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## Crossing the T – Male Hormone Replacement Therapy

November-December  
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CROSSING THE T – MALE HORMONE  
REPLACEMENT THERAPY

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When clinically warranted, the topical use of testosterone replacement can be an effective treatment in males with hypogonadism. Various commercially available products exist, but occasionally the need for specialty compounding arises. This session seeks to evaluate the prescribing of testosterone replacement therapy and explore the appropriateness of specialty compounding. Challenges of compounding a topical testosterone replacement therapy and patient counseling points are identified and extrapolated for 'best practice' recommendations. This program has been ACPE accredited as a 'compounding' program.

### Learning Objectives

#### Pharmacist

- 1 Describe skin tissue penetration of testosterone
- 2 Recognize appropriate counseling points for compounded topical testosterone
- 3 Describe how to adjust topical testosterone at physician request

#### Nurse

- 1 Interpret laboratory levels of testosterone in different test samples
- 2 Interpret patient assessment  
Define instances where compounded testosterone may be inappropriate

#### Pharmacy Technician

- 1 Identify possible situations that may prompt a compounded prescription for topical testosterone
- 2 Identify appropriate processing elements of a topical testosterone prescriptions
- 3 Recognize appropriate basic compounding steps for a topical testosterone product

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## Target Audience

Pharmacists, Pharmacy Technicians, Nurses

## Universal Activity Number

Pharmacist

0798-0000-19-199-H07-P

Pharmacy Technician

0798-0000-19-199-H07-T

Nurse

0798-0000-19-199-H07-N

## Credit Hours

1.0 Hours

## Activity Type

Knowledge-Based

## CE Broker Tracking Number

20-675347

## Activity Release Date

November 1, 2019

## Activity Offline Date

May 1, 2022

## ACPE Expiration Date

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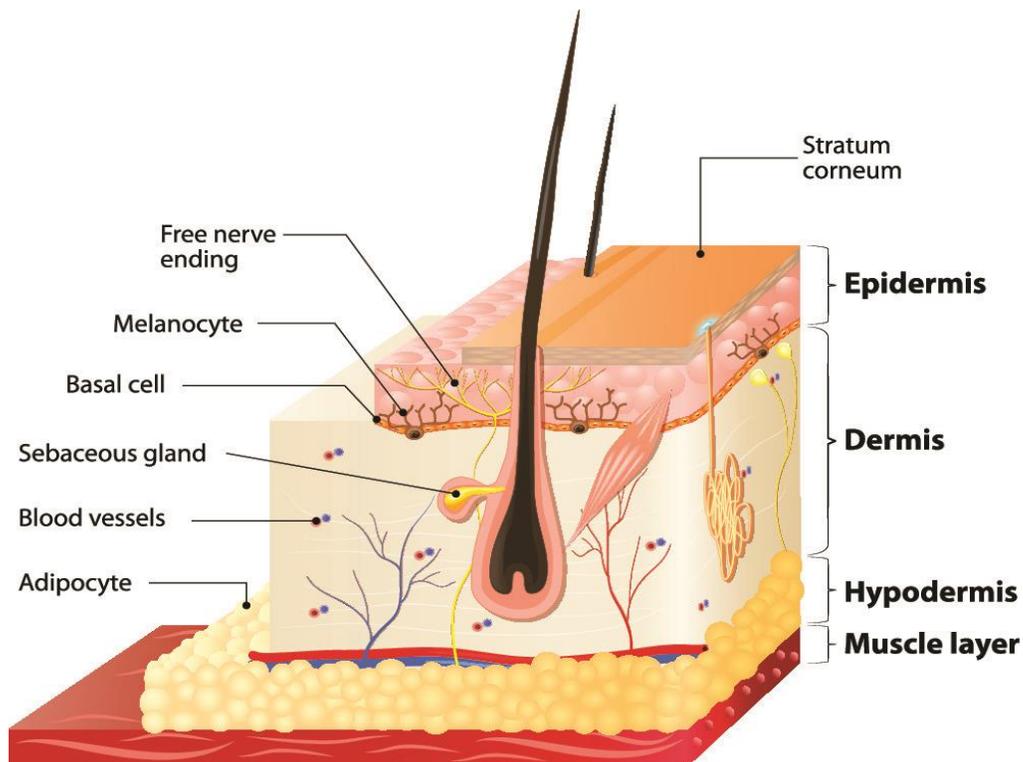
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## **Introduction**

The Fountain of Youth as Ponce de Leon is purported to have imagined was a healing river of paradise that could turn old men back into boys, an idea of immortality that many of that day dreamed of, and a thought that is not lost on our culture today. As some may erroneously surmise today, De Leon's "Fountain of Youth" may have been wondering around his blood stream naturally; he just needed way more of it in his body! In fact, this is how testosterone replacement has been described recently, as a way to 'turn back the clock', regain our bodies from the past, revive our memory and recollection, and halt the aging process. Most understand that mortality is a part of the human experience, but it doesn't stop the mind from wondering if there is a solution to it: the proverbial "fountain of youth". It has been mostly debunked that Ponce de Leon was actually sent to find this magical river by King Ferdinand in 1512, (1) just as it should be mostly debunked that testosterone replacement is the "Fountain of Youth" for our times.

While testosterone is an extremely important hormone in the body, for both men and women, it is important to understand the difference between physiological deficiency and supra-physiological doses of testosterone as well as the diverse methods of delivery. Medical providers should effectively discuss with patients that while testosterone is important and, in some cases, needs replacing pharmaceutically, it is not a cure-all hormone. This article will focus on topical testosterone in both commercially available and compounded products. After reading this article, the reader should have a firm understanding of testosterone as a necessary hormone in the body, be able to discuss with patients true symptomatic expectations of topical replacement and lab value analysis, understand the basics of making a topical product if needed, and accurately counsel a patient on the proper use of both commercially available (CA) and compounded testosterone.

## Skin Structure



### Getting Under Your Skin

The stratum corneum and epidermis is the body's immediate barrier to the outside world and the largest barrier to drug penetration. A topical medication would have the properties to be able to penetrate this layer at a minimum, and this is exactly how topical medications work for skin conditions such as dermatitis. But testosterone must be able to penetrate deeper by having certain properties. The major determinant of drug absorption by the skin is the ability of the drug to diffuse into the intercellular lipid matrix. (2) A medication would need to following attributes to be able to produce this response: (2)

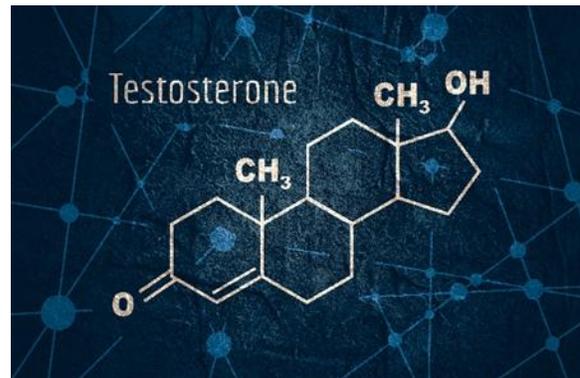
- Low molecular weight (<600 Daltons)
- Solubility in water and oils
- High and balanced partition coefficient (very high coefficients would increase drug retention in the skin)
- Low melting point (<200 degrees Celsius).

Testosterone has a molecular weight of 288gm/mol and is soluble in oil. This, among its other characteristics, makes it a candidate for topical/transdermal penetration. Please note that many times in the literature that the topical designation for products is given to different formulas, this is different than transdermal application where we a

physiologic response in the bloodstream is expected. For general use, topical is used in this article, but most often the transdermal designation would be used. Note that for testosterone replacement, we are looking to get beyond the epidermis, deeper into the dermis for the medication to be sufficiently absorbed.

## Testosterone as a Molecule

Testosterone is a hormone that is mostly produced in the testes by Leydig cells. In the bloodstream, it is bound with medium affinity by serum hormone binding globulin (SHBG), a protein that binds testosterone in a non-bioavailable form. (3) Free testosterone is a hormone that can cause an effect on different areas of the body. If testosterone levels are



normal, but a patient presents with conditions of high or low testosterone, SHBG can be also checked as a measurement of testosterone function. According to the Endocrine Society, "suggestive" symptoms of low testosterone include reduced sexual desire, low sperm count, gynecomastia, low bone mineral density, erectile dysfunction, and hot flashes. "Non-specific" symptoms include decreased energy, depressed mood, poor concentration and memory, sleep disturbances, unexplained anemia, and increased body fat with reduced muscle bulk. (4)

Testosterone has been described as beneficial in a number of different disease processes in the body. One way to supplement testosterone to a patient in need, of course, is topical replacement.

Primary hypogonadism as a condition is caused mostly by non-lifestyle-modifying issues such as testicular trauma, advanced age, Klinefelter syndrome, and cancer chemotherapy. Secondary hypogonadism conditions include a more patient-modifiable list. It is important to note that there are many other factors that could contribute to the non-specific and suggestive symptoms and other factors that could contribute to true lab abnormalities in testosterone. As a healthcare worker who understands the benefits of testosterone replacement, a thorough assessment of all these factors should be completed prior to administration of topical testosterone. If any reasonably modifiable risk-factor for low testosterone is found, it is recommended to discuss lifestyle changes, other prescription medications to correct a condition, or other supplementation before use of testosterone. Chronic alcohol ingestion, exposure to

other sex hormones (topical estrogens, progesterone, or progestins), hypothyroidism, medical conditions such as hypothyroidism, and medications such as metformin, thiazolidinediones, glucocorticoids, and opioids can all inhibit the conversion of androstenedione to testosterone. Some conditions can increase the conversion of testosterone towards estrogen. Excess adipose tissue, alcohol consumption, zinc deficiency, stress, and inflammation can all contribute to this conversion. (4, 5) Other hormone deficiencies such as DHEA and progesterone could also contribute to variations in testosterone due to the steroidogenic conversion pathways. All aforementioned issues can cause negative variations in testosterone levels, both are and total, that may cause symptoms related to secondary hypogonadism. The important question is: Is the patient suffering from true Low-T, or something else?

### **Normal Lab Values**

There are several hormones that should be evaluated to confirm low testosterone. Free testosterone (FT), total testosterone (TT), serum hormone binding globulin (SHBG) luteinizing hormone (LH) and follicle stimulating hormone (FSH). It is recommended to start by measuring TT and FT. If these are confirmed to be low then more information can be obtained by measuring LH and FSH, this should help confirm a diagnosis of secondary hypogonadism if these levels are low, and primary hypogonadism if levels are high. If TT and FT are normal, the clinician should consider other issues for the symptoms the patient may be experiencing. (4) There are other tests to obtain levels of these hormones that will be discussed later, but since blood testing is a more familiar test, normal levels for a male patient for serum testing are going to be discussed. A normal TT level in a healthy and non-obese young man should be around 300 to 1200ng/dL. FT can be measured directly by blood test or estimated based on levels of TT, SHBG, and albumin. A reference range for FT has not been officially established, but it can be reasonably assumed to be between 9 to 30 ng/dL. (6) Normal LH levels are between 1 and 9 IU/L and normal FSH levels are between 1 and 13 IU/L. (6) Results of any lab testing should be closely analyzed to determine if the clinician is dealing with primary or secondary hypogonadism to determine treatment options. For example, a patient with a total testosterone level of 290 ng/dL with mild symptoms may not need to be immediately placed on topical testosterone replacement. Every patient is different and should be treated based on a combination of presenting symptoms and lab values.

### **Different available tests**

There are 3 main testing methods for topical hormone level evaluation. The standard of topical testosterone to many practitioners is the blood, or serum, test, and this is the test recommended by many commercially available (CA) testosterone products by analyzing total serum

testosterone concentration. It is important to note here that total testosterone means it is bound by SHBG, so this is not free, bioavailable testosterone. <sup>(7, 10)</sup> They recommend titrating to the specific dose desired by the physician and then assessing periodically after a dose is found to provide the response desired. <sup>(7, 10)</sup> Saliva testing is an option to measure free testosterone levels and is touted by many in the compounding field as a standard for topical hormone measurement. While testosterone can be measured in a saliva sample, it is sometimes not recommended because saliva testing testosterone has been studied to not be superior to blood testing for topical products as has other hormones like estrogens and progesterone. <sup>(8)</sup> Saliva testing can still be considered valid to detect free testosterone as the levels have been found to correlate with hypogonadal symptoms. <sup>(8)</sup> There is also dried-urine testing which measures water-soluble conjugated hormones. This test can help determine hormone metabolites. <sup>(13)</sup>

## The Prescription Basics

It may be a no-brainer for a person familiar with pharmacy and commercially-available medications that testosterone is a product that requires a prescription, but there's a large percentage of people that do not understand the how's and why's of compounding, let alone when to compound. Just like a commercially available product, a compound for topical testosterone requires a prescription from a licensed practitioner that is licensed by law to prescribe controlled substances. Testosterone is a schedule 3 controlled substances according to the Controlled Substances Act (CSA) and is subject to the same guidelines as any schedule 3 prescription. <sup>(9)</sup> The prescription should conform to all information requested by the CSA such as the patient's full name and address, the practitioners full name, address, DEA registration number, drug name, drug strength, dosage form, quantity prescribed, directions for use, and refills if authorized. It is also important to check with state laws to verify if reporting is necessary to a prescription drug monitoring program (PDMP). In certain states, even very low doses of compounded testosterone must be reported and even the PDMP checked each time they are dispensed to a patient to help prevent misuse and abuse.

Both forms of testosterone (commercial and compounded) should have the correct and accurate amounts to dispense to avoid confusion at the pharmacy. There are many different products that have different amounts of testosterone per dose. A dispensing device of one product may be different from that of another product, or one pump of a product may deliver 20.25mg of testosterone where another may deliver a different amount. Sometimes a prescription will be written in milligrams of testosterone, a percentage of product, in grams per cream or gel, or a combination of these. It is important to understand the product differences and the strength differences. For example, a certain CA testosterone product at 1.62% that delivers 20.25mg of testosterone per *pump or actuation*. <sup>(7)</sup> This can be confusing so correct identification on the prescription is imperative. A compounded prescription must be written or expressed the same way, with a strength per day or at least a strength per dose verification. An example of a prescription that would **not** provide enough information to the compounding pharmacist would

be “testosterone 15mg: apply 1/2ml twice daily.” This may read as supply testosterone at 15mg/gm and dispense 1/2ml twice daily in a pump, or supply 15mg *in* a 1/2mL pump twice daily. These two scenarios could lead to either 1/2 or double the dose depending on how it is interpreted. Needless to say, proper knowledge of how a topical testosterone device works must be coupled with accurate knowledge of concentration math to provide an accurate product to the patient.

Insurance can cover topical testosterone products. Insurance companies vary wildly between covering CA topical testosterone. They can either cover the medication with a reasonable copay to the patient, cover it with an unreasonable copay, require a prior authorization to be filed by the doctor, or completely not cover the product at all. A common reason that compounded pharmacies are used are for the last three reasons listed above, basically due to cost for the patient. While it is true that a compounding pharmacy may be able to compound a topical testosterone product for less expense to the patient, this is by no means a reason to compound. Cost savings alone is an inappropriate reason to compound a product for a patient when a commercially available product is sufficient to meet the patient’s needs. A compounded formula should have a significant difference from the commercially available product, whether that be different inactive ingredients due to patient allergy or a dose that is not readily achievable with CA products.

Like CA topical testosterone, insurances also vary in their coverage of compounded testosterone, but more are on the side of not covering the product. When billing a compound, it is best practice to bill each NDC of each ingredient that is used in the compound. Some insurances will accept an override if there is a rejection for certain ingredients. They may pay for testosterone used, but they may not pay for inactive ingredients or the cream base. An override would allow the insurance to pay for what NDC they accept, and if the override is accepted, the pharmacy may receive a paid claim and the patient would have a copay. This means that the pharmacy may not be reimbursed for some of the ingredients used. It is up to the pharmacy to accept payment for ingredients covered. If the prescription is not covered by insurance, it is also up to the pharmacy to choose a price point for these cash options. The pricing should include thoughts on devices used, active and inactive ingredients used, time for the compounder to make the prescription, and time for the pharmacist to check and counsel the patient appropriately.

### **Commercially Available Doses and What Compounding Can Provide**

Testosterone products are widely available in the retail pharmacy setting. When one of these products can be appropriate based on symptoms and lab determination, these are products the patient should be prescribed. Available options for topical testosterone replacement in the retail setting include transdermal patches, topical solutions, topical gels, mucoadhesive buccal

tablets, and nasal gels. To focus on the topical products and leaving out the topical nasal product, currently available dosages include (in different expressions) 10mg/pump, 50mg/5gm packets, 1.62% gel packets, 2mg/day patches, 1% gels, and 30mg/1.5mL solution. One can expect absorption from topical products to be around 10% of the dose.<sup>(11)</sup> This will be affected by many factors including type of skin, base used (gel v. cream), trauma to the application site affecting permeability, and if the product contains “skin driving” agents, which are chemicals that can enhance penetration of the skin.

Generally, compounds have not been FDA tested for safety or effectiveness, but a quality compounding pharmacy can provide patient-specific topical products and validate their methods by having a final quality assurance check. A compounded testosterone topical product can be listed at any un-FDA approved dosage or may be listed as the same strength if perhaps a patient has an allergy to an inactive ingredient. If a product is commercially available, a compounder should not make a product at that strength unless certain conditions are met. This is true for testosterone products as well as any product. Compounding is available for patient-specific compounding to fill a void between what is CA testosterone and patient need. Compounding a similar medication with the same strength as a CA testosterone option should be considered inappropriate, however. Take, for example, a patient in need of a 1% testosterone topical gel. The patient has a listed allergy to an ingredient contained in the CA testosterone product at 1%, rendering the commercially available option impractical and infeasible. With the doctor’s approval and the pharmacist’s documentation, a pharmacy may provide a compounded product that contains the active testosterone but without the problem that the inactive ingredient imposes in this scenario. This allows the gap to be filled between CA and compounded testosterone for the patient to receive the intended therapy. There are other beneficial differences that compounding can provide. It has been discussed previously that there may be other hormone factors that can make testosterone levels low. As there are no CA products combining testosterone topically with other hormones currently, a physician may work with a compounding pharmacy to provide a combination of hormones that may benefit the patient, such as testosterone and progesterone.

### **Inappropriate Doses and Situations**

There are situations where testosterone replacement should be avoided. It was mentioned previously that a thorough assessment of both symptoms and labs should be completed. A testosterone level alone, or symptoms alone should not be used to determine whether to prescribe topical replacement. If testosterone replacement is deemed necessary, one should most likely start with a CA dose, considering the 10% absorption, and relate that to follow-up bloodwork. If, at that point, it is deemed that a CA product cannot fill the need, compounding can be an option. Over-replacement should be avoided at all costs. There should be few patients that would need very high doses of testosterone topically to replace physiological levels. Testosterone dosage should never be increased just because a patient “doesn’t feel like it is working.”

There are also disease states where topical testosterone replacement should or may need to be avoided, including prostate disease, breast cancer, high or unevaluated PSA levels, hematocrit over 50%, and congestive heart failure that is poorly controlled. <sup>(4)</sup>

### **Actual Compounding Steps**

It is outside the scope of this printing to discuss an exact step-by-step process because processes will vary based on variations in bases, chemicals used, facility used, automated machinery used, and many other factors, so this discussion will focus on commonalities and highlight some important steps in general compounding techniques. While this article is not a discussion of commercial manufacturing, there are similarities between the processes a compounder will follow and those of a manufacturer. For a manufacturer, these processes are validated and should follow Current Good Manufacturing Processes, or cGMP, and are regulated under the authority of the FDA. Compounding facilities will have a distinction of either 503a or 503b. <sup>(12)</sup> A 503a facility is considered a compounder that provides patient specific medications at the direction of a physician, in low-volume increments. Anticipatory compounding based on previous usage of certain compounds is allowed. These facilities do not have to follow the FDA's cGMP processes, but should have proper internal controls, quality assurance checks, and follow the United States Pharmacopeia (USP) General Chapters for quality compounding. They are largely state regulated instead of federally regulated, but the FDA has the authority to inspect them at any time if deemed necessary. 503a compounding facilities may opt to be accredited by an outside company with specifically defined standards, documenting adherence to these standards. A 503b compounding facility on the other hand must follow cGMP guidelines for their products as they are considered a manufacturing facility that provides compounds in bulk and are regulated by state and federal laws and regulations.

The most important step in the compounding process is the selection of the active ingredient as this is what we want to cause a physiological response in the patient. A chemical purchased from a supplier that does not validate their processes or analyze their active pharmaceutical ingredients (API) should be avoided. A knowledgeable compounder understands that a quality chemical will have documentation to reinforce that quality. API's should come with a certificate of analysis (C of A) which will have information including, but not at all limited to, purity, water content, loss on drying, and solubility analyses. Everything listed on a certificate of analysis is important, but we will discuss these few items as an in-depth discussion of this record is not necessary to understand the general basics of calculation.

The purity assay on a C of A describes how much actual API you have obtained. For example, if you are working with testosterone USP and your C of A lists a purity of 95%, then you would need to weigh out 5% over this number in order to obtain your label strength. In this example, you would weigh out 15.79mg of this testosterone chemical to have a label claim of 15mg in the compound. This is not the only calculation needed in some cases. If a chemical takes in water, meaning it is hygroscopic, there may be a "water content" or "loss on drying" analysis on the C of A. A cut off for taking this into account in the calculation is up to the compounder, and in some cases is defined as greater than 1%. This means that if a chemical has a loss on drying greater than 1%, they will take this into account on their API weight. Certainly, a compounder can calculate any loss on drying even less than 1% to be more accurate, but it would not normally vary your weight significantly enough to cause a formula failure. So, let's look at the above example with a 95% purity and a 5% loss on drying. One could think that these are additive, making our calculation require a 90% increase in weight, but it is a bit different. Since we already obtained our 15.79mg adjusted for initial purity assay, we can now take this number and again take 95% of this and calculate 16.62mg. This should be your final weight measurement based on purity and loss on drying. To check your work against just adding these two losses together, you would then take your original 15mg and divide by 16.62mg. Multiplying by 100 would give you a new percentage to work with, that being 90.25%. 90% versus 90.25% may not seem significant, and in some cases, it may not be, but different numbers can lead to different results, so it is important to understand this concept for accuracy. Water content can be calculated the same way as discussed if it is significant.

Solubility analysis is another important part of the C of A as this will tell you what kind of interaction you will have with the base. Testosterone solubility can change depending on which salt form is being used. List salt forms and discuss solubility. If an aqueous base is used, but you're working with a chemical that is only slightly soluble in water, you may need to incorporate the chemical with a wetting agent such as propylene glycol or glycerin, or it may not be compatible at all. It is important to understand these concepts as you start the compound.

There are many steps to compounding a testosterone cream, but in general at a minimum they follow the following basic outline. Once you weigh out the appropriate API, you must then incorporate it into your chosen base. Using the geometric dilution method along with a mortar and pestle can be sufficient; however, a mill should be used to ensure a reduced particle size for skin penetration, and there are newer more automated methods of this process available. An electronic mortar and pestle (EMP) may be used which automates the mixing process. After a product has gone through the EMP process, it should then (as a best practice) be pressed through an ointment mill to reduce the particle size. There are other machines that can take the place of the mortar and pestle and the milling process completely for some formulas which can help save the compounder time.

Once these processes are complete and checked for accuracy, the compounder is ready to package the product for dispensing to the patient. The last step should be to calibrate the device you are using. Your device may have evidence with certain bases or even multiple bases that shows it accurately dispenses, for example, 1ml. However, all bases and formulas will have different densities which may alter this dispensing. If you have a prescription with a testosterone concentration of 10mg/gm, then you would need to make sure the device when used appropriately will dispense the 10mg when actuated to 1ml. This may be accomplished in several ways, but a simple method would be to weigh out 1ml of your product as directed by the certain device. If this happens to be 1gm, plus or minus your acceptable margin of error, then you can be reasonably certain your product will contain 10mg in each ml dispensed by the device. If it is outside of your acceptable range, then you will need to adjust the amount of API used to make it equivalent to dispensing 10mg of API that the prescriber ordered. For instance, if 1mL when actuated is actually equal to 75% of one gram when weighed, you would need to adjust your testosterone concentration to what your device will dispense. This is a similar process to what a commercially available product would go through except that compounders can provide certain doses that aren't available therefore would need to go through calibration for each new dose per prescriber order. For example, if commercially available testosterone is prescribed, a manufacturer would make one or several strengths in very large quantities and typically have one type of device to dispense from, so it would be less extensive to validate the calibration as the formula should not change greatly provided that all quality control factors are met. For a compounded product, a small change such as incorporation of air into the cream during the mixing process may change the way a certain pump will dispense its volume, so it is imperative in the compounding process that all controls are followed, and a quality product is ultimately dispensed to the patient.

## **Counseling**

Counseling for both compounded and commercially available topical testosterone should be mostly the same except, of course, for application method. Per a commercially available gel package insert, the products can be applied to clean, dry, intact skin of shoulders, upper arms, and/or the abdomen, and should not be applied to the genitals, chest, or back.<sup>(7)</sup> This can be true for most compounded testosterone as well, however there have been cases particularly off-label where these areas are utilized. Off-label use of any commercially available testosterone or usage beyond accepted knowledge of a compounded testosterone product should be thoroughly discussed with the prescriber and documented, and the patient counseled completely and appropriately. Patients using both compounded and CA testosterone products should wash their hands immediately after applying the medication and may avoid potential transfer issues by covering the area(s) with clothing after the application has dried.<sup>(7)</sup>

For a compounded testosterone product, it is reasonable to assume from skin penetration studies of creams that after 30 minutes of the product being in touch with the skin, when rubbed in well and allowed to dry, that it can be appropriate to remove the product residue on the outer layer of skin with soap and water to avoid transfer and still receive an effective dose. <sup>(2)</sup> Some commercially available testosterone products also recommend washing the area of application before skin-to-skin contact is anticipated, but do not have necessarily state a recommended time frame.

Compounded topical testosterone products may be dispensed in many different devices, with some of the more common ones being pumps, click-activated units, and syringes. A good device will be calibrated to dispense a certain amount of milliliters per activation. As a compounder, you must verify that what device you are using will give the patient what dose was prescribed and be able to counsel your patient in regard to the proper use of the device and troubleshooting should issues arise.

It is always extremely important for the pharmacist to discuss potential side-effects of topical testosterone with the patient. In no situation should any compounder imply that a compounded medication is safer or more effective than a commercially available testosterone product. Compounders are required by law to say just the opposite, that they have not been deemed to be safer or more effective and that they are not FDA approved or studied. This does not mean that they are *ineffective* and *unsafe*. A quality compounded testosterone product can, indeed, deliver needed results in a safe manner. It is important to find a compounder that follows the guidelines of accreditors and the USP general chapters. All differences aside from CA products and compounded products, the side-effects and warnings to the patient should remain the same. Adverse events with evidence include, erythrocytosis, acne, detection of subclinical prostate cancer, growth of metastatic prostate cancer, and reduced sperm production and fertility. <sup>(4)</sup> Adverse events with weaker evidence include gynecomastia, balding, growth of breast cancer, and worsening of obstructive sleep apnea.<sup>(4)</sup> After counseling, the patient should follow-up with the prescriber on when to re-check levels.

There are many considerations to discuss before, during, and after testosterone replacement whether a compounded or commercially available testosterone is used. The main goal is to always provide a safe product that is appropriate for the patient. The patient should additionally fully understand the proper use of the product. By engaging the patient in the discussion and adhering to the highest standards of quality, a pharmacist can be an integral part of the patient's health journey.

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### Crossing the T – Male Hormone Replacement Therapy

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Release Date: November 1, 2019

This lesson furnishes 1.0 (0.1 CEUs) contact hours of credit.

Universal Activity Number for this activity:

Pharmacist 0798-0000-19-199-H07-P

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FLORIDA PARTICIPANTS – READ THIS!

Place your Florida license # on every quiz.

QUIZ – November/December 2019 • Crossing the T – Male Hormone Replacement Therapy

In order to receive credit for this activity, fill in the information below, answer all questions, and return Quiz Only for certification of participation to:

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**LESSON EVALUATION**

Please fill out this section as a means of evaluating this lesson. The information will aid us in improving future efforts. Either circle the appropriate evaluation answer, or rate the item from 1 to 7 (1 is the lowest rating; 7 is the highest).

1a. PHARMACISTS ONLY: Does this lesson meet the learning objectives? (Circle choice).

Describe skin tissue penetration of testosterone	YES	NO
Recognize appropriate counseling points for compounded topical testosterone	YES	NO
Describe how to adjust topical testosterone at physician request	YES	NO

1b. TECHNICIANS ONLY: Does this lesson meet the learning objectives? (Circle choice).

Identify appropriate processing elements of a topical testosterone prescriptions	YES	NO
Recognize appropriate basic compounding steps for a topical testosterone product	YES	NO

2. Was the program independent & non-commercial? YES NO

3. Relevance of topic                      Low Relevance                      Very Relevant  
1                      2                      3                      4                      5                      6                      7

4. What did you like MOST about this lesson? \_\_\_\_\_  
\_\_\_\_\_

5. What did you like LEAST about this lesson? \_\_\_\_\_  
\_\_\_\_\_

6. How would you improve this lesson? \_\_\_\_\_  
\_\_\_\_\_

PLEASE MARK THE CORRECT ANSWER(S)

1. Which factor would contribute to a molecule being sufficient for skin penetration?
  - a. Molecular weight greater than 600 Daltons
  - b. Melting point greater than 200 degrees Celsius
  - c. High water and oil solubility
  - d. Low water and oil solubility
  
2. What would an appropriate counseling point be for a topical testosterone product?
  - a. Compounded topical testosterone has a safer side-effect profile than commercially available topical testosterone.
  - b. Compounded testosterone is not FDA approved, therefore it is not safe or effective.
  - c. Washing is not needed between topical doses because the medication is fully absorbed and there is no risk of transfer to any other person or animal.
  - d. Patients should follow up with their prescriber for lab values to determine effectiveness of treatment before continuing therapy.

3. Consider a patient that is on topical testosterone at 15mg/gm, applying 0.5mL's from a pump device (assuming 0.5gm in this formula is equivalent to 0.5mL). If a physician wanted to increase their expected absorbed dose to 1mg of testosterone, what would be an appropriate recommendation considering the 10% absorption rule?
- a. 20mg/gm- applying 0.5mL per dose
  - b. 11.5mg/gm- applying 0.5mL per dose
  - c. 15mg/gm- applying 1mL per dose
  - d. 20mg/gm- applying 1mL per dose
4. In what situation listed below may a compounded prescription be considered?
- a. Insurance requires a PA for a commercially-available product but the patient wants the prescription as soon as possible at your pharmacy instead.
  - b. A patient has an allergy to an inactive ingredient in a commercially available product.
  - c. Insurance covers the commercial medication, but the copay is \$100 for a 30 day supply and the pharmacy can make the same strength and day supply for \$25.
  - d. The insurance doesn't cover the commercially available product at all so the patient will have to pay out of pocket, so the patient wants it compounded for cost savings.
5. You receive a prescription for compounded topical testosterone. Which of the following should not be done in order to process the prescription appropriately?
- a. Receive all information required by the CSA (controlled substance act).
  - b. Report the prescription to the state prescription drug monitoring program (if required)
  - c. Process the prescription as a non-controlled legend drug since it is compounded and not commercially available.
  - d. Bill the patient's insurance if they request this.
6. In the compounding of topical testosterone, this is not a basic manipulation to create the formula:
- a. Weighing the API
  - b. Milling to reduce particle size
  - c. Geometric dilution to mix the product
  - d. Dissolving the API in distilled water before weighing

7. Which measurement of total testosterone should most warrant topical testosterone supplementation?

- a. A total testosterone of 24000ng/dL
- b. A total testosterone of 1500ng/dL
- c. A total testosterone of 105ng/dL
- d. A total testosterone of 500ng/dL

8. A patient complains of a lack of energy and libido. He is a 48 y/o male with thyroid disorder, but is unsure of what kind. He has heard of Low-T from advertisements and wants to try topical T. What is the most appropriate first step a prescriber should consider?

- a. Discuss his thyroid level and get records or new labs to see if this may be causing his issue before prescribing topical testosterone.
- b. Tell the patient that topical testosterone has no place in medicine.
- c. Prescribe a low-dose topical testosterone since the patient wants to try it.
- d. Get a blood sample to discuss testosterone levels, but prescribe topical testosterone without discussing thyroid issues because this is not your area of practice.

9. When can topical testosterone products be appropriate to use?

- a. A patient has breast cancer, but has low energy and wants to try topical testosterone without having proper lab work completed.
- b. A patient is on high-dose topical testosterone, but is still suffering from low libido, so the prescriber wants to increase his dose to two times the current dose.
- c. A patient is on topical testosterone and is experiencing major side-effects of testosterone over supplementation.
- d. A patient is on a moderate dose of topical testosterone and has lab work done showing his current dose is not providing the adequate response.

10. All of these are accepted tests to verify hormone levels except:

- a. dried urine analysis
- b. polymerase chain reaction analysis
- c. saliva testing
- d. blood serum testing