

Penn State University Summary

Maximize performance

A five-year study at Penn State showed that wearing LYCRA® POWER™ garments can have a significant impact on performance. Men and women tested the effects on performance of high-stretch, high-power garments, made to exact specifications established by DuPont. The results were conclusive: Men and women wearing LYCRA® POWER™ garments improve their total force and power production by an average of 12 percent.

How LYCRA® POWER™ apparel works

Just how can a garment produce such measurable improvements in performance? Quite simply, by enhancing your body's ability to work.

LYCRA® POWER™ garments are designed to reduce muscle vibration, a major cause of muscle fatigue, improve the feedback between your body and your brain, increasing accuracy and efficiency of movement, and provide superior comfort and fit. LYCRA® POWER™ garments reduce muscle vibration.

Details of the study

A series of findings from a research program conducted at The Penn State Center for Sports Medicine show a direct link between wearing compressive sports apparel and an athlete's performance. Dr. William Kraemer, a distinguished sports medicine expert, conducted the research over a five-year period in collaboration with DuPont, Wilmington, DE.

Athletes, men and women, experienced a dramatic improvement in force and power production when wearing compressive sports apparel made with LYCRA® that meet certain standards developed by DuPont.

"The intent of the research was to understand the relationship between compression and muscle performance," said Dr. Kraemer. "We hypothesized a relationship existed because of the anecdotal reports from athletes who had tried compression garments and liked the way they felt and performed."

The LYCRA® POWER™ Research Story

LYCRA® POWER™ garments impact performance levels by reducing muscle fatigue and improving proprioception. The five-year research program, conducted by Dr. Kraemer's laboratory and sponsored by DuPont from 1991-1995, showed that all types of fatigue (strength, endurance, and power) can be significantly reduced by wearing LYCRA® POWER™ apparel. The findings showed that an athlete's force and power production increased by an average of 12% and that 73% of the athletes tested increased the accuracy of their movements or body positioning. Improvement in one of these areas can have a significant effect on overall athletic performance. Improvement in all of the areas does suggest that wearing LYCRA® POWER™ apparel could make a difference between winning and losing.

Testing Methodology

An intense laboratory study that involved long-term subject familiarization, subject jump practice (without the certified garments), subject achievement of high test-jump/retest-jump reliability, and highly controlled laboratory conditions was used to uncover the benefits of the LYCRA® POWER™ certified apparel. A series of tests were administered that represented the span of fatigue types experienced by an athlete when involved in sport or recreational activities. Before

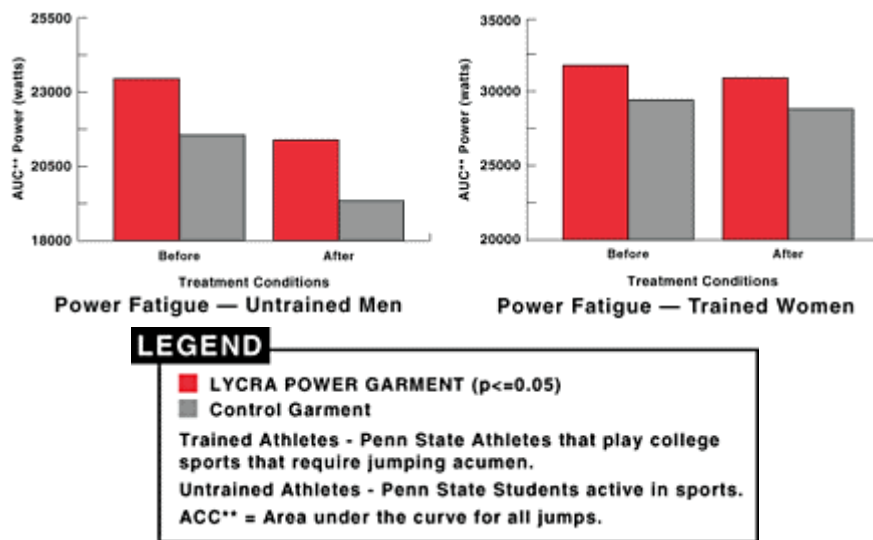
and after creating the fatigue, the athlete's ability to produce power was examined.

Preliminary findings from the Penn State research show up to a 30% improvement in force and power production when wearing the garments certified by DuPont.

Power Fatigue

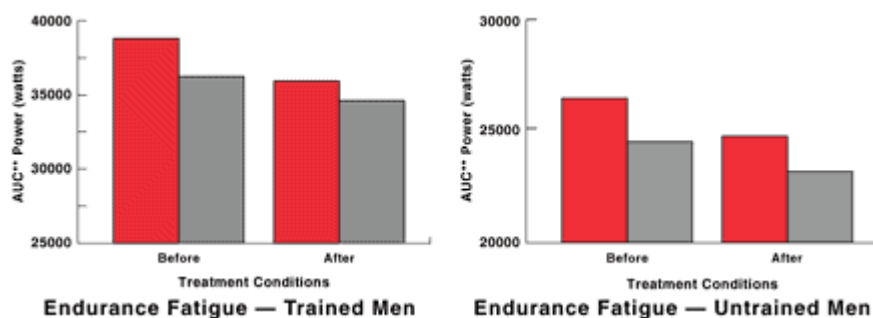
Power fatigue was tested by analyzing repetitive jumping performance in the laboratory setting that allowed for careful and tedious isolation of performance effects. When the athletes wore LYCRA® POWER™ apparel, power loss related to fatigue dropped off significantly.

This has important performance implications for repetitive, intermittent, explosive sports such as football, volleyball, basketball, and soccer where production must remain high in conditions of fatigue. The results were even more dramatic in the untrained than in the trained subjects. This offers interesting applications for performance enhancement with the beginner.



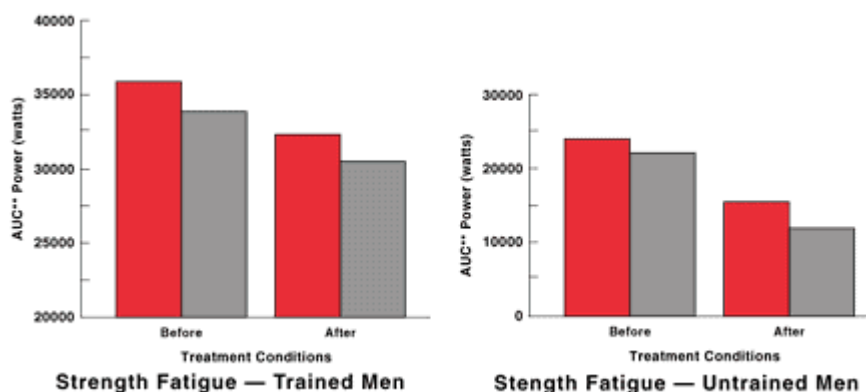
Endurance Fatigue

Endurance fatigue was produced by a run at 70% maximum heart rate on a treadmill set at 2% incline. The effects of the LYCRA® POWER™ garment were determined by comparing the results of the laboratory jump analysis of ten consecutive maximal jumps on a force platform before and after the run. In both the trained and the untrained subjects there was significantly greater performance in those wearing the LYCRA® POWER™ apparel than those who did not.



Strength Fatigue

Strength fatigue was produced by having the subject perform a strength task consisting of four sets of maximal weight, lifted for only ten repetitions with one-minute recovery, on a supine leg press. The effects of the garment were determined by comparing results of the laboratory jump analysis before and after the strength task. The results, once again, showed that the group wearing LYCRA® POWER™ garments showed significantly greater power production.



Get the Competitive Edge

In sport, where the search for even the smallest advantage is a never-ending quest, any improvement can make huge differences in competitive results. Small gains are always significant, but they are especially so at the highest level of competition where quantum leap improvements are rare. LYCRA® POWER™ apparel, certified by DuPont and made by leading athletic brands, will change the way you think about what to wear during training and competition.

Dr. William J. Kraemer is the Director of Research and Professor of Applied Physiology, and the leader of a comprehensive research program in the Center for Sports Medicine at Pennsylvania State University. He has appointments in the Intercollege Program in Physiology, Department of Kinesiology, and the Department of Orthopedics at Penn State's Milton S. Hershey Medical School. He is a past president of the National Strength and Conditioning Association (NSCA). Dr. Kraemer has been honored by the NSCA with both their outstanding Sports Scientist Award and the Lifetime Achievement Award for his contributions to bringing science into the field of strength and conditioning. He is a former member of the Board of Trustees of the American College of Sports Medicine (ACSM). Dr. Kraemer serves on numerous scientific journal boards and was appointed to the US Olympic Science and Technology Committee in 1993. He has authored and co-authored more than 150 manuscripts in areas of sports medicine, endocrinology, physiology, exercise science, and strength training. Dr. Kraemer is considered one of the premiere experts in the physiology of strength and conditioning in the world.

LYCRA® is a DuPont registered trademark for its brand of elastane fiber. LYCRA® POWER™ is a DuPont trademark licensed for use on apparel that meets DuPont approved performance standards.