

# The role of science in modern society

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Keywords: innovations, scientific society, covid-19, pandemia

Available on-line at the Journal web address: <http://www.ache.org/HI/>

EDITORIAL

UDK: 001.895: 001.3: 616-036.21

Hem. Ind. 74 (2) 75-78 (2020)

Every epoch brings new challenges for people who are trying to solve them by their will, commitment and innovation. At this moment, the world is facing one of the biggest crises in the last 100 years that has paralyzed life on the larger part of the planet. Inevitably and expectedly, our eyes are turned to scientists and researchers, innovative people of different professions, who are taking small and large steps toward the same goal and giving hope that a solution will be found. Researchers are trying to organize and connect globally, so recently the *Crowdfight Covid-19* platform has come to life, aiming to involve a wider scientific community in research related to this virus-

The battle is fought simultaneously on several fronts. The priority is finding the vaccine and dozens of research teams around the world are working on this subject. According to the information from the World Health Organization, at the end of March, two vaccines entered the clinical evaluation process - one developed by the company *CanSino Biological Inc.* China and the other by the company *Moderna*, USA. Around 60 potential vaccines, based on 8 different platforms, are in the preclinical evaluation phase, among which another 2, created by research teams from the University of Oxford and *Inovio Pharmaceuticals*, started with animal testing in early April. It is significant that, besides pharmaceutical companies, universities are also heavily involved in these studies. In addition to the University of Oxford and the Beijing Biotechnology Institute, whose team developed the *CanSino* vaccine, very active are also the University of Hong Kong, the University of Osaka, the University of Tokyo, University of Pittsburgh School of Medicine, University of Miami, and the Imperial College London. There is no doubt that they will be joined by others.

New protocols for treatments based on combinations of drugs that have proven effective in similar viruses, and the use of oxygen therapy for patients with severe forms of the disease are under consideration, as well as alternative methods such as injecting blood plasma from recovered patients, rich with antibodies on Covid-19. A preliminary study has already been conducted at the Zhejiang University School of Medicine and several US university hospitals plan to follow this approach. This type of therapy is likely to be implemented in other countries, including Serbia, in the near future.

Universities are also actively involved in the identification of potentially infected persons, so that several clinical university laboratories have been transformed into Covid-19 testing facilities in a very short time (*e.g.* the Broad Institute of MIT and Harvard, and the National University of Colombia in Bogota).

Patients with breathing difficulties have to be treated with some type of oxygen therapy and several teams are working on development of new types of ventilators but also less invasive devices that bridge the gap between the oxygen mask and the full ventilator. Cooperation of experts from various fields has also come to light here: researchers from the University College London hospital in collaboration with engineers from the Mercedes' Formula 1 team have in less than a week created a device, which helps patients with respiratory problems to breathe easier. The device, currently under clinical trials at several London hospitals, supplies patients with the continuous flow of oxygen like a standard ventilator, but is non-invasive and does not require sedation.

Along with the efforts invested in finding a vaccine and treatment of patients, it is important to prevent the virus from spreading further. In this sense, new solutions in the fields of personal protection and disinfection of surfaces and facilities are also important. In Serbia, researchers have tried to address this challenge, among other ways, in the frame

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<https://doi.org/10.2298/HEMIND200427013Z>



of a call for proposals by the Innovation Fund, Republic of Serbia. In a very short time period, about 300 project proposals applied for funding, of which 12 were approved. These include a portable ozonizer for rapid disinfection of public areas, a protective mask with a removable and reusable *HEPA* filter, a mobile counter for contactless temperature measurement, reusable protective suits, and a ventilator developed by a team, which included researchers from the Institute "Mihajlo Pupin".

Let us return to the question from the beginning of the text: what is the role of science in modern society? Under normal circumstances, relatively little is invested in science, compared to some other areas of human activities, but in difficult situations as the current one, researchers are those who are expected to find the answers and provide solutions. Is it really a crisis of this magnitude necessary to realize the full significance of research, innovation, and scientific progress?

# Koliki je značaj nauke u savremenom društvu?

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РЕЧ УРЕДНИКА

*Ključne reči: inovacije; naučna zajednica, covid 19; pandemija*

Svako vreme nosi određene izazove koje ljudi svojom voljom, inovativnošću i angažovanjem nastoje da prevaziđu. U ovom trenutku svet se suočava sa jednom od najvećih kriza u poslednjih 100 godina koja je paralisala život na većem delu planete. Neizbežno i očekivano, oči su uprte u naučnike i istraživače, inovativne ljude različitih struka koji malim i velikim koracima idu ka istom cilju i pružaju nadu da će se rešenje ipak naći. Istraživači nastoje da se organizuju i povežu na globalnom nivou tako da je nedavno zaživela i platforma *Crowdfight Covid-19* čiji je cilj uključivanje šire naučne zajednice u istraživanja vezana za ovaj virus.

Borba se vodi istovremeno na više frontova. Prioritet je pronalaženje vakcine na čemu radi više desetina istraživačkih timova širom sveta. Prema informacijama Svetske zdravstvene organizacije (*World Health Organization*) krajem marta su 2 vakcine, kineske kompanije *CanSino Biological Inc.* i američke *Moderna*, ušle u proces kliničke evaluacije. Oko 60 potencijalnih vakcina, baziranih na 8 različitih platformi, nalazi u fazi pretkliničke evaluacije, pri čemu su za još 2, čiji su tvorci istraživački timovi sa Univerziteta u Oksfordu (*University of Oxford*) i kompanije *Inovio Pharmaceuticals*, počela ispitivanja na životinjama početkom aprila. Značajno je da osim farmaceutskih kompanija, veliko učešće u ovim istraživanjima imaju i univerziteti. Pored već pomenutog Univerziteta u Oksfordu i Instiuta za biotehnologiju iz Pekinga (*Beijing Institute of Biotechnology*) čiji je tim razvio *CanSino* vakcinu, tu su i Univerzitet u Hong Kongu (*University of Hong Kong*), Univerzitet u Osaki (*Osaka University*), Univerzitet u Tokiju (*University of Tokyo*), Univerzitet u Pittsburgu (*University of Pittsburgh School of Medicine*), Univerzitet u Majamiju (*University of Miami*), Imperijal koledž u Londonu (*Imperial College London*), a bez sumnje će im se uskoro pridružiti i neki drugi.

Radi se i na uspostavljanju novih protokola za lečenje, baziranih kako na kombinacijama lekova koji su se pokazali efikasnim kod srodnih virusa i primeni kiseonične terapije za pacijente sa teškom formom bolesti, tako i na ispitivanju alternativnih metoda poput ubrizgavanja krvne plazme oporavljenih pacijenata koja je bogata antitelima na virus *Covid-19*. Preliminarna studija je već sprovedena na Univerzitetu Đidan (*Zhejiang University School of Medicine*) u Kini, a nekoliko univerzitetskih bolnica u SAD planira da sledi ovaj primer. Ovaj vid terapije će verovatno u skorije vreme biti primenjen i u drugim zemljama, uključujući i Srbiju,

Univerziteti su se aktivno uključili i u fazu otkrivanja zaraženih, pa je vise kliničkih laboratorija pri univerzitetima za veoma kratko vreme transformisano u ustanove za testiranje na *Covid-19* (npr. *Broad Institute of MIT and Harvard* i *National University of Colombia* u Bogoti).

Za lečenje pacijenata sa otežanim disanjem neophodna je neka vrsta kiseonične terapije tako da više timova radi na razvoju novih tipova respiratora ali i uređaja manje invazivnog karaktera koji bi premostili jaz između maske sa kiseonikom i klasičnog respiratora. Na ovom polju je takođe došla do izražaja saradnja stručnjaka iz različitih oblasti; istraživači iz Univerzitetske bolnice u Londonu (*University College London hospital*) u saradnji sa inženjerima iz Mercedesovog tima formule 1 za manje od nedelju dana napravili su uređaj koji pomaže pacijentima sa respiratornim problemima da lakše dišu. Uređaj, koji je trenutno u fazi kliničkog testiranja u nekoliko londonskih bolnica, omogućava kontinualan dotok vazduha poput klasičnog respiratora, ali nije invazivnog karaktera i ne zahteva sedaciju pacijenata.

Istovremeno, uz napore koji se ulažu u pronalaženje vakcine i lečenje obolelih, važno je sprečiti dalje širenje virusa. U tom smislu bitna su i nova rešenja na polju lične zaštite i dezinfekcije prostora. U Srbiji su istraživači pokušali da odgovore na ovaj izazov, između ostalog i kroz poziv Fonda za inovacionu delatnost. U vrlo kratkom roku, na konkurs se prijavilo oko 300 projekata od kojih je za 12 odobreno finansiranje. Među njima su i prenosivi ozonizator za brzu dezinfekciju javnih površina, zaštitna maska sa izmenjivim *HEPA* filterom za višekratnu upotrebu, mobilni pult za

beskontaktno merenje temperature, višekratna zaštitna odela ali i respirator u čijem je razvoju učestvovao tim istraživača sa Instituta "Mihajlo Pupin".

Da se vratimo na pitanje sa početka teksta: koliki je značaj nauke u savremenom društvu? U normalnim uslovima u nauku se, u poređenju sa nekim drugim oblastima ljudskog delovanja relativno malo ulaže, ali su u teškim situacijama upravo istraživači ti od kojih se očekuju odgovori i rešenja. Da li je potrebno da nastupi kriza ovih razmera da bi se uvideo sav značaj istraživanja, inovacija, naučnog napretka?