

## Blood, a fountain of youth?

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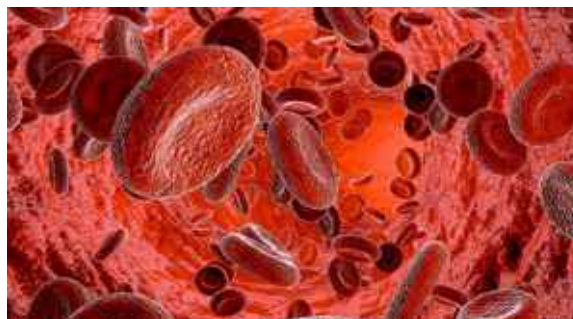
*Three studies published back to back indicate that a protein naturally present in the blood can slow down the aging of muscle mass and the decline in cognitive functions. Is blood itself actually the long-sought fountain of youth?*

To remain functional, all of our **organs** must continually replace dead cells or those which have become damaged by injury or by pathological causes. This regeneration is made possible by the presence of stem cells, cells which possess the ability to generate new, specialized cells and thus to ensure maintaining the physiological functions of the organ in which they are found. The cells of our muscles, for example, are often damaged by intense physical exercise but the lesions activate stem cells present at the surface of the muscle fibres, which stimulate the production of new cells which will repair the muscle.

Unfortunately, our experience with life amply shows that the renewal of tissues is not infinite: our physical and intellectual capacities are not essentially the same at age 70 as they were at 20! During the process of aging, the number of stem cells as well as their regenerative abilities are gradually reduced, which also affects the function of each of our organs. The discovery of a way to preserve the regenerative properties of stem cells would thus have an extraordinary impact on the health of the elderly as well as on their life expectancy.

### NEW BLOOD

Spectacular progress was realized in this sense by examining the impact of blood taken from young mice on the physiological functions of more elderly animals. For example, researchers have observed that the interaction between an elderly mouse and the circulating blood from a young mouse stimulated the function of stem cells present in the muscles, which provoked an increase in both muscular tone and physical endurance in the elderly animals<sup>(1)</sup>. The injection of blood taken from young mice into very old mice also spectacularly improved their cognitive functions, possibly by permitting greater influx of blood to the brain<sup>(2)</sup>, as well as by better transmission of nervous impulses at the level of the synapses which link the cells amongst themselves<sup>(3)</sup>.



In all these cases, the scientists observed that these positive effects could be reproduced by injections of a blood protein named growth differentiation factor 11 (GDF11), which strongly suggests that this factor is largely responsible for the rejuvenating properties of blood. Regarding this, it is interesting to note that the protein GDF11 is highly abundant in young individuals, but diminishes considerably with age.

### SLOW DOWN AGING

These observations are very interesting because they suggest that administration of the protein GDF11, or of a molecule which can mimic its action, could eventually permit us to slow down the decline in physiological function that accompanies aging and to considerably improve the health and the quality of life for the elderly.

But while awaiting this potential molecular fountain of youth, it is worthwhile remembering that a good diet, regular physical exercise and good sleep habits can considerably diminish cellular aging and slow down the loss of physiological functions that are produced over time.

- (1) Sinha M et al. Restoring systemic GDF11 levels reverses age-related dysfunction in mouse skeletal muscle. *Science* 2014;344:649-652.
- (2) Katsimpari L et al. Vascular and neurogenic rejuvenation of the aging mouse brain by young systemic factors. *Science* 2014;344:630-634.
- (3) Villeda SA et al. Young blood reverses age-related impairments in cognitive function and synaptic plasticity in mice. *Nat. Med.* 2014;20:659-663.