

Could overmedication associated with spinal injuries be treated with one more CNS drug?

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Overmedication is not a problem encountered only by elderly

Overmedication is a common problem generally associated with the aging population suffering typically of one or several chronic diseases. However, side effects, drug interactions and excessive use of multiple drug treatments have recently been shown to be an important issue also in patients suffering a chronic spinal cord injury (SCI) or, more generally, by people with significant mobility problems.

SCI is on the rise and still no cure

SCI of traumatic origin generally leads to an immediate and irreversible loss of sensation, voluntary muscle contraction and walking capabilities. On average, in Europe and North America 70,000 new cases are diagnosed each year [1]. Recent data from the Paralysis Task Force, a collaborative effort between the Christopher and Dana Reeve Foundation and Centers for Disease Control (CDC) has reported prevalence to have reached 1.275 million people in the U.S. only [2]. That is a five-fold increase compared with earlier estimates of prevalence [3]. Unfortunately, no cure capable of repairing SCI has yet been approved [4].

Dysfunctions, diseases and life-threatening complications associated with chronic SCI

Within a few weeks to a few months post-trauma, several organs and systems including bones, muscles, immune cells, guts, skin, brain, blood cells and heart, undergo some dysregulations leading to the development of chronic diseases and health concerns. Bones face premature decalcification leading to osteoporosis and increased risks of fractures [5, 6]. Lean mass decreases, adiposity increases, anabolic hormone levels are below normal, and insulin resistance develops [7]. Hypertension, cholesterol, type II diabetes, obesity are also typically found [8] increasing incidence of cardiovascular problems (e.g., stroke, coronary artery disease, etc.). Immune deficiency is also encountered and its role in frequent infections (e.g., UTIs, skin sores, septicaemia, pneumonia) is a main cause of premature death associated with SCI [9].

Overmedication associated with these many secondary complications

To control or reduce some of these so-called secondary complication and diseases, patients suffering a SCI are found to use a plethora of symptomatic drug treatments. Indeed, it has been reported recently that as many as three hundred (300) different medicines belonging to nineteen different classes are regularly administered to chronic SCI patients [10]. Among them, drugs against bowel and bladder problems, blood clot/deep venous thrombosis, cardiovascular problems, depression/anxiety, stomach acidity, infections, pain, inflammation, sleeping problems and vitamin deficiency are commonly used after chronic SCI [10]. Given that many of these problems are associated largely with chronic physical inactivity, a therapy capable of enabling the recovery of treadmill training, for instance, could potentially constitute an interesting approach against many of these secondary complications.

A first oral pill in development for metabolically challenging, drug-induced exercising after SCI

Engaging actively most large muscle groups for relatively intense contractions is one of the main basic principles underlying cardiovascular training capable of metabolic benefits (www.rcmp-grc.gc.ca; www.cdc.gov/physicalactivity). As of now, a drug candidate called Spinalon™ is probably one of the most promising solutions enabling challenging physical activity to be induced after SCI.

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It is an oral tritherapy composed of buspirone/levodopa/carbidopa shown first in paraplegic mice to induce, within a few minutes post-administration, 30-45 min episodes of self-weight bearing walking on a treadmill [11]. It has recently undergone successfully, at the Montreal General Hospital/McGill University Health Center, a randomized double-blind study in 45 subjects suffering a SCI (<https://clinicaltrials.gov/ct2/show/NCT01484184>). It does not repair the spinal cord but, instead, potentially reactivates the spinal network for locomotion typically located in L1-L2 level - below injury level in most cases. Administered between 3 and 5 times/week for a few weeks in paraplegic mice, Spinalon™ successfully prevented bone loss, muscular atrophy, immune system deficiency, and anemia normally found after SCI [12, 13].

Concluding remarks

Overmedication is undoubtedly an underrated problem associated with aging and other chronic conditions such as SCI and related debilitating diseases. Many of those symptomatic drugs prescribed to SCI patients could potentially be avoided or their doses significantly reduce if those patients were capable of being engaged regularly into metabolically challenging workouts on a treadmill. Indeed, regular exercising is well-known to improve general health and vital functions that are typically impaired after paralysis. Consequently, if Spinalon™ were to be approved by authorities, pending upon results from the phase II/III trials, it may become a relatively simple holistic approach against overmedication in patients with SCI.

Conflicts of interest

Author declares no conflicts of interest.

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