



**EISCSA State-of-the-Art Session:
“Deficit related strategies in walking and running”**

Restoring running and walking after overuse injury

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Overuse injuries of the musculoskeletal system are sustained frequently in physically active people (Macera 1992, Rauh 2000, Taunton 2002 & 2003). Those injuries and accompanying pain can result in functional impairment which forces the patient to omit or to reduce the usual level of activity. Several conservative treatment strategies have been proven to be effective in the therapy of overuse injury (tendinopathies: eccentric training, shock wave, orthotics; stress fractures: load management, adjusted physical activity) (Alfredson 1998, Hirschmüller 2009, Magnussen 2009, Mayer 2007, Murell 2007, Niemayer 2006, Paoloni 2004). However, evidence based guidelines how to advise patients properly in the training process back to full restore of gait function are missing. The purpose of this work was therefore to provide a review on the available evidence concerning therapy and training strategies for restoring gait function in overuse injury conditions.

A literature search (Medline 1966->, Web of Science->1945, The Cochrane Library) was performed to extract the available evidence (search items: overuse, injury, therapy rehabilitation, return-to-play, gait, walking, running, locomotion, ambulation). Relevant studies were selected in a stepwise procedure: 1. Selection according to title, keywords and abstracts: studies and reviews concerning lower extremity overuse injury diagnosis and treatment / therapy. 2. Selection according to final inclusion criteria: articles explicitly stating or evaluating running/walking training recommendations, return-to-play guidelines or load management strategies.

Only two studies are available that give a proven rationale for the aspect of how to train most effectively to restore gait function: 1. Achilles tendinopathy: therapy accompanying pain adjusted running not detrimental (Silbernagel 2007). 2. Patella tendinopathy: no activity for 4 weeks, week 4-8: light jogging on flat surface, week 8->: gradual increase back to normal training volume (Purdam 2004). In many further studies and reviews return-to-play serves as an outcome to be achieved but descriptions how return-to-play should be performed are very rare. It seems generally accepted that “it is not reasonable to run through pain”, that “activity modifications” are obliged (“relative rest”), that “the activity level depends on the specific pathology and the accompanying therapy”, that “a shift to other activities like swimming or cycling” can be recommended and in the “programmed return to running a mileage increase of 10% per week” should be considered” (Ballas 1997, Browning 2001, Bruckner 1997, Diehl 2006, Fredericson 1996, Fredericson 2005, O’Toole 1992, Renstrom 1993). Those statements from reviews are expert based. A training strategy incorporating the best available evidence was then developed to give some guidance in the therapy process. It can be considered a proposal. The Silbernagel et al. study, where a stepwise eccentric training program was used in a randomized controlled trial serves as the base. The program allowed in one group of the RCT

“pain adjusted” activity alongside an eccentric training regimen but without giving a specific description how this activity should be organized. The proposed running training strategy is incorporated into the eccentric training regimen using also the pain adjustment. A visual analogue pain scale is initially used to decide the starting point of activity (VAS >5 out of 10: no activity allowed, VAS <5 out of 10: reduced running program can start). The running training contains walking and running intervals on a minute-by-minute base and progressively elongates the walking / running time. The visual analogue pain rating scale is used to monitor the therapy process. Milestones are defined, if progression to the next phase can be performed or if stepping back in the program is required:

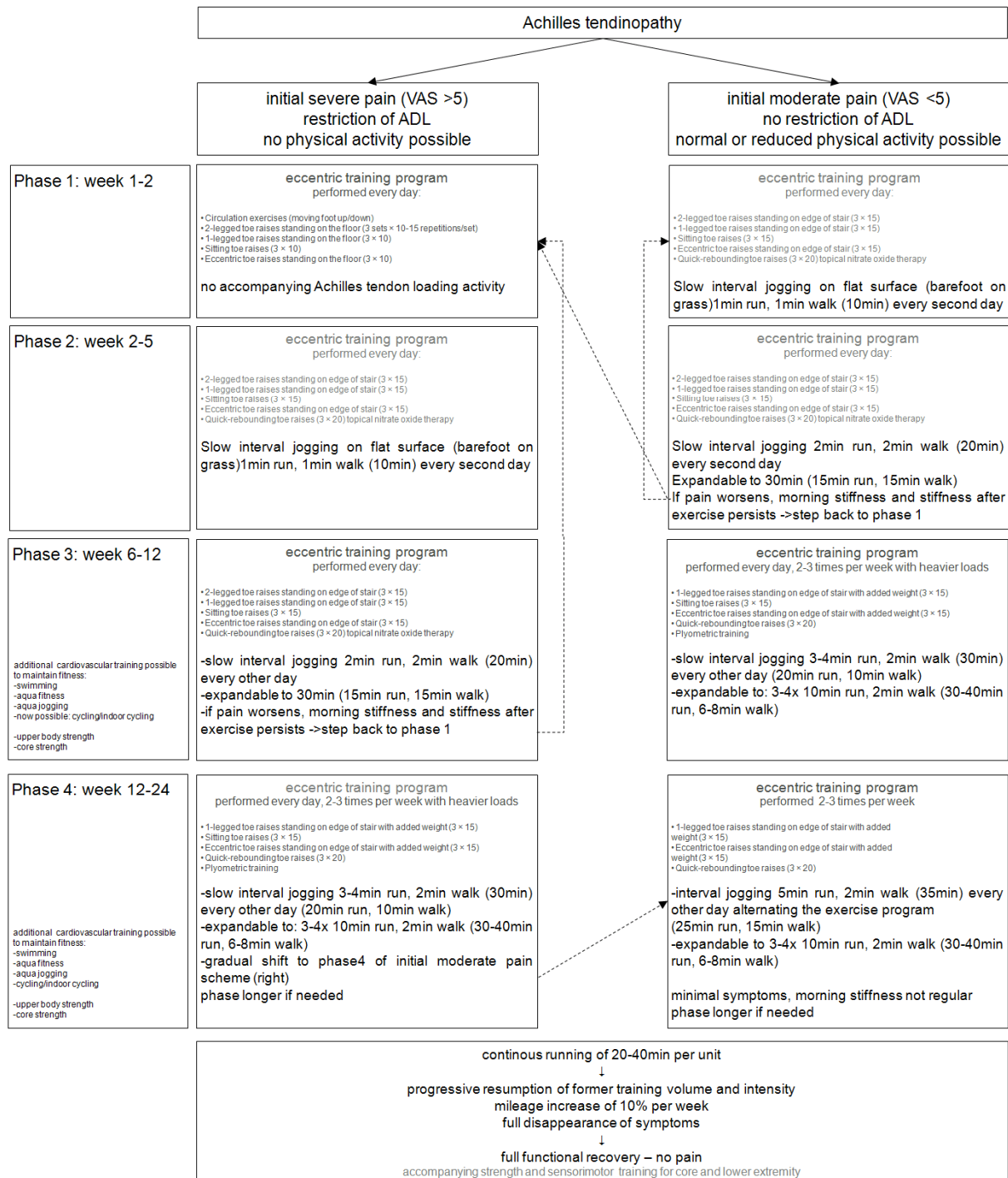


Figure 1: training strategy for “return to running” in Achilles tendinopathy (see also Silbernagel et al. 2007)

It would be preferable, if this program could undergo a strict evaluation in an RCT. At the moment, the simple interplay of pain adjusted running “load” and recovery based on clinical experience seems to be the only way to give some structure to the therapy process.

Restoring of gait pattern is thought to be achieved by typical evidence based treatment regimens for the present overuse pathology. There is consensus that some reduced level of walking and running can accompany the therapy process. The question remains open how these activities have to be designed to work optimally. Studies suggest that pain can serve as a reasonable guidance (Silbernagel 2007).

Acknowledging the absence of high level evidence from RCTs, clinical experience seems currently without alternative. The available knowledge should be incorporated into the design of training programs. Studies on the effectiveness of defined running and walking programs following or accompanying other therapy strategies are necessary to optimize the process from diagnosis to return-to-play in top athletes, recreational athletes and sedentary people.

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