From Medscape Medical News

Study Shows Why Massage Helps Exercise Recovery

Janis C. Kelly

Authors and Disclosures

February 2, 2012 — Ten minutes of massage therapy can help repair exercise-induced muscle damage by subduing inflammation and renewing mitochondria. This mechanism is similar to the way nonsteroidal anti-inflammatory drugs (NSAIDs) work. Data from the small controlled study also debunk the notion that massage clears lactic acid from tired muscles.

Mark Tarnopolsky, MD, PhD, and colleagues from the Department of Pediatrics and Medicine at McMaster University in Hamilton, Ontario, Canada reported the results of their research in the February 1 issue of *Science Translational Medicine*.

The authors write, "[D]espite having no effect on muscle metabolites (glycogen, lactate), massage attenuated the production of the inflammatory cytokines tumor necrosis factor–alpha and interleukin-6 and reduced heat shock protein 27 phosphorylation, thereby mitigating cellular stress resulting from myofiber injury. In summary, when administered to skeletal muscle that has been acutely damaged through exercise, massage therapy appears to be clinically beneficial by reducing inflammation and promoting mitochondrial biogenesis."

Dr. Tarnopolsky and colleagues recruited 11 healthy young men at McMaster University. Each underwent baseline biopsy procedures from the quadriceps (*Vastus lateralis*). On the next visit, each participant exercised on an upright cycle ergometer to exhaustive aerobic failure, defined as the point at which the participant could no longer maintain a cycling cadence exceeding 70 rpm following 50 minutes of interval exercise that ranged from from 65% VO_{2peak} to 85% VO_{2peak}.

"We used acute aerobic exercise in unconditioned individuals to cause contraction-induced muscle damage to mimic a common scenario where massage therapy is used in human subjects," the authors write.

The participants were allowed to recover for 10 minutes, during which time massage oil was applied to both quadriceps. Then investigators randomly selected one leg of each subject for 10 minutes of treatment by a registered massage therapist. The massage focused on the knee extensor muscles and included 2 minutes of effleurage, 3 minutes of petrissage, 3 minutes of slow muscle stripping, and finally 2 minutes of effleurage. The subjects rested for 10 minutes, and then a second muscle biopsy was obtained from each leg. Investigators collected a third biopsy 2.5 hours later (3 hours after the cessation of exercise).

The researchers used whole-genome microarrays to screen for genes induced during massage, and then performed targeted real-time reverse transcription-polymerase chain reaction (RC-PCR) protein signaling analysis and metabolite quantification to characterize the processes affected by massage.

Five genes were differentially expressed in muscle immediately after the massage treatment, one of which was functionally related to actin dynamics (filamin B, β). Four genes were differentially expressed 2.5 hours later, one of which was related to NFκB nuclear trafficking (nucleoporin 88).

"Overall, this profile suggested that massage altered processes related to the cytoskeleton and to inflammation, with the former process being activated early after massage and the latter induced later in recovery," the authors write.

Further investigation of the MAPK-related signaling proteins activated by massage showed increased nuclear levels of the tissue repair mediator PGC-1α in the massaged leg 2.5 hours after treatment. Mitochondrial electron transport chain components encoded by nuclear and mitochondrial genes were also elevated at that time, "confirming that mitochondrial biogenesis signaling was augmented by massage therapy," the authors say.

Conversely, levels of NFκB, which plays a critical role in muscle inflammation, were reduced immediately after massage but not 2.5 hours later, as was phosphorylation of heat shock protein HSP27 (an indicator of cellular stress) and the ratio of mature to precursor TNF-α protein. Levels of interleukin-6 (IL-6), another inflammatory mediator, were reduced in the massaged leg at 2.5 hours. Massage had no effect on muscle lactate levels, proglycogen, macroglycogen, or total glycogen fractions.

"In summary, our findings suggest that the perceived positive effects of massage are a result of an attenuated production of inflammatory cytokines, which may reduce pain by the same mechanism as conventional anti-inflammatory drugs such as NSAIDs. The results elucidate the biological effects of massage in skeletal muscle and provide evidence that manipulative therapies may be justifiable in medical practice," the researchers conclude.

"Theres general agreement that massage feels good, now we have a scientific basis for the experience," said coauthor Simon Melov, PhD, from the Buck Institute for Research on Aging, Novato, California, in a press statement.

The authors have disclosed no relevant financial relationships.Science Translational Medicine. Published online February 1, 2012. Abstract