a recommendation from

anthony v. seaber

duke university medical center, k·lab

Michael W. Krzyzewski Human Performance Laboratory
"Studying the world's most complex machine."

Buccal Delivery of Electrolytes During Athlete Performance

by Anthony V. Seaber

Muscle cramping is a frequently encountered problem among athletes and is believed by many to be caused by depletion of electrolytes during intense exercise. The current methods of replenishing electrolytes often involve ingesting large amounts of fluid, incorporating carbohydrates as well as electrolytes and tablets or gels via the gastrointestinal tract. This may not be the most rapid or efficient method to restore electrolyte balance.

In the Michael W. Krzyewski Human Performance Laboratory (The K Lab), we are presently assessing new materials, including the Enlyten™ Electrolyte SportStrips™ from HealthSport Inc., using the buccal mucosa delivery site for electrolyte delivery. ***Athletes using a thin bi-layer film impregnated with electrolytes report decreased post exercise cramping.***

Buccal administration of drugs via the mucosal membranes lining the cheeks has many advantages over current methods of electrolyte delivery. Scientific evidence is abundant that among the various transmucosal sites available, mucosa of the buccal cavity is found to be convenient and is an easy and accessible site for delivery of electrolytes and other therapeutic agents. The oral cavity is accessible during even the most active sport if innovative ways can be found to carry and deliver the material.

The cellular lining of the cheek has abundant vascularization, rapid recovery from stress and is supported by smooth muscle which is relatively immobile. The environment is moist but is not flooded by saliva under usual circumstances. Because the buccal mucosa is so highly vascularized, compounds absorbed via this route enter the systemic circulation directly, bypassing the gastrointestinal tract and metabolism by the liver. Using the buccal mucosa approach, it is thought that the ***substance enters the blood stream within 5 minutes*** as opposed to 30 minutes via the gastrointestinal route. Also, the concentration of a given substance is absorbed at a significantly higher level when compared to the gastrointestinal route.

There are other sites of delivery within the oral cavity. The sublinqual site (under the tongue) perhaps would afford more rapid absorption because the tissue is thin and permeable. However, the area is prone to rapid dilution by saliva and more likely to be swallowed. The same problem exists if material is placed on the tongue. ***The efficiency and ease of buccal delivery could make this the choice for athletes in the future.***

To your performance,

Anthony V. Seaber
Senior Research Associate
Director Orthopedic Research Laboratories
Duke University Medical Center