CASE STUDY:

ABSORPTION OF TESTOSTERONE CREAM VIA SCROTAL DELIVERY

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ABSTRACT **Transdermal testosterone has been used for years to treat patients with low testosterone symptoms. Clinically, we have monitored patients to evaluate results of testosterone absorption via blood serum concentrations. The data on multiple time points to determine trough and peak concentrations is lacking in the literature. In this case study, we demonstrate the absorption of testosterone cream via scrotal delivery. The data suggests that after application therapeutic levels are reached with concentrations of (1204.7 ng/dL) within two hours. Additionally, consistent concentrations (1320.6 ng/dL) remain beyond six hours. To our knowledge, this is the first study to collect and measure multiple time points for testosterone via transdermal delivery. The research indicates that testosterone via transdermal delivery is an excellent method to achieve therapeutic concentrations of testosterone. Most importantly, the patient's symptoms resolved without side effects.**

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Because of first-pass effect, testosterone is not absorbed well orally. Testosterone was thus originally delivered either compressed into subcutaneous pellets or the oral form of methyltestosterone. Methyltestosterone doses high enough to achieve therapeutic levels in men can cause toxic liver side effects. In the 1950s, injectable testosterone enanthate became the preferred therapeutic modality and, later, testosterone cypionate. Implantable pellets require an expensive and invasive office procedure by a specially trained clinician,[1] and the concern of infection post implant is a valid one. After the pellets are inserted, it is nearly impossible to remove the pellets. If the correct dose is not achieved the first time, it is 3 months to 6 months before the next scheduled dose. This can lead to problems with overdosing (side effects) or under dosing (no optimal effectiveness). Injections can lead to inconsistent levels when dosed every 3 weeks, leading to side effects and/or a lack of therapeutic effect. Injections require a needle, and many patients are not comfortable with administering injections. Options include a visit to a clinician every 3 weeks to receive the injection, which is expensive and time consuming, or they have someone else administer the injection. Needle disposal is also a problem and an extra expense. In 1992, there was a postulation that therapeutic levels could be achieved via transdermal delivery. Skin patches followed, and, finally, in 2000, transdermal testosterone gels became available.[2] Questions remained regarding absorption of transdermal testosterone.[3-7] Proper dosing and the maintenance of consistent therapeutic levels of testosterone has not been established. Frequency of dosing, the proper timing of blood draws, and interpretation of those results have not been demonstrated (to our knowledge).

In this case study, we propose to demonstrate how topical testosterone cream can be used scrotally to deliver therapeutic serum levels.

METHODOLOGY

The testosterone cream was compounded at a concentration via an electronic mortar and pestle, a process that has been verified to ensure adequate mixing. The compounded cream was delivered via a Topi-Pump (Topi-Pump, Lucedale, Mississippi). Each pump delivered 200 mg of testosterone (1 mL). The pump was calibrated to ensure consistent delivery of testosterone. The cream base used was VersaBase (Professional Compounding Centers of America, Houston, Texas).

DISCUSSION

The patient in this case study was a white male in his mid-40s who was experiencing low testosterone symptoms that are typical in this age group, including:

- Decreased libido
- Erectile dysfunction
- Lethargy
- Loss of lean body mass
- Weight gain around the mid-section

Under the advice of a physician, the patient began testosterone therapy. Efforts were undertaken to optimize the dose and application of the testosterone cream. Since the patient had been on a previous 1-year testosterone treatment, the patient was provided the following instructions before beginning the new testosterone therapy:

- Shower the night before the first study application
- Scrub the scrotum and perineum vigorously with warm water and soap to remove any residual testosterone cream
- Apply one pump of a 200-mg dose of the compounded testosterone preparation to the lower scrotum and perineum and, using two fingers, rub the preparation onto the skin to obtain a chalky residue
- Apply the excess cream that remained on his fingers to the upper right inner thigh
- Wash hands with warm soapy water after the application to avoid any possible contamination during sample collection

Per instructions at Spectracell Laboratories (Houston, Texas), blood samples were drawn into a vacuum-sealed vial using venous blood draw. Time points of approximately 0, 1 hour, two hours, and six hours were collected (see results for exact time points). Samples were centrifuged at 3000 rpm for 15 minutes before being placed on ice and shipped to Spectracell Laboratories for further processing and testing of testosterone levels.

RESULTS

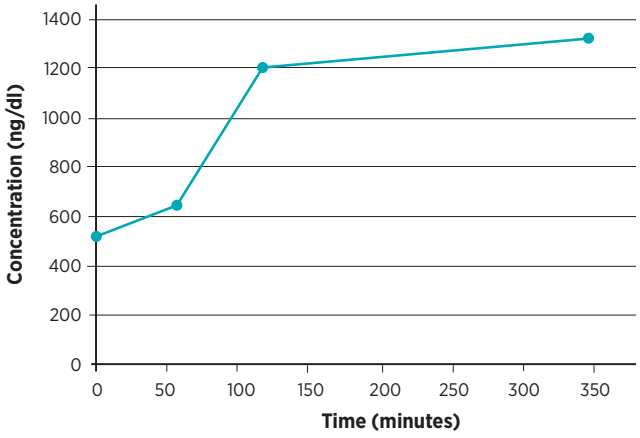
Figure 1 shows the concentration profile in blood serum after administration of a 200-mg dose of testosterone via Topi-Pump and VersaBase.

As shown in Figure 1, therapeutic levels were reached at 116 minutes and remained maintained to beyond 346 minutes. Further evidence (unpublished internal data) suggests therapeutic concentrations (>1100 ng/dL) at up to 24 hours. More research is needed to confirm these concentrations. Most importantly, the patient's low-testosterone symptoms resolved without adverse effects from the therapy.

CONCLUSION

In this study, we demonstrated that with the application of testosterone, adequate absorption occurred to achieve consistent and therapeutic concentrations via scrotal delivery. This data shows the effectiveness of testosterone transdermal delivery with VersaBase cream. In the future, we would like to study dose "proportionality," further time points past six-hours, and how different application sites affect absorption.

FIGURE 1. CONCENTRATION PROFILE IN BLOOD SERUM AFTER ADMINISTRATION OF A 200-MG DOSE OF TESTOSTERONE VIA TOPI-PUMP AND VERSABASE.



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