

# Muscle Injury

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## When is the best time to begin physiotherapy after a muscle injury?

Over the past 30 years, there has been a trend toward earlier loading and rehabilitation after musculoskeletal injury or surgery. It is increasingly recognized that immobilization or activity reduction leads to almost immediate adverse physiological & biochemical effects on tissues. In muscles, the rate of protein synthesis is reduced, and protein breakdown is increased, in as little as 6 hours. This leads to a loss of muscle protein. Strength, endurance, and muscle mass are rapidly reduced, and atrophy is often observed in under 7 days. Strength losses are also greatest within the first week. There is an early increase in collagen cross-linkages, both within muscle and around joints, leading to joint contractures. Biochemical effects include a reduction in resting levels of glycogen and adenosine triphosphate (ATP), an increased lactate build-up, and a reduced ability to oxidise fatty acids. On the flip-side, early loading stimulates correct repair and remodeling of collagen, and minimizes the overall adverse effects of de-conditioning, including to the cardiorespiratory and neuromotor systems.

Muscle strain injuries, particularly to the hamstring group, account for most days lost to injury in professional football. Surprisingly, there have been few randomized controlled trials investigating the ideal timing of rehabilitation after muscle strain. In a 2017 Denmark study, amateur athletes with lower limb muscle strain injury (quadriceps, hamstring, or calf) were randomly assigned to early (**2 days post-injury**) or delayed (**9 days post-injury**) physiotherapy. Interventions were standardized, and specific to each muscle region.

The subjects were followed up for 12 months. The main outcome measures were time to return to full sporting activity, and a successful recovery on functional testing.

It was found that early intervention resulted in a return to sport **3 weeks earlier** than if rehabilitation was delayed for a further 7 days. As the delay in recovery was magnified, this is a substantial finding. However, it is not surprising when you consider that the greatest decrease in muscle mass and loss of strength occurs within the first week of reduced tissue loading (Appell 1990; Booth 1987). Therapeutic loading - within the tolerance levels of the healing tissues - can arrest many of the adverse physiological and biochemical effects which are known to occur post-injury. Research has also shown that by ten days post-injury, the healing tissues can tolerate relatively strong tensile loads, allowing a rapid progression in rehab parameters. Accordingly, it does not make sense to avoid loading for several days post-injury.

In this study group, it can be extrapolated that beyond the second day post-injury, each day of delayed rehabilitation led to an average 3.3 days longer return to play. This knowledge is vitally important in professional sport, where minimizing days lost to injury is critical. It is also useful information for our recreational athletes. If they choose to opt for plenty of rest and a delayed recovery, they should be aware of the consequences, and that their overall recovery will be exponentially increased.

### References:

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3. Booth, F (1987). Physiologic and biochemical effects of immobilization on muscle. Clinical Orthopaedics and Related Research, (219), 15-20.



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