



## Science, ethics, responsibility and COVID-19

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Since the Second World War, a great number of ethical standards have been developed to protect science and society from misconduct in scientific research, such as abusive experimentation, fraudulent research reports, professional jealousy or rivalry, or misuse of scientific funding. Ethics and responsibility are important human values; however, they are rarely mentioned together with science. In the twenty first century, ways of separating the scientific method from values, beliefs and opinions are no longer self-evident and the complex realities of science call for a greater consensus in the ethical principles of scientific research.

In this special issue of *Biologia Futura* authors connect these concepts in many different aspects. S. Hendriks discusses how science should be ethically conducted. G. Hermerén guides us to realize that even the beneficent regenerative medicine hides ethical pitfalls. A. Kagansky et al. investigate in what way we can utilize the predicted value of biomolecular diversity for drug discovery, human health and well-being. Nevertheless, pharmaceutical drug development is an expensive project. How to share resources between basic research and innovation? S. Annett looks into the dilemma how the pharmaceutical investments pay off: by high drug prices or through public funding. We learn from M. Hassan and D. Schäffer's paper that no one can escape the moral imperative of money: a nation's priorities are well visible from the investments in science. How can science funding be made more transparent and just? Leaders must be given good and independent advices by a nation's academy of science. K. Lohne explores what ethical capacities the academy has and what its challenges are. Why is it so crucial for academic scientists to take part in the policy making process? Finally, I. Nath wrote about how science is responsible for peace. Nations do not work in different sciences: we share the building we are mutually constructing. What one

begins, the other continues and ultimately the result can be claimed by all who have contributed to its creation.

Until recently scientific researchers had to protect seemingly only these ethical principles. The present emergency of the COVID-19 pandemic has changed the world. It made evident that science has more obligations not only those listed above. As the world is responding to the global COVID-19 pandemic, quick decision-making is vital. But it can also become a challenging exercise when ethical questions and sometimes dilemmas arise in a context of emergency where human lives and human dignity are threatened. This is the first ever real global challenge what affects every nation regardless where they live, how high is their GDP or what is their history.

COVID-19 is an infectious respiratory disease caused by the most recently discovered coronavirus, SARS-CoV-2. This new virus and disease were unknown before the outbreak began in Wuhan, China, in the final months of 2019. The virus has now spread to well over 150 countries and more than 55 million people are known to have been infected as of 20 November 2020. The disease is thought to spread from person to person primarily through small droplets which are spread when a person with COVID-19 coughs, sneezes, or exhales.

Illness due to COVID-19 infection is generally mild, especially for children and young adults. However, it can cause serious illness: about one in every five people who catch it may need hospital care. Older people and those with underlying medical problems like high blood pressure, heart or lung problems, cancer or diabetes, are more likely to develop serious illness.

Let's consider some of the new outstanding questions that decision makers, healthcare professionals and researchers around the world are facing today, as the COVID-19 pandemic has put states, public health systems, economies, societies, communities and individuals under utmost pressure.

When medical resources are scarce in times of pandemics, what are the criteria for choice and decision-making? In times of national lockdowns, whose dignity and livelihood are threatened while a society attempts to preventively save

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lives? Does the imperative urgent search for a cure override the regular research ethical standards? How shall we balance the fundamental rights to privacy and the need to trace individuals with digital technologies for the sake of prevention?

Risk is a notion closely related to uncertainty. Managing risks involves further problems. What is regarded as "acceptable risk" is ultimately a question of values. The unequal distribution of risks within societies raises traditional ethical concerns of fairness and integrity. Similar considerations apply to the distribution of risks among different generations. They serve to justify a precautionary strategy in those areas that may be vital for the future generations. One such strategy in regard to new knowledge and technology may be to delay the practical uses thus providing time for more comprehensive assessments.

The various roles that lab animals have played throughout the COVID-19 pandemic highlight a growing need to re-evaluate current scientific research models and requirements. In the race to develop a vaccine for COVID-19 a biotech company left out the crucial preliminary step of conduct animal trials. In March the first-ever injection of a possible COVID-19 vaccine was administered to a human volunteer, in a phase one trial. In a time of such urgency, the strict prerequisite of animal testing can simply cease to exist. Mass euthanasia was the fate of lab animals currently involved in research not involving coronavirus or otherwise seen as non-essential as the result of closed universities and scarce animal care staff.

If a possible vaccine can be rushed into human trials, if lab animals can be so easily and suddenly discarded and the importation of animals for experimentation can increase the risk of virus spread, then the exclusive focus on first using animal models should be reconsidered. More than 90 per cent of drugs tested and found to be safe and effective in animal models fail in human clinical trials. There are tremendous differences between humans and other animals and now is the time to take those differences seriously. There is more than enough brilliance, ingenuity and resourcefulness within the scientific community to create a new model, where *Homo sapiens* serve as the quintessential animal model and our biology is the gold standard. This could be a development of the COVID-19 pandemic which would transform our practices in drug development.

The global emergency of the COVID-19 pandemic confronts us all with unpredictable, disruptive situations which have changed our daily lives, economies, political decisions. The recent and constantly evolving developments of the COVID-19 pandemic raise major ethical questions that will, in one way or another, transform our habits, practices and theories.

Key ethical issues pertaining to the medical treatment, the prevention and containment policies, as well as the scientific research that is more than ever needed. Crises are no excuse for lowering scientific standards and researchers must always act ethically.