

Young blood for old hands? A recent anti-ageing trial prompts ethical questions

Nikola Biller-Andorno

University of Zurich, Switzerland

Rejuvenation is an old dream of an ageing humankind. In our societies – with their confidence in scientific and technological fixes and high demands on individual appearance and performance – the wrinkles and frailties of advanced age have become an almost unbearable nuisance.

Blood and other body materials, particularly from young, strong and/or innocent beings, have long been a popular source of revitalising remedies, both in fiction and in real life. Vampire stories come to mind, a favourite teenage genre. In a novel on a preservationist suffering from heart failure the recently deceased Swiss writer Markus Werner invokes a story of a sick knight who can only be rescued by a virgin voluntarily donating her heart [1].

In biomedical research, a lot of efforts are going into developing scientifically sound, carefully scrutinised organ repair and replacement therapies. At times, however, the compelling idea of using “young” material to refresh an ageing organism seems to sweep away scientific rigor. “Fresh cells”, originally from sheep fetuses or placentas, have been used for cures that are still offered in some spas and clinics today. Their efficacy, however, seems questionable to the point that the Swiss Federal Office of Public Health has taken active steps to curtail their use [2]. Cord blood is another widespread source of hope and hype, and stem cell therapies of all sorts have become a blossoming global market.

Another hot new approach is young human plasma. It has been known for some time that an old mouse sewn to a young mouse – a technique from the 19th century called parabiosis – seems to benefit from the young mouse’s blood [3]. In spite of its promising results this set-up must seem somewhat impractical even for the most daring proponents of anti-ageing medicine. In 2014, a study suggested that the injection of young blood plasma into elderly mice may have also beneficial effects, reversing effects of brain ageing and improving learning and memory [4]. So far, no significant impact on lifespan has been found [5].

A trial using human plasma for rejuvenation is currently underway, prompting a number of ethical issues some of which were recently pinpointed in *Science* [6]. A major concern relates to the poor trial design that invites participation from anyone who is aged 35 years and older and willing to pay a charge of 8000 US dollars, but includes

no placebo arm. There is little clinical evidence to start out with, and because of the way the study is set up it cannot be expected to contribute much to the status quo. Apparently a commercial ethics board has reviewed the study, yet questions remain about the risk-benefit ratio and the high charge. Additional issues could be raised, such as: How will incidental findings, which are likely given the high number of laboratory tests, be dealt with? Were blood donors informed that their plasma might be used for non-medical purposes? Furthermore, there are concerns about possible long-term risks, with worries that rejuvenating cells in old organisms might lead to an increase in cancer [7].

But let us assume that plasma for rejuvenation developed into a successful therapy, with robust evidence of its clinical effectiveness. Who should be eligible for this therapy? Alleviating symptoms of patients with Alzheimer’s disease or brain injuries is one matter, but boosting the performance of healthy people is quite another.

There would probably be a high demand for such an enhancement, if it was indeed safe, effective and reasonably priced. But at least as long as live donors are needed, human plasma is not a commodity like any other. Before consenting, donors would have to be informed about the intended commercial use in healthy people. This could be expected to reduce the number of volunteers willing to give blood under these conditions. Great care would need to be taken to avoid negative implications for the blood supply for medical purposes. And clearly, assuming blood will remain a scarce resource, use should be prioritised according to medical need [8]. Enhancement would have to be last in line.

Thus the availability of young plasma for anti-ageing might well be limited. In this situation, live directed donation might become attractive – children or young adults more or less altruistically donating for their parents or grandparents. An alternative would be tapping into the global (and largely illegal) market for organs and other body parts and pay poor young people in developing countries for their blood.

Both scenarios have ethical question marks. In the 1970s, when parabiosis studies were quite popular, an influential ethics paper appeared, questioning our duty to maintain an-

other human by presenting the following thought experiment [9]. You wake up in the morning and find yourself back to back in bed with a famous violinist suffering from terminal kidney failure who is plugged into your circulatory system. The Society of Music Lovers has kidnapped you as you are the only one who has the right blood type to save him by cleaning his blood through your own kidneys. The peculiar assumptions about the medical situation set aside, this case was used to discuss the personal obligations we have to keep others alive. The author, Judith Thompson, arguing back then in the context of the right to abortion, concluded there was no such duty.

There is something peculiar about the old literally feeding on the young. In public discourse, for instance regarding retirement pensions, we usually take care not to overburden the young generation. Maybe the question comes back to what Aristotele had already told his pupils: it is about the right measure. We will all age and die, and many of us would like to postpone or even abolish both. But our attempts to stay fit as long as possible should not impose undue burdens on the next generation. And it would be wise to accept rather than vainly revolt against human frailty and mortality. At the end of the day, the end of oneself is not the end of the world.

Disclosure statement: No financial support and no other potential conflict of interest relevant to this article was reported.

Correspondence: Nikola Biller-Andorno, Prof. Dr. med. Dr. phil., Director, Institute of Biomedical Ethics and History of Medicine, Center for Medical Humanities, University of Zurich, Winterthurerstrasse 30, CH-8006 Zurich, biller-andorno@atjethik.uzh.ch

References

- 1 Werner M. Bis bald (See you soon). Frankfurt a.M.: Fischer, 2011.
- 2 Federal Office of Public Health (FOPH): Confederation and cantons take action against providers of illegal fresh cell therapy. Media release, March 26, 2015. <https://www.admin.ch/gov/en/start/documentation/media-releases.msg-id-56686.html>
- 3 Egel A, Wyss-Coray T. A revival of parabiosis in biomedical research. *Swiss Med Wkly.* 2014;144:w13914.
- 4 Villeda SA, Plambeck EK, Middeldorp J, Castellano JM, Mosher KI, Luo J, et al. Young blood reverses age-related impairments in cognitive function and synaptic plasticity in mice. *Nature.* 2014;477:90–4.
- 5 Shytikov D, Balva O, Debonneuil E, Glukhovskiv P, Pishel I. Aged mice repeatedly injected with plasma from young mice: a survival study. *Biores Open Access.* 2014;3(5):226–32. doi: 10.1089/biores.2014.0043.
- 6 Kaiser J. Antiaging trial using young blood stirs concerns. *Science.* 2016;353:527–8.
- 7 Scudellari M. Ageing research: Blood to blood. *Nature* 2015;517:426–9, doi:10.1038/517426a.
- 8 Schulz-Baldes A, Biller-Andorno N, Capron A. International perspectives on the ethics and regulation of human cell and tissue transplantation. *World Health Bulletin.* 2007;85(12):941–8.
- 9 Thompson JJ. A defense of abortion. *Philosophy & Public Affairs.* 1971;1(1):47–66.