Pharmacology Updates in Pediatric Endocrinology

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Hypothyroidism Treatments

- Synthroid / Levoxyl
  - Generic variability
  - May contain lactose, gluten or food dyes
  - GI conditions that affect absorption
    - Celiac disease
    - IBS
    - Prior gastric bypass
    - Lactose intolerance

- Tirosint gel caps
  - No generic
  - Made of gelatin, LT4, glycerin, and water
  - No dyes or allergens
  - Produced in dedicated facility
    - No cross contamination

- Impact of gastric pH
  - May require 37% INCREASE in LT4 dose when given in presence of acid reducers

- Tirosint gel capsules
  - Tirosint least impacted by gastric acidity
  - Doses 13mcg thru 150mcg
  - Cannot split or crush
  - Packaged in color-coded blister pack to protect from moisture & light
Jenna, Dad, Amanda, & Mom  
Spring Break fun

So many insulins...  
U-100, U-200, U-300, U-500  
2, 3, 5 pens per pack  
Expires in 28 days, 42 days, 56 days

Thyroid Disorders
- Humalog U-100 (300u/pen)  
  - Approved for insulin pump  
  - 5 pens per box  
  - Avg < 45 units/day

Concentrated Insulins
- Humalog U-200 (600u/pen)  
  - Not for insulin pump  
  - 2 pens per box  
  - Avg > 45 units/day

Store in use at Room Temp < 86°F  
- Away from heat/light  
- Discard after 28 days
Concentrated Insulins

- **Toujeo (glargine 300U/mL)**
  - 1:1 conversion from once daily basal
  - Expect higher dose than Lantus
  - Administer at any time of day (same time daily)
  - 450 units per pen (Packages of 3 or 5)
  - pH of 4 (same as Lantus)
  - Steady state 5-8 days
  - First dose of Toujeo may be inadequate for glycemic needs
  - Onset of action 5 hours *
  - Store in use at Room Temp < 86°F
    - Away from heat/light
    - Discard after 28 days

Concentrated Insulins

- **Tresiba insulin degludec**
  - Onset 1 hour — Duration up to 42 hours
  - Allow minimum of 8 hours between doses
  - Basal insulin with no true peak
  - Steady state 3-4 days
  - Store in use at Room Temp < 86°F
    - Away from heat/light
    - Discard after 56 days
    - Specifies not to refrigerate a pen in use

Concentrated Insulins

- **Tresiba U-100**
  - Holds 300 units
  - 5 pens per box
  - 1 unit increments
  - 1-80 units
  - Blue & yellow

- **Tresiba U-200**
  - Holds 600 units
  - 3 pens per box
  - 2 unit increments
  - 2-160 units per dose
  - Blue & olive green 200
Thyroid Disorders

• Injections
  – Testosterone cypionate
    • IM injection q 2-4 weeks
  – Cottonseed oil
  – Testosterone enanthate
    • IM injection q 2-4 weeks
  – Sesame oil
  – Aveed®/Testosterone undecanoate
    • Restricted availability
    • Risk for pulmonary oil microembolism & anaphylaxis
    • IM q 10 weeks

Options for Testosterone Replacement

• Androderm® patch
  – 2mg/24h and 4mg/24h
  – Apply daily at hs
    • Back, abd, thigh, arm
  – Allow 7d before reuse site
  – If site falls off before noon, place new patch and change that night
  – Keep dry for 3 hrs post
  – Skin reaction common
    • Burn like blisters (bony prominences)

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Gels for Testosterone Replacement

• Pros
  – Not a shot
  – Administered at home
  – More consistent dosing
  – Reviews indicate wide variance between different gels in absorption

• Cons
  – Time to dry
  – Transfers Testosterone
  – Odor
  – Feels sticky / tacky
  – Some prefer the ‘boost’ they feel post injection
  – Cost

Gels for Testosterone Replacement

• Fortesta® 2%
  – Dries fast (less than 2.5min)
  – No odor, colorless
  – Volume less than a quarter
  – Concentrated apply with one finger to thigh/inner thigh
    • Not arm or shoulder
  – Keep area dry for 2hrs

• Testim®
  – Reviews c/o long time to dry
  – Odor – questions about their cologne

• Androgel® 1% and 1.62%
  – c/o cost 2 bottles of 1.62% were $985
  – Dries quickly, No odor

• Vogelxo® – c/o feels tacky
Testosterone Replacements

- Axiron ® – topical solution
  - Applied underarm 1-2x/day
  - No odor
  - Low risk of transference
  - Mixed reviews

- Striant ® (buccal tablet)
  - Apply to gum BID
  - Gum irritation 1st week
  - Trough am labs
  - Reapply if falls off within hrs
  - Replace every 12 hrs

- Testopel ® pellet
  - 17α alkyl androgens
  - In office sterile procedure
  - SQ into abdominal tissue
    - Cellulitis
      - in thin pts
  - Implant every 3-6 months
  - 6-12 pellets implanted
  - Rare for those on pellets to go back to injections
  - Study followed 973 implants over 13 years

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Testosterone – not all the same

- Bypass the Liver
  - Gels
  - Pumps
  - Patches
  - Topical solution
  - Short acting injections
    - Testosterone enanthate
    - Testosterone cypionate

Testosterone-Replacement Options

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- Testosterone cypionate

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Testosterone…convenience carries risks

- 17α alkyl androgens (oral, depot injection, implants)
  - Metabolized in liver
  - Rare liver cancer
  - Monitor LFTs
    - Cholestatic hepatitis & jaundice occur at low doses
    - Liver tumors
  - Peliosis hepatitis – multiple blood-filled cavities in liver
    - Risk fatal hemorrhage
    - Testopel® Pellets
    - Aveed® 10 week injection
      - Risk of pulmonary oil microembolism
      - Striant® buccal tablets
      - Pills: Androxy®, Methitest®, Android® or Testred®
Thyroid Disorders

Resources

• Package inserts
• WebMD reviews