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2nd International Conference and Expo on
Novel Physiotherapies
June 09-11, 2016 London, UK

Novel of extracorporeal shockwave therapy (ESWT) in musculoskeletal pain

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Extracorporeal Shock Wave Therapy (ESWT) can be currently considered an effective, safe, versatile, repeatable, non-invasive therapy for the treatment of various musculoskeletal conditions where regenerative effects are desirable. It seems possible to foresee new interesting and promising applications in the fields of regenerative medicine, tissue engineering and cell therapies. The proposed mechanisms for the benefit of ESWT on regeneration of musculoskeletal tissues and effective for pain relief include direct effects on tissue calcification, alteration of cell activity through cavitation, acoustic micro streaming, hyper vascularity and blood flow increment, alteration of cell membrane permeability and effects on nociceptors through hyper stimulation, blocking the gate control mechanism. The effect of ESWT in myofascial pain syndrome (MPS), may by mechanotransduction effects, including increase perfusion, promote angiogenesis and alter the pain signaling in ischemic tissues caused by the influx of calcium, produce transient dysfunction of nerve excitability at the neuromuscular junction by bringing about the degeneration of AChR and finally, a pure mechanistic with break-up the actin myosin links. The pain relief with ESWT might work by means of hyper stimulation analgesia. Overstimulation of the treated site would lead to a diminished transmission of signals to the brainstem. Animal studies show that ESWT has an influence on pain transmission by acting on substance P, calcitonin gene-related peptide (CGRP) expression in the dorsal root ganglion and on neurovascular sprouting. In animal models of osteoarthritis (OA), ESWT was found to improve motor dysfunction and ameliorate pain and may prevent and slow joint degeneration in vivo. It has been suggested that ESWT may inhibit the production of NO in knee synovia and reduce chondrocyte apoptosis. Accordingly, ESWT for OA may have disease-modifying activity. Several studies have reported effects of ESWT on osteoarthritis in animals. Cartilage degradation biomarkers reduce as following: Mankin score, Safranin O strain, MMP-13, collagen II, nitric oxide, DKK-1. Subchondral bone remodeling biomarkers increase as following: VEGF, vWF, BMP-2, osteocalcin, PCNA. Ultimately, ESWT may become a non-invasive, low-risk alternative to artificial joint replacement in many cases. The indications for ESWT for the top athlete including all the follows; Plantar Fasciitis, Tennis or Golfer's elbow, Patellar Tendinopathy (jumper's knee), Rotator Cuff Tendinopathy (In the shoulder), Achilles Enthesiopathy and Tendinopathy. It is thought that the shockwaves for the top athletes trigger the body's repair mechanism through the local release of various growth factors and over-stimulates pain transmitting nerve endings. This leads to a short-term reduction in pain and sensitivity and also early return of the function and performance. In conclusion, ESWT has become one of the best investigated treatment modalities for musculoskeletal pain.

Biography

Areerat Suputtitada is a Professor of Physical and Rehabilitation Medicine. She is the Chairperson of Neurorehabilitation Research Unit at Chulalongkorn University and Chairperson of Excellent Center for Gait and Motion at King Chulalongkorn Memorial Hospital in Thailand. She was invited as international speaker for more than 60 times around the world. She has received 18 international and national awards and published more than 60 international and national articles in the areas of her expertise including neurological rehabilitation, spasticity and dystonia, gait and motion and pain. She is an expert clinician in ESWT for various indications in the field of physical and rehabilitation medicine. She has been elected and appointed to important positions at ISPRM such as the Chair of Women and Health Task Force and the International Exchange Committee.

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