<table>
<thead>
<tr>
<th>Route of Administration</th>
<th>Drug</th>
<th>Trade Name</th>
<th>Formulation</th>
<th>Usual Dosage Range (adult men androgen deficiency)</th>
<th>$ /30 days</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORAL</td>
<td>Testosterone undecanoate</td>
<td>ANDRIOL</td>
<td>40mg cap</td>
<td>80mg AM + 40mg PM 80mg BID after meals swallow without chewing 40mg every other day</td>
<td>$108 $142</td>
<td>$25</td>
</tr>
</tbody>
</table>
|                         |                                     |                  |                 | • taking after meals greatly enhances absorption¹  
|                         |                                     |                  |                 | • no effect on liver function over 10yrs (observation)²  
|                         |                                     |                  |                 | • Storage: refrigerate in pharmacy; store at room temperature after dispensing (stable for 90 days)³  
|                         |                                     |                  |                 | • applied to shoulder, abdomen or upper arms  
|                         |                                     |                  |                 | • patient should wait >6hrs before showering, etc.  
|                         |                                     |                  |                 | • possible transfer to partner . T-shirt before hugging gel generally better tolerated than patch  
| TRANSDERMAL GEL         | Testosterone 1% Gel (5g packet delivers 50mg testosterone & approx. 10% absorbed) | ANDROGEL         | 2.5g, 5g packet | 5g daily in AM initial dose  
|                         |                                     |                  |                 | 7.5g daily in AM  
|                         |                                     |                  |                 | 10g daily in AM  
|                         |                                     |                  |                 | • produces stable – normal testosterone levels (8-12hrs after nightly application)  
|                         |                                     |                  |                 | • skin irritation at site; burn-like blister >10%; if mild use low potency topical corticosteroid  
|                         |                                     |                  |                 | • apply to back, abdomen, thigh or upper arms; avoid bony areas; ROTATE site weekly  
| TRANSDERMAL PATCH       | Testosterone (in alcohol based gel)  | ANDRODERM        | 2.5mg, 5mg patch | 2.5mg patch daily at HS  
|                         |                                     |                  |                 | 5mg patch daily at HS  
|                         |                                     |                  |                 | 7.5mg patch(s) daily at HS  
|                         |                                     |                  |                 | (Apply between 8 & 12 PM)  
|                         |                                     |                  |                 | • supratherapeutic levels during first few days; subtherapeutic levels thereafter; ±more prone to side effects (e.g. mood disturbance, ±polycythemia)  
|                         |                                     |                  |                 | • testosterone levels: 7th day injection (mid range)  
|                         |                                     |                  |                 | • range: 50mg q2wk – 200mg q2wk - 400mg q4wks  
| INJECTABLE              | Testosterone cypionate               | DEPO-TESTOSTERONE| 100mg/ml (10ml Vial) | 100mg IM q2wks  
|                         |                                     |                  |                 | 150mg IM q2-3wks Alternating buttsocks  
|                         |                                     |                  |                 | $12 $14  
|                         | Testosterone enanthate               | DELATESTRYL      | [small injection volume advantage] | 200mg/ml (5ml Vial) | 100mg IM q2wks  
|                         |                                     |                  |                 | 150mg IM q2-3wks  
|                         |                                     |                  |                 | 100mg IM q4wks  
|                         |                                     |                  |                 | $14 $16  

### TESTOSTERONE AGENTS [non-17-α-alkylated]  


**Potential BENEFITS of Androgen Therapy**  

- ↓↓ body fat; ↑ lean body mass (LBM)  
- ↑ bone density; ↓ lack data on fracture outcomes  
- ↑ hand-grip strength; (less effect on lower body)  
- improvement in mood, mixed effects on cognition  
- antidepressant effect in depressed refractory men with low testosterone levels (preliminary data)  
- ↑ libido; possible improvement in sexual function but often not useful in erectile dysfunction  
- ↓↓↓ body fat; ↑ lean body mass (LBM)  
- (improvements specifically seen in men with the very low/lowest of testosterone levels)  

**Potential RISKS of Androgen Therapy**  

- Cardiovascular - ↓ HDL; long-term effects unknown  
- Fluid retention: exacerbation of heart failure  
- Polycythemia (↑Hgb; ↑Hct) – ↑ stroke risk; less with oral/ transdermal forms which provide stable levels  
- Gynecomastia (especially if hepatic/renal disease)  
- Testicular: atrophy or infertility  
- Prostate: ↑ prostate size; ↑ PSA but usually within normal range; possible acceleration of prostate cancer; Difficulty with urination - ↑ to benign prostatic hypertrophy (one study found retardation in BPH)  
- Sleep apnea – may exacerbate  
- Other: acne; exacerbation of aggression, hostility, inappropriate sexual behavior or psychotic illness  
- Hepatotoxicity only with anabolic 17-α-alkylated forms (e.g. stanozol)  

**MONITORING of Androgen Patients**  

- Clinical evaluation of symptom response and side effects (from patient and/or spouse or family member)  
- Prostate assessment: baseline & annually; some references suggest more frequent in first year  
- questionnaire regarding urinary/prostate symptoms  
- digital rectal exam (DRE) & PSA (range: 0-4 ug/L)  
- Lab Tests: Hct, Hgb, Liver Function Tests  
- CV assessment: lipid profile, edema, weight gain  
- Testosterone total level(normal = 6-29nmol/L)  

**Free Androgen Index**  

- Provides better measure of bioavailable testosterone (normal = 14.8-94.8; accounts for effect of sex hormone binding globulin (SHBG))  
- Sleep disturbance: excessive snoring; sleep apnea  
- Mood changes  

**Conversion Factor**: Testosterone ng/dL x 0.0347 = nmol/L  

**Major Contraindications**: polycythemia, prostate cancer, prostate hypertrophy with severe urinary retention, testicular or breast cancer  

**Precautions**: mild prostatic hypertrophy, sleep apnea  

**Goal of Androgen Therapy**: primarily to improve symptoms of hypogonadism and to bring T levels into the normal range  

**Therapeutic Trial Duration**: ≥ 3-6 months  

**Related Conditions & Therapies**:  

- DEPRESSION ⇔ antidepressants, mood stabilizers;  
- ERECTILE DYSFUNCTION ⇔ VIAGRA, MUSE, other;  
- OSTEOSPOROSIS ⇔ bisphosphonates, Ca++ & Vitamin D;  
- HYPOPTHYROIDISM ⇔ levothyroxine;  
- LIBIDO ⇔ multifactorial;  
- LIFESTYLE ⇔ exercise, diet, sleep, avoid excess alcohol & caffeine, positive social support/relationships  

**CAUTION**: Treatment safe & effective in true hypogonadism but not well established in Partial Androgen Deficiency in the Aging Male (PADAM). Trials too small & too short term for heart & prostate outcomes.  

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References – 1. Androgens & the Aging Male - www.RxFiles.ca


