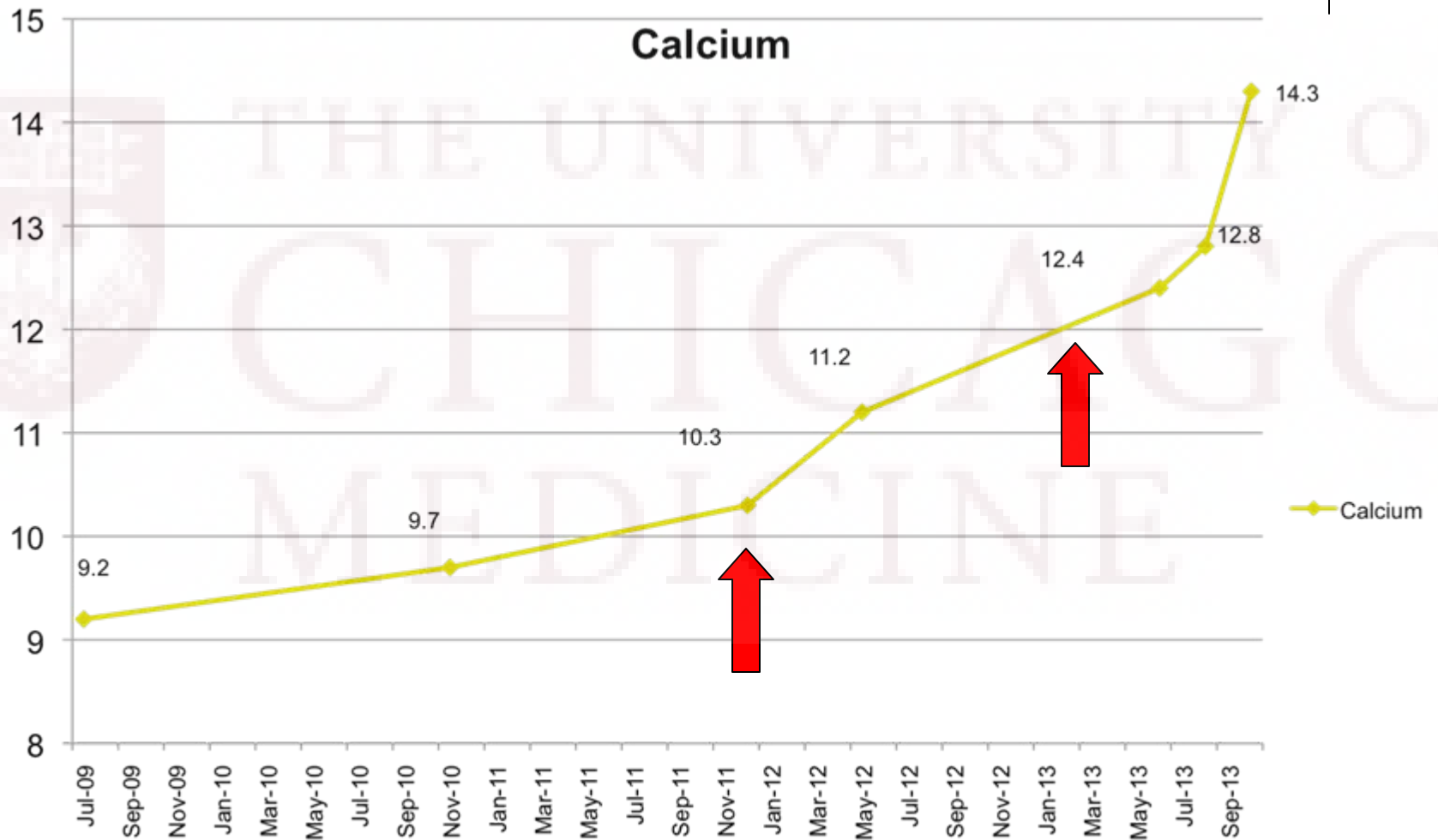


- Calcium: 14.3 mg/dL
- iCa: 7.6 mg/dL
- Phosphate: 2.2 mg/dL
- PTH: 291 pg/mL
- Vitamin D 25-OH: 100 ng/mL
- GFR: 70 mL/min
- CBC:
 - WBC 6.8, Hgb 13.1, Plt 217
- TSH 0.32, Free T4 1.17



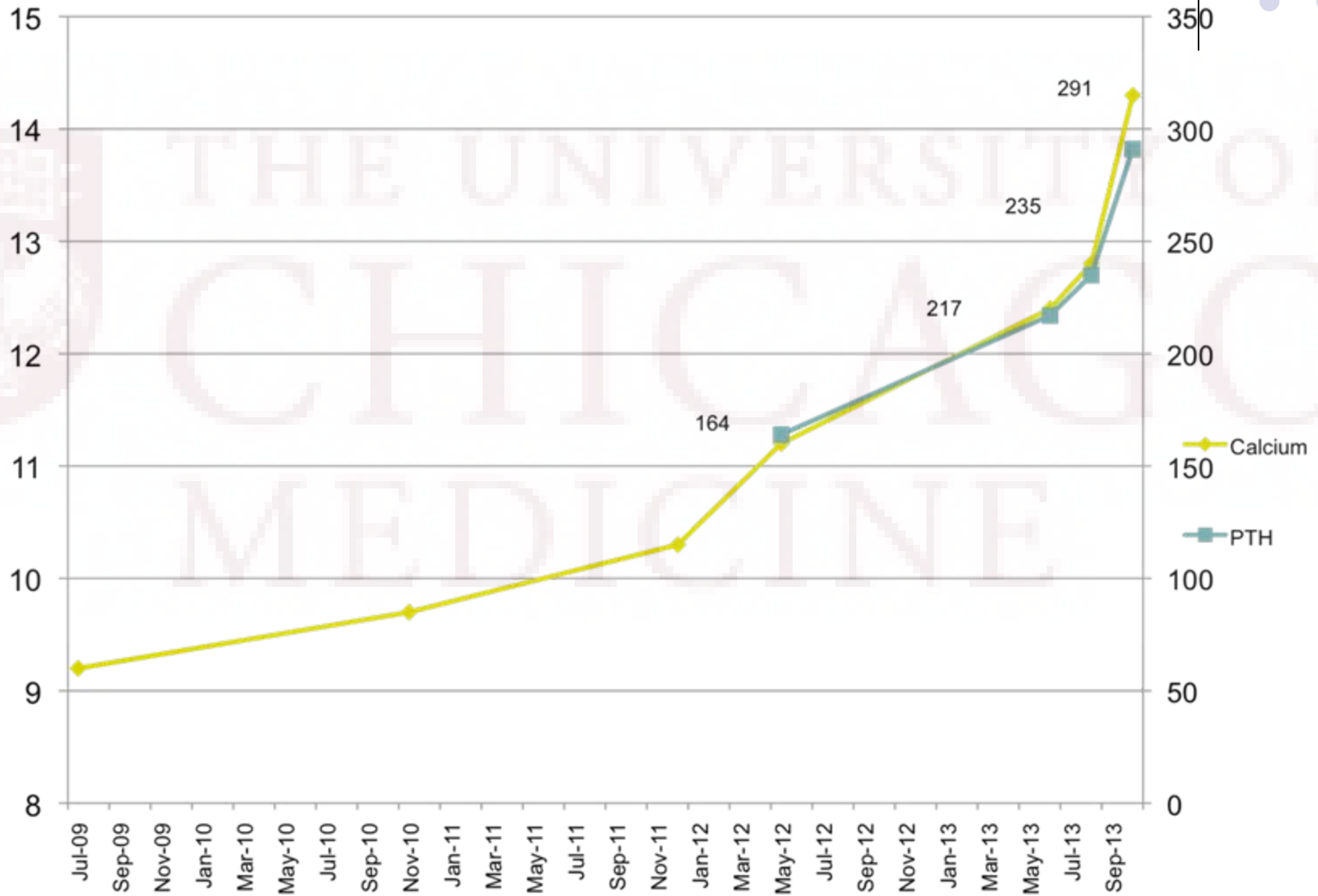
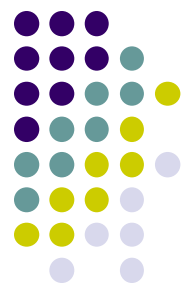


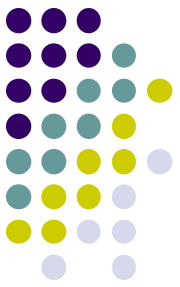
Calcium Trend





Calcium/PTH Trend





Next Step: Hospitalization

- Treatment:
 - Aggressive hydration with NS at 200cc/hr
 - Cinacalcet 60mg daily
- Calcium improved: 10.9 mg/dL
- Discharged with Cinacalcet

- ED Visit 1 week later, Calcium 12.8 mg/dL
 - s/p NS bolus, discharged with Cinacalcet



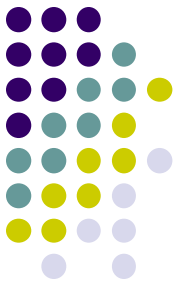
Parathyroid Imaging

image 1/2
Frame# 0/
11/7/2013
13:38:08

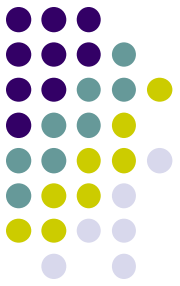


Zoom 200%
ww/wl 108/55
ORIGINAL PRINT/STATIC/EMISSION

Surgical Procedure: 11/26/13



- Unilateral exploration
 - “Enlarged right upper parathyroid at the middle portion of the thyroid. The right lower parathyroid was seen and appeared normal.”
- Right Upper Parathyroidectomy
 - Pathology: Enlarged, hypercellular parathyroid (390 mg).
- Intraoperative PTH Monitoring:
 - Pre 1/2: 335/474
 - 5 min: 120
 - 10min: 70
 - 25min: 19



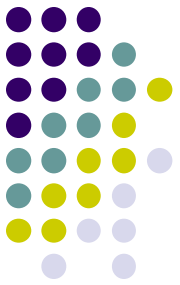
Post-Operative Follow-Up

Presentation

- Calcium: 14.3 mg/dL
- PTH: 291 pg/mL
- iCa: 7.6 mg/dL
- Phosphate: 2.2 mg/dL
- Vitamin D 25-OH: 100 ng/mL

Post-Parathyroidectomy

- Calcium 9 mg/dL
- PTH 19 pg/mL
- Vitamin D 25-OH: 40 ng/mL



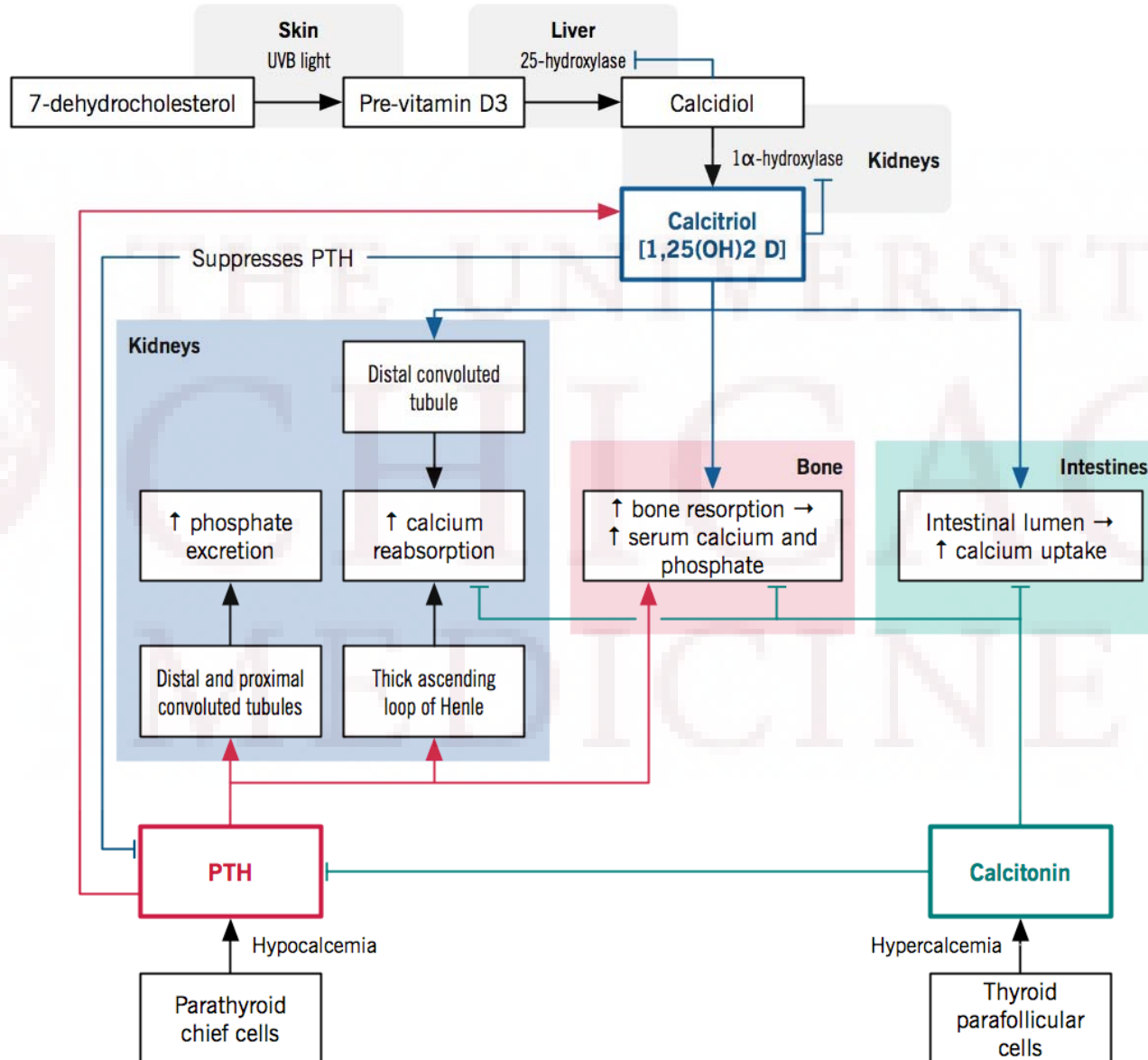
Diagnosis

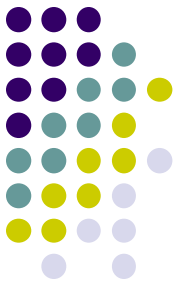
- Hypercalcemia secondary to primary hyperparathyroidism while on high-dose Vitamin D replacement

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MEDICINE

Calcium homeostasis

Ashu Jain and Sultan Chaudhry





Clinical Questions

- What is the standard of care for treatment of Vitamin D deficiency among alternative health care providers?
- What is appropriate treatment of Vitamin D deficiency in the setting of primary hyperparathyroidism?



The World's Single Deadliest Vitamin Deficiency

An estimated 85% of people in the U.S. are Vitamin D Deficient and Many Scientists and Researchers Consider This an Unrecognized Global Epidemic

GIVE ME MY FREE REPORT

Free Report: The Amazing Wonder Nutrient That May Prevent Or Cure Seven Common Diseases

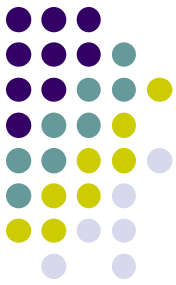
Betrayal of a Nation: Why U.S. health authorities are keeping you vitamin D deficient and who stands to gain

The 10 Health Dangers of Vitamin D Deficiency

Posted by: Contributing Source in News ⌚ June 3, 2013



Alternative Health Philosophy



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Page 2 of about 12,500,000 results (0.33 seconds)

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Supplements and Herbal Medicine for COPD ... physician Jeremy Mikolai, ND, a researcher at the National College of **Natural Medicine** in Portland, Ore.

[Vitamin D - American Cancer Society](#)

[www.cancer.org](#) > ... > Herbs, Vitamins, and Minerals

In orthomolecular medicine and some other forms of **alternative medicine**, large doses of **vitamin D** may be used along with other vitamins to treat cancer (see ...

[How Much Vitamin D is Enough? | Alternative Medicine](#)

[www.alternativemedicine.com/food...and.../how-much-vitamin-d-enoug...](#)

In 2010, the USDA increased its Daily Recommended Intake of **vitamin D** from 400 IU to 600 IU for people younger than 70 years old, and to 800 IU for those ...

[Vitamin D the natural cancer cure - CANCERactive](#)

[www.canceractive.com/cancer-active-page-link.aspx?n=509](#)

The Boston **Medical School** has completed a great many research studies on **vitamin D**. Read the following statement from their Professor Hollick, "If women ...

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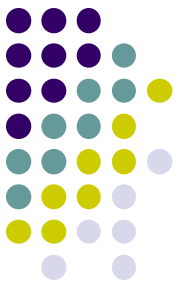
[LuckyVitamin...](#)

Ads

[Dr. Weil Vitamin Advisor](#)

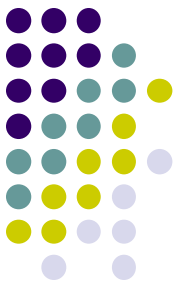
[www.weilvitaminadvisor.com/](#)

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Alternative Health Philosophy

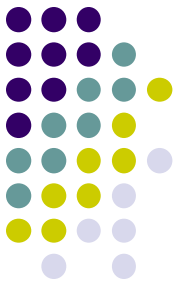
- Assessment of Vitamin D 25-OH Levels:
 - “Minimum”: 80nmol/L = 32ng/mL
 - “Optimum”: 125-175 nmol/L (50-70ng/mL) in Caucasians, 80-120 nmol/L (32-48 ng/mL) in AA
 - “Safe Upper Limit”: 250nmol/L (100ng/mL)
- Treatment of Vitamin D Deficiency:
 - “Loading Dose”: 20,000 IU (?time) for 3-6 months
 - “Maintenance Dose”: 5,000 IU/day
- Caution: Sarcoidosis, drug interactions (“diuretic”), “Vitamin A, D, K2 interaction”
- Summary: “Increase dosage 4-10 times the current RDI recommendations”



Evaluation, Treatment, and Prevention of Vitamin D Deficiency:

An Endocrine Society Clinical Practice Guideline

- Goal Vitamin D 25-OH: $>30\text{ng/mL}$
- Vitamin D Replete:
 - Maintenance for $> 70\text{yo}$: 600-800 IU/d
- Vitamin D Deficient:
 - Treatment: 50,000IU/week or 5,000IU/dx 8 weeks
 - Maintenance: 1,000-2,000IU/d (2-3x higher if obese or malabsorption)



Clinical Questions

- What is the standard of care for treatment of Vitamin D deficiency among alternative health care providers?
- What is appropriate treatment of Vitamin D deficiency in the setting of primary hyperparathyroidism?



Vitamin D Deficiency and Primary Hyperparathyroidism (PHPT)



- 27-93% of patients with PHPT are Vitamin D deficient¹
- Vitamin D deficiency exacerbates biochemical phenotype of PHPT as well as “hungry bone syndrome” in post-surgical pts²
- Treatment of Vitamin D Deficiency^{3,4,5}:
 - Reduce PTH levels
 - Reduce markers of bone turnover
 - Improved bone mineral density

1.Silverberg et al. American Journal of Medicine. 1999.
2.Stewart et al. Surgery. 2008.
3.Silverberg. J Bone and Mineral Research. 2007.
4.Grey et al. JCEM 2005.
5.Tucci, JR. European Journal of Endocrinology 2009.



Vitamin D Repletion in Patients with Primary Hyperparathyroidism and Coexistent Vitamin D Insufficiency

Andrew Grey, Jenny Lucas, Anne Horne, Greg Gamble, James S. Davidson, and Ian R. Reid

Department of Medicine (A.G., J.L., A.H., G.G., I.R.R.), University of Auckland, 92019 Auckland, New Zealand; and Department of Chemical Pathology (J.S.D.), Labplus, Auckland City Hospital, Auckland, New Zealand

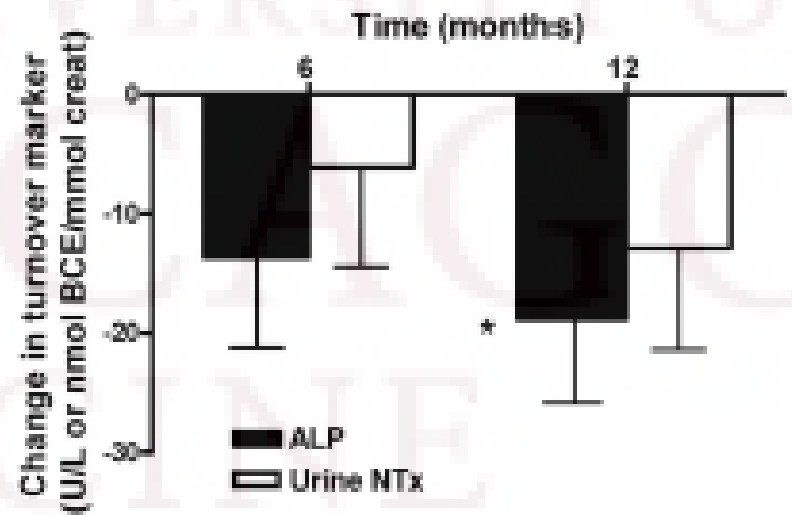
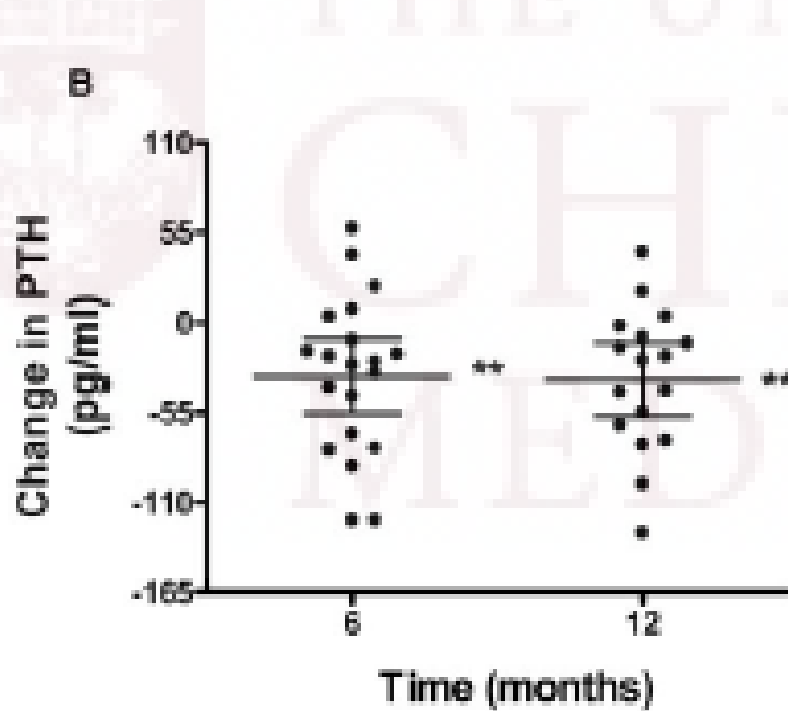


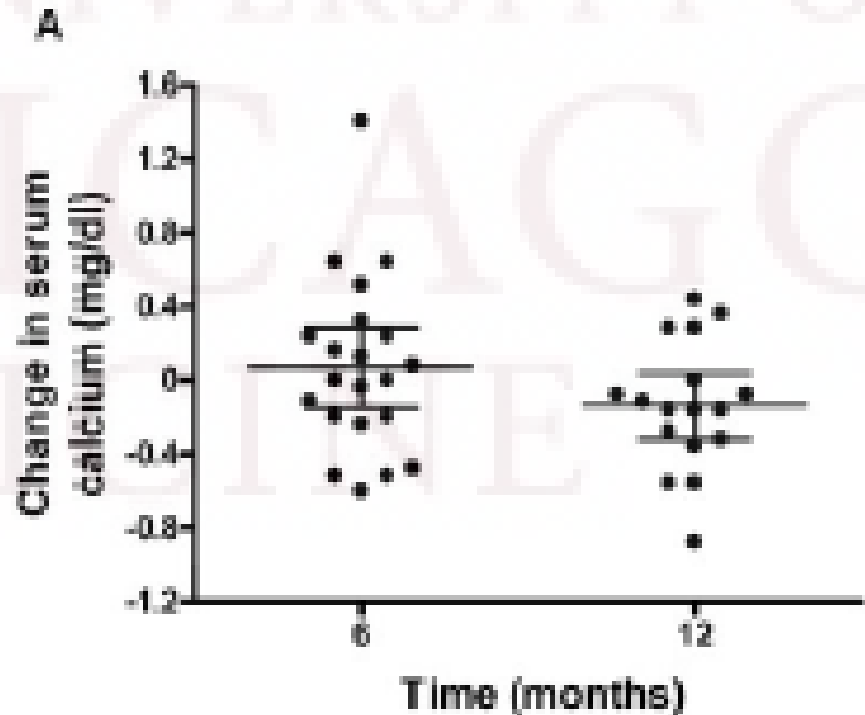
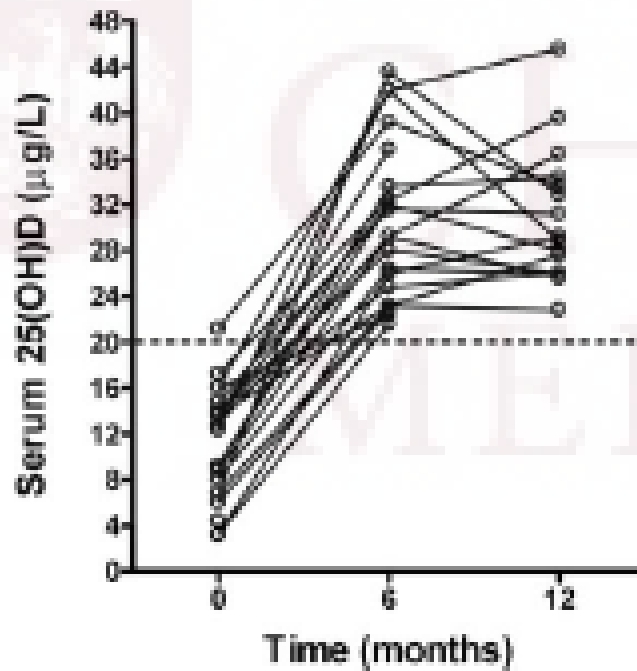
FIG. 3. Plot of changes in total ALP (dark bars) and urine *N*-telopeptides of type 1 collagen (open bars) in patients with PHPT and vitamin D insufficiency treated with cholecalciferol for 1 yr. *, $P < 0.05$ vs. baseline. BCE, Bone collagen equivalent; creat, creatinine.



Vitamin D Repletion in Patients with Primary Hyperparathyroidism and Coexistent Vitamin D Insufficiency

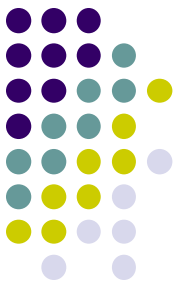
Andrew Grey, Jenny Lucas, Anne Horne, Greg Gamble, James S. Davidson, and Ian R. Reid

Department of Medicine (A.G., J.L., A.H., G.G., I.R.R.), University of Auckland, 92019 Auckland, New Zealand; and Department of Chemical Pathology (J.S.D.), Labplus, Auckland City Hospital, Auckland, New Zealand

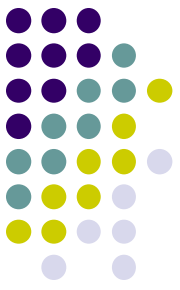




Treatment of Vitamin D Deficiency in PHPT



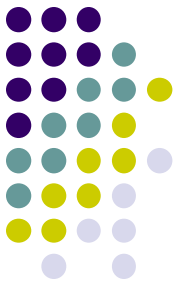
“For patients with primary hyperparathyroidism and Vitamin D deficiency, we suggest treatment with vitamin D as needed. Serum calcium levels should be monitored.” Suggested (Level 2) with high-quality evidence.



Conclusion

- Use of over-the-counter supplements can be dangerous if not used properly
- Vitamin D deficiency is not uncommon among patients with PHPT
- Vitamin D deficiency exacerbates the phenotype of PHPT and should be treated
- Treatment of Vitamin D deficiency in patients with PHPT is safe, but requires close monitoring of calcium

Works Cited



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