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Extracorporeal High Energy Shock Wave Therapy

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Effects of early exposure to MSG and Phenobarbital

Newspaper and television ads extol the benefits of a multitude of drugs and supplements, diet products, and flavor enhancers. People take herbal remedies to fight everything from a cold to depression, if those don't work, they obtain a prescription for one of the many drugs to elevate or alter their mood. Nobody knows yet the long-term effects of all these substances on the human body, and in particular on the highly vulnerable perinate. What may be therapeutic or safe for the mother, could be toxic to the fetus and nursing infant. Many of these compounds are too new to have been studied for a long period of time.

There are two substances that have been widely available for many years, and they, for 25 years, have been one of the subjects of **Dr. Bernard Shapiro's** funded research. Shapiro, professor of biochemistry, has studied the influence of MSG on prenatal and perinatal development. Fifteen years ago, he added the drug phenobarbital to his investigations. Why those two? MSG, commonly known as monosodium glutamate, is a food additive that cannot be avoided. It's in prepared foods, and has been widely used in the United States since the 1940s as a flavor enhancer—it is estimated

that Americans consume 200 million lbs. of MSG or related products annually. Phenobarbital, a barbiturate, is frequently prescribed to infants in intensive care and to pregnant women for a variety of commonly occurring maladies, among them convulsive disorders that complicate one out of every 200 pregnancies. Prescriptions for pregnant women were particularly common between the 1950s and 1970s exposing more than 23 million children in the United States alone. Neither MSG nor phenobarbital produce visible birth defects, however, it is thought that they interfere with the production of a number of liver enzymes, known as CYPs that are vital to the body's ability to metabolize drugs and other potentially toxic substances.

The expression of these drug metabolizing enzymes is controlled by growth hormone produced by the pituitary. Levels of the hormone in males and females are different as males secrete the hormone in an episodic on-off rhythm with periods where the hormone cannot be detected. Women produce growth hormone continuously and it is always present in circulation. Because of these profiles, the levels of drug metabolizing enzymes are different in

males and females; this may in part explain the difference in response to drugs, for example women take longer to emerge from anesthesia



than men. To complicate matters, levels of growth hormone decline as a person ages.

In earlier studies, Dr. Shapiro's group has shown that neonatal administration of normal, exposure-like levels of both phenobarbital and

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Lithotripsy, the fragmentation of bladder stones by shock waves, is an established treatment in human medicine. Now these shock waves are utilized in equine medicine to help heal specific ligament and bone injuries. **Dr. Olga Seco**, lecturer in sports medicine and imaging, and other ultrasound specialists at the Allam Center for Equine Sports Medicine at New Bolton Center are compiling data on horses they are treating with Extracorporeal High Energy Shock Wave Therapy (ESWT).

The Scott Equine Sports Medicine Building houses the ESWT equipment. Horses with suspensory ligament desmitis and stress fractures, and other musculoskeletal problems are treated with ESWT. In the condition known as suspensory ligament desmitis, the ligament originating in the palmar/plantar aspect of the canon bone has sustained an injury. This injury can affect only the ligament, or have an associated avulsion fracture (piece of bone pulled up at the area of attachment of the ligament by the stress caused by the pulling on the ligament). A

stress fracture is an incomplete fracture that occurs as the result of repetitive overload and microfractures in one area of the bone. They frequently occur in the dorsal aspect of the canon bone in thoroughbred racehorses.



ESWT is thought to speed healing as well as relieve pain. Pulsated pressure waves (shock waves; not electric) are sent to the targeted area

via a probe contained in a head that also incorporates an ultrasound transducer that helps localize the area of injury during the treatment and focus very accurately in the area of interest. Horses with soft tissue injuries usually receive three treatments at three weeks intervals. For bony injuries, there is usually one treatment, but sometimes depending on the response to the treatment, there can be additional sessions. Each treatment usually consists on 2,000 shocks delivered to the area of injury. Horses received this treatment under sedation as the shock waves cause some pain while being administered.

Many chronically lame horses become sounder with ESWT treatment, although no one knows with any degree of certainty why the treatment seems to work. It is thought that increased blood flow may help with the healing process.

Dr. Seco and **Dr. Virginia Reef** will present their findings at the Sports Medicine Symposium in the spring of 2003.