The Biological Aspects in the Process of Musculoskeletal Rehabilitation

Paulo Roberto Veiga Quemelo*

Department of Physical Therapy, University Center Sao CamiloPhysio Institute, Brazil

Editorial

The focus of clinical practice and graduate/professional development courses in musculoskeletal rehabilitation has often been on electrotherapy, phototherapy, thermotherapy, manual therapy, kinesiotherapy, and other rehab techniques. Techniques are very important; however, knowledge of the biological response of the tissues to injuries has often been taken for granted, left aside or not considered. However, incomplete knowledge of injury physiology is common among therapists and often results in incomplete rehabilitation process and chronicity. In addition to the focus on techniques, clinical practice and studies often seek the development and testing of clinical rehabilitation protocols. Although protocols have advantages, following them in a "rigid and inflexible" way as if it were a "cooking book or recipe", without taking into account the underlying biological mechanisms, can result in rehabilitation failures. Understanding inflammation and tissue repair are key factors in musculoskeletal disorders' treatment. The inflammatory process happens to protect and prepare the injured tissues for repair. Inflammation involves vascular and cellular events; the vascular events include vasodilation and increased hydrostatic pressure culminating in edema, while the cellular events involve migration and diapedesis of inflammatory cells to the lesion site. On the other hand, the repair process is divided into regeneration and scarring. Regeneration is the replacement of damaged tissue by new/intact cells of the same type, while scarring is the replacement of damaged tissue with fibrous tissue. The main factors that determine the occurrence of regeneration or scarring are the magnitude of the lesion and the type of tissue that has been affected.

Inflammation and repair occur simultaneously, but in different time frames (Figure 1). Under normal conditions, inflammation starts at a higher intensity, but it ends sooner than tissue repair. Understanding the intensity and timing of inflammation and repair is critical point for adequate musculoskeletal rehabilitation. However, these characteristics are often misinterpreted by patients and even by therapists. The end of the inflammatory process does not mean that the patient is ready for discharge and/or engagement in intense therapeutic or recreational exercises because the repair process is still ongoing and the tissue does not yet have the necessary properties to withstand extensive overload. Therefore, gradual exercise intensity increase is required so that no re-injuries occur and to safely return the patients to their usual level of activities.

Although there is an estimated timeline for each tissue repair, several factors, such as age, genetics, magnitude of injury, site of injury, and tissue affected influence repair time. In this sense, knowing the typical repair time of each tissue, as well as the clinical parameters such as pain, heat, flushing, edema and functional parameters such as strength, range of motion and rebalancing of the sensory-motor condition are fundamental to guide therapists in the process of rehabilitation.
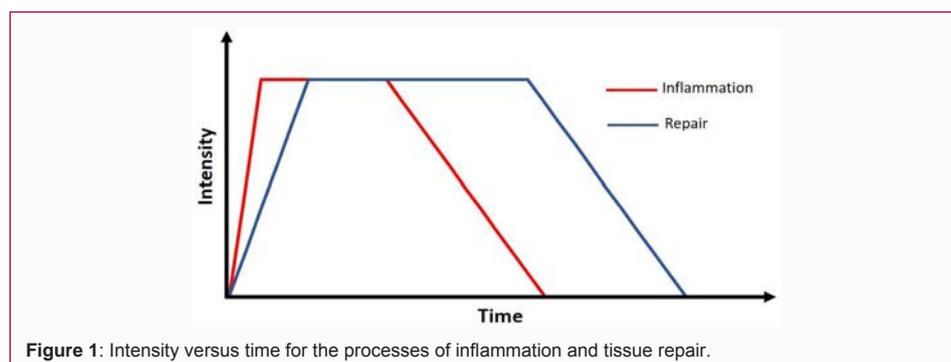
Figure 1: Intensity versus time for the processes of inflammation and tissue repair.