THERAPEUTIC OPTIONS FOR TRANSDERMAL CO₂
Medical therapy through the skin is a well described practice. Specifically, transdermal application of patches containing medicine for treating pain, nausea, heart failure, and dementia are commonplace. All these regimens permit the prolonged transfer of drugs into the body so there is continuous amount of the drug in the bloodstream. An alternative option for transdermal therapy is to use a gas, instead of a patch. The use of gas is less common due to the difficulty in transporting the gas and administering it in a controlled fashion. A new device is now on the market that will allow providers to offer this new therapeutic option.

Carbon dioxide gas is the most recent entry into the gas therapy market. Hyperbaric oxygen is probably the best recognized. Carbon dioxide therapy has been around for over one hundred years. It has been identified as one of the most significant therapeutic components of the very popular natural bath springs. This natural therapeutic option has been the focus of many studies. Studies include those performed in the natural baths as well as those performed in laboratories using baths of with controlled concentrations of carbon dioxide. Laboratory studies in animals and humans clearly demonstrate that carbon dioxide will increase tissue blood flow, increase tissue oxygenation, and increase the number of small blood vessels. It should also be noted that carbon dioxide gas is bacteriostatic which means that bacteria do not grow or multiply in a CO₂ environment. This leads to many therapeutic possibilities to treat diseases burdened by poor blood circulation.

Studies of patients, or animals, partially immersed in water containing carbon dioxide have shown positive therapeutic effects including:

- Reduced fluctuations in blood pressure (calming effect)(16)
- Increased swimming endurance(1)
- Increased oxygenation, blood flow, and blood vessels in ischemic limbs(5, 15)

Treatment using baths is of limited practical utility because it is so cumbersome. Investigators have therefore looked at other methods for transcutaneous carbon dioxide therapy, namely the use of carbon dioxide gas itself (CO2GAS). To investigate the therapeutic effect of CO2GAS it has been applied in chambers and in plastic reservoirs that enclose limb(s), the lower body, or the entire body of a human, or animal. Some of the studies are case series and others are more controlled studies using a placebo control. I will only discuss studies with appropriate experimental controls. These studies have shown many positive therapeutic responses including:

- Reduction of symptoms from peripheral vascular disease including claudication(2, 4, 10)
- Increased oxygenation, blood flow, and blood vessels in ischemic limbs(5)
- Enhanced endurance(14)
- More rapid healing of fractures(8)
- Suppressed metastasis of oral squamous cell carcinoma(13)
- Induced tumor cell apoptosis and suppressed metastasis(3)
- Improved Raynaud’s disease(11)
- Repair of skeletal muscle(9)
• Increased blood vessel formation in skin flaps for plastic surgery (12)
• Stimulate immune responses and raise endorphins (7)
• Increase skin blood flow (6)

Thus there are many possibilities for therapeutic use of carbon dioxide gas. Many of these studies have only been performed in small animals so there is a lot of opportunity for more prospective studies in large animals and humans using the new device from Respiderm.

Bibliography:


