



The results showed that runners lost an average of 5.4 percent body volume during the course of the race, most of which was in the first 2,000 kilometers. They lost 40 percent of their body fat in the first half of the race and 50 percent over the duration of the race. Loss of muscle volume in the leg averaged 7 percent.

"One of the surprising things we found is that despite the daily running, the leg muscles of the athletes actually degenerated because of the immense energy consumption," Dr. Schütz said.

While most people do not run to this extreme, several of the study's other findings still have implications for the marathon runner and even the recreational runner, according to Dr. Schütz.

For example, the results showed that some leg injuries are safe to "run through." If a runner has intermuscular inflammation in the upper or lower legs, it is usually possible to continue running without risk of further tissue damage. Other overuse injuries, such as joint inflammation, carry more risk of progression, but not always with persistent damage.

"The rule that 'if there is pain, you should stop running' is not always correct," Dr. Schütz said.

Another key finding of the study was that the first tissue affected by running was fat tissue. More importantly, visceral fat loss (mean 70 percent) occurred much earlier in the running process than previously thought. Visceral fat is the most dangerous fat and is linked to cardiovascular disease. The findings also revealed that the greatest amount of overall fat loss appeared early in the process.

"When you just begin running, the effects of fat reduction are more pronounced than in athletes who have been running their whole life," Dr. Schütz said. "But you should do this sport constantly over the years. If you stop running for a long time, you need to reduce your caloric input or opt for other aerobic exercises to avoid experiencing weight gain."

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