# A_Atrofi: New compounds for the treatment of musculoskeletal atrophy and cachexia

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# The invention

It is estimated that the decrease in muscle mass (Sarcopenia) at 50 years of age is about 10%, and at 70 years of age about 70%; in the case of disuse, the reduction is approximately 60% while in cases of oncological diseases, about 50% of patients suffer from cachexia with obvious loss of muscle and skeletal mass. These obvious changes in the musculoskeletal system also characterize the human body subjected to environments other than the earth, such as weightlessness or lesser gravity conditions. To date, there are no pharmacological treatments available that can slow the loss of muscle mass efficiently, so much so that the only form of protection is still dietary supplements and exercise. The invention is represented by a mixture of molecules, called A_ATROFI, capable of regulating the balance between protein synthesis and its degradation in skeletal muscle cells. This regulatory action is effective against both the muscle atrophy associated with aging (sarcopenia) and the loss of muscle mass that is a side effect of weightlessness, muscle disuse, or tumor disease (cachexia), as well as in cases of other diseases such as lung and kidney failure, heart failure, diabetes, liver cirrhosis, and HIV infection. Experimental data obtained in the preclinical phase, still undergoing in-depth studies that even hint at the possibility of new patent filings, have demonstrated the ability of A_ATROFI to prevent degeneration and volume reduction of skeletal muscle cells induced by glucocorticoid administration. A_ATROFI is thus a novel pharmacological treatment, with no analog available on the market, capable of finding useful application--also as a preventive measure--in a diverse range of muscle atrophies.

# The Team

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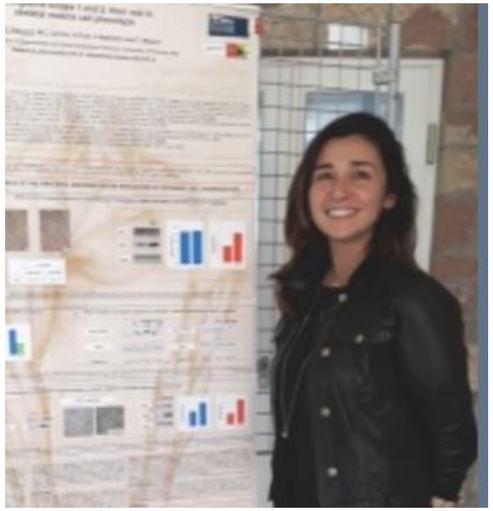

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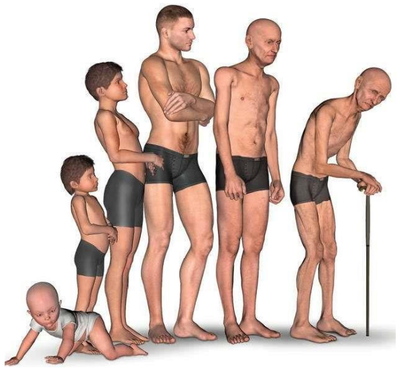

# Industrial application

The invention consists of a mixture of molecules capable of modulating Sphingosine 1-phosphate receptors (S1PR) for the prevention and treatment of muscle fiber atrophy or degeneration. In short, this is a new compound that can modulate the acquisition of the atrophic phenotype of the cell and thus delay or decrease its natural processes of response to pathological events (e.g., cancer) or other external causes (e.g., disuse) or aging. Experiments that have already been carried out in vitro have focused on the phenomena of muscle atrophy, and the evidence gathered has shown that by administering the mixture, the pathological phenotype and some markers (e.g., expression of Atrogin-1/MAFb) are significantly reduced. Preclinical phase R&D is continuing with in vitro and in vivo models, with the aim of confirming and extending the results already obtained, in particular: 1) containing and limiting the normal aging processes of the muscle cell, particularly 2) when aggravated by disuse or weightlessness; 3) by pathology, 4) evaluating in the case of cachexia, the positive effects in terms of survival of cancer patients. The first business case and, consequently, the killer application lies in the treatment of sarcopenia.

# Possible Developments

- TRL 3/4
- The patent is early in its life and the family is extended into large and attractive markets.
- A potential new drug, it should be precautionarily assumed that the success rates and time to market are comparable to other new technologies in the field, and therefore a time to market in the range of 5-10 years should be assumed, provided all necessary testing and approval steps are passed.
- The marketability of the new compound has an almost unlimited potential market since it can be used, in the medical sector, as a preventive therapy for Sarcopenia and also as a treatment for Cachexia phenomena related to disease states, which include extremely frequent diseases (e.g., oncology, respiratory and renal diseases, diabetes, and many others).
- Outside the strictly medical field, moreover, it is conceivable that a drug such as the patented one could have useful use in the field of space exploration, which in recent years is undergoing a remarkable acceleration behind the push of new private companies.

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