

# Insulin-Like Growth Factor I (IGF-1) In Older Adults: A Review

## Introduction

Aging can be described as a dynamic and progressive process, including morphological, functional and biochemical changes, as well as psychological modifications. These changes determine the progressive loss of adaptability to the environment, causing a high tendency to vulnerability and a higher incidence of pathological processes [1]. Among the inherent alterations in the aging process, it can be highlighted the deficits in balance, mobility, muscular strength, flexibility [2,3] changes in body composition, including decreased muscle mass and bone mass [4] and endocrine abnormalities, such as the reduction of insulin-like growth factor I (IGF-1) serum levels [5,6].

Therefore, the aim of the present study was to review the effects of physical exercises on IGF-1 serum levels in the elderly and the possible mechanisms underlying these responses.

The circulating IGF-1 is mainly produced by the liver in response to increased growth hormone (GH) levels, but it can also be produced in other tissues, including skeletal muscles and bones [7]. The IGF-1 provides information about the rate of bone remodeling, related to bone mineral density (BMD) [8] and exerts, on the bones, an anabolic effect on the osteoblasts, increasing the cellular proliferation and estimating the synthesis of the bone mineral matrix [9].

The IGF-1 generates an anabolic effect on skeletal muscle, related to the preservation of lean body mass [10]. Accordingly, the reduction of IGF-1 due to aging may be associated with greater susceptibility to sarcopenia and functional dependence [11,12] loss of lean mass, decreased protein synthesis, increased fat mass [13] and myostatin in elderly individuals [14]. Consequently, higher levels of IGF-1 are associated with improvements in physical fitness [15] and lean body mass [10], and reduced risk of heart disease [16] and mortality [17].

Physical exercises may influence the secretion of hormones in the elderly [18]. The hormonal impact of physical exercise can help to verify the effectiveness of training programs to maintain or improve IGF-1 levels and to determine the potential effects of different types of exercise on this hormone. However, the training programs presented methodological differences, such as the type of exercise used, the intensity and the volume of training [19-23].

Among the different types of exercises that influenced the IGF-1 serum levels in the elderly, increases of this hormone were found with strength training [21,22,24] aerobic training – with aquatic exercises [22] and running [25] flexibility training [20] dance [21,26] and kinesiotherapy [27]. The interventions ranged from two to three times per week, during three to six months.

Muscle strength training has shown higher increases in IGF-1 levels in the elderly compared to endurance training [22,25]. This may improve functional autonomy [28] and quality of life in aging [29].

### Mini Review

Volume 1 Issue 6 - 2017

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**Received:** July 01, 2017 | **Published:** August 07, 2017

Therefore, due to the benefits of higher levels of IGF-1 in the elderly, it is suggested to extend the knowledge of means that can possibly increase the synthesis and release of this hormone. Thus, future researches should investigate the effects on IGF-1 of different configurations of intensity and volume of training, as well as different types of exercises.

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