Phonophoresis Technique Questioned

To the Editor:

I read with interest the research report entitled "Phonophoretic Delivery of 10% Hydrocortisone Through the Epidermis of Humans as Determined by Serum Cortisol Concentrations" by Bare et al in the July 1996 issue of Physical Therapy. As indicated in the report regarding the results: "No rise in serum cortisol concentrations following hydrocortisone phonophoresis was detected.... These findings suggest that there was no penetration of hydrocortisone through the epidermis and into the underlying vasculature."

I have treated my own personal animals (horses) with ultrasound, using dimethyl sulfoxide (DMSO) as a coupling agent (I work only with my own animals; as far I know, the only physical therapy practice act that mentions referral from veterinarians is that of New Mexico). I've used dosages that have ranged from 0.5 to 1 W/cm². The types of injuries have included rupture of tendons (bowed tendons) and myositis. The results have been encouraging, but have not been part of an ongoing objective study. (The use of DMSO for humans is not approved by the US Food and Drug Administration.) If physical therapy for animals ever becomes a part of every state's practice act, it would be most interesting to initiate a study of this physical therapy modality using DMSO as a coupling agent.

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To the Editor:

I am writing in response to the research report on phonophoresis by Bare and colleagues in the July 1996 issue. Bare and colleagues' conclusion that there was no penetration of hydrocortisone through the epidermis and into the underlying vasculature leaves me a bit disturbed. With transdermal penetration of large complex molecules (e.g., nitroglycerin, insulin)—a common procedure today—I find it unusual that with the aid of the sound wave's energy, there was no penetration. This leads me to my favorite argument: It is not the concept of phonophoresis that is in question, but rather it's the technique of administration that may be faulty.

In this study, a 10% solution of hydrocortisone acetate was utilized. Why 10% hydrocortisone? We use...
1%. Perhaps the high concentration of hydrocortisone molecules used in this study was a deterrent to transdermal passage. In practice, most clinicians prefer and use 0.5% to 1% ointments. This would follow the Arndt-Schultz Law of "the less the better," providing a less dense concentration of molecules and facilitating individual molecular mobility. (Incidentally, we use a dosage of 0.5 to 1 W/cm² for a total of 5W, depending on the size of the transducer head.)

The authors also blended the hydrocortisone with transmission gel, adding to the problem of molecular availability for transfer. In practice, the hydrocortisone ointment is massaged into the skin over the target area, then a light film of transmission gel is applied for the ultrasound treatment. By placing the molecules directly in contact with the skin, transmission would be enhanced, avoiding the additional "travel" through the non-penetrating transmission gel.

This is a very important study and should be repeated using techniques that more closely resemble actual clinical procedures. Our favorable results with hydrocortisone phonophoresis (ie, 1% ointments) should not be dismissed easily.

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