My question is:
With testosterone, whether that be the injection or topical or troches, what is the difference between bio identical and synthetic. Regarding topicals or sublinguals, I generally don't use the "manufactured" testosterone like androgel or testim because of all of the alcohol in the preparations and the poor absorption and poor levels I get with them. It's also harder to get proper dosing because of how it is supplied. But again, are they bio identical or not?
Regarding the injectable version, is Testosterone Cypionate bio identical or is it synthetic? Does it matter?
Thanks for your written answer because it will be going into our nurse training manual!
~Dr. A

Good morning Dr. A,
Testosterone is testosterone. All testosterone is "bio identical". It is the same molecule the body makes.

All of the topical formulation (Androgel, Testim, etc.) are testosterone in a hydroalcoholic gel. They are "bio identical" because they contain testosterone. The problems are 1) the amount of gel the man must apply, 2) the alcohol content, 3) irritation potential and 4) inflexibility in dosing. Synthetic testosterone products include things like nandrolone and methyltestosterone. They are very good at stimulating the testosterone receptors, but cannot participate in the hormone cascade and therefore the body cannot clear them in physiologically relevant ways if they present themselves in excess. Think about the addition of a methyl and hydroxy group to progesterone. You get methylhydroxyprogesterone (AKA medroxyprogesterone) which is a bad player. The addition of a few small molecules really affects the pharmacokinetic and pharmacodynamic profile of the drug!

One positive thing methyltestosterone has going for it is that it is not aromatizable. Aromatase will not convert to estradiol. It may be an appropriate option for estrogen dependent breast cancer survivors who have symptoms of low androgens.

The question regarding Testosterone Cypionate and Testosterone Enanthonate is a little more tricky. These are cypionic acid and enanthonic acid esters of bio identical testosterone. I do not know if the intact molecule possesses biological activity on its own. I suspect that the cypionic acid moiety must be cleaved either by acid/base catalyzed hydrolysis or by non-specific esterases in the body. It is the slow cleavage that liberates the bio identical testosterone from its depot position in the muscle and lets it travel through the blood stream. The answer on bioidenticality of these molecules is kind of. They are synthetic molecules that are converted to bio identical molecules in vivo. I hope this clears things up and doesn't confuse them more.

Call with questions.
Dave

ALS and Muscle Clonus

John,
I have been giving your question quite a bit of thought and have conducted a fair amount of research over the past 24 hours. I think it would be worth considering two tracks. The first will work on the muscle fiber itself to weaken its contractile ability after receiving the depolarization from the nerve fiber. I would like to hit this with multiple pharmacological agents to ensure efficacy. It is also probable that the different physiochemical properties of the agents will provide quick onset and prolonged duration. This cream would contain: Guaifenesin 10%Baclofen 2%Cyclobenzaprine 2%Diazepam 2%In an anhydrous speed gel formulation The second track that may be worth considering is using non-competitive acetylcholinergic blocking agents that work at the neuromuscular junction. Among these are pancuronium bromides or atracurium. These may be an option should the first track fail. I will have to perform some formulation development if we decide to go this way, but if "relaxing" the muscle doesn't work, competitive blocking of its stimulation may prove effective. The idea will be to release the clonus but not paralyze the muscle altogether. Perhaps your neurology contact would have insight on these two approaches. I await your thoughts. Let me know when you need the samples and I will get them to you.
Warmest regards,
David Miller, R.Ph., Ph.D., Keystone Pharmacy

Hi Dave,
Quick question...
I looked up the femring... it is supposedly bio identical estrogen (estradiol acetate)...is this actually bio identical?
Thanks, Dr. Ann

Ann,

Kind of. Estradiol, of course, is bio identical. The acetate version is an acetate ester at the 1 position of the molecule. This should increase the molecule's lipophilicity and possibly aid with its absorption. I think the body de-esterifies the acetate from the e2 molecule in the body, but I am not sure how easily this happens in the body. Think about methyl, hydroxyprogesterone acetate (medroxyprogesterone acetate). This is close to the real thing, but no cigar. The small modifications to this molecule make it one bad player. I'm not sure to what extent the acetic acid esterification affects bio identicality or the body's ability to process the molecule back to the e2 form.

David Miller, RPh., Ph.D., Keystone Pharmacy

Good morning Dr. Diane,

I have spoken with fellow pharmacists about vaginal and pelvic floor pain caused by muscle spasms. As you know, this is a very difficult condition to treat because every patient is unique and respond differently to different therapeutic options. To make matters worse, the etiology of the pain and muscle spasm is unknown making exact therapies difficult to obtain. However, I have established the following list of therapeutic options that can be used for vaginal pain. These drugs can be used in any combination in creams or suppositories. For most of these options, the patient would use the therapy up to four times daily.

Amitriptyline 2%, Baclofen 2%, Gabapentin 6%, Lidocaine 5%, Ketamine 5%, Diazepam 0.5-1% (5-10mg/gram or suppository)

Following your thought that histamine release may be, in part, responsible for the muscle spasms and vaginal pain, the following can be used in combination with the above agents:

Cromolyn sodium (mast cell stabilizer) 4%, Diphenhydramine (H1 blocker) 1-2%, Cimetidine (H2 blocker) 5%

Another thought I have is to try to intercept the pain on the way to the brain. Applying some topical Ketamine 10%/Ketoprofen 10%/Tetracaine 4% directly over the spinal cord over the T12, L1, S2 or S3 may be useful. Sometimes spinal palpitation will reveal tender or "hot spots" that we can target with dermatomal therapy.

This should be the beginning of a good dialog of therapeutic options.

I'm always available should you wish to discuss this, or any other, matter further.

Warmest regards,
David J Miller, R.Ph., Ph.D.
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