Clinical trial paves the way for swifter research into neurodegenerative diseases

28 May 2020

Researchers conducting a clinical trial to advance the treatment of multiple sclerosis successfully applied a new drug testing methodology which allows several treatment options to be trialled at once. Although none of the three drugs in the study proved effective in treating the disease, the investigation's findings were worth the effort. The groundbreaking results, published in *Lancet Neurology* and credited in part to UOC researchers, confirmed that the new multiarm approach is a viable option for testing neurological drugs and may streamline the search for new medicinal treatments for multiple sclerosis and other neurodegenerative diseases.

Most areas of medicine currently test out new drugs one by one against a placebo. In other words, traditional clinical trials compare two patient groups: one group which receives the drug under investigation and a second—the control group—which is given a substitute containing no active pharmacological substance. However, in oncology, an area in urgent need of new treatment options, researchers have begun to compare multiple drugs against common control groups within single studies. Not only does the new multiarm approach cut costs, it accelerates the entire process.

Multiarm trials require an exceedingly large number of patients to prove worthwhile, which poses both logistical and financial challenges. Furthermore, this type of methodology had never previously been used on drugs for treating neurodegenerative diseases. Nonetheless, according to Ferran Prados, researcher at the Applied Data Science Lab (ADaS) at the UOC's Faculty of Computer Science, Multimedia and Telecommunications, "Now that multiple sclerosis biomarkers have been improved, we're able to reduce the required sample size, making [the multiarm approach] a viable option."

This led a team of researchers, coordinated by the UK's University College London (UCL), in collaboration with the UOC, to carry out a multiarm trial to study the potential effectiveness of three drugs against multiple sclerosis. This neurodegenerative disease, which in 2019 afflicted roughly 55,000 people in Spain and 2.5 million worldwide, causes severe disability and currently has no cure. In previous studies, the three compounds tested in the trial—fluoxetine, amiloride and riluzole—had shown some effectiveness in curbing cerebral atrophy and the appearance of new brain lesions in patients suffering from the disease.

Negative results that open the door to new, quicker trials

With a sample of 445 volunteer patients, the trial aimed to determine whether the three drugs, each of which was administered to a different group, could prove effective against one of the most severe forms of the disease: secondary progressive multiple sclerosis. Prados, who took part in analysing the data, said: "Sadly, the results came back negative. The disease continues to be more aggressive than any available treatment. We must trudge forward."

Despite the negative results, the fact that the three drugs were trialled simultaneously signifies a momentous step forward. The UOC researcher had this to say: "[The multiarm approach] had never been tested on treatments for neurodegenerative diseases. It has created an entirely new paradigm in which lowered costs make trials more viable. We're witnessing the future of clinical testing."

The study broke new ground in another way as well: using algorithms to computerize the analysis of medical images. Designed by Prados himself, the system helped to enhance the reliability of the results. The researcher said: "Computerization allows experts to focus their efforts on checking that analyses are going smoothly, a task which is

less susceptible to human error, rather than analysing data themselves. This equates to saved time for researchers and more accurate results."

Prados concluded: "Single trials carried out on multiple drugs coupled with fully computerized data processing will allow us to generate answers more quickly and see results in a shorter period of time. We're conducting more promising trials now and developing new markers based on medical images, all of which will help us to provide more accurate and sensitive analyses of patients' responses to different drugs, lest we overlook their true effectiveness."

More information: Jeremy Chataway et al. Efficacy of three neuroprotective drugs in secondary progressive multiple sclerosis (MS-SMART): a phase 2b, multiarm, double-blind, randomised placebo-controlled trial, *The Lancet Neurology* (2020). DOI: 10.1016/S1474-4422(19)30485-5

Provided by Universitat Oberta de Catalunya