BGU COVID-19 Response Effort
Project Highlights

More than 50 projects have now been identified to help mitigate and contain COVID-19 and/or its repercussions. Following are highlights from 15 of them:

**Identifying Antibodies to Inhibit Infection**
Prof. Angel Porgador, Dr. Ran Taube, Dr. Tomer Hertz and other researchers in BGU’s Shraga Segal Department of Microbiology, Immunology and Genetics have formed a consortium to identify neutralizing monoclonal antibodies capable of inhibiting viral entry into target cells. They are also working on developing techniques based on antibody dependent enhancement to predict the severity of COVID-19 and the resultant need for ICU treatment.

The consortium is bringing together experts with specialization in various facets of immunology and virology, who will collaborate with specialists in infectious disease at Soroka University Medical Center. An advanced research lab has been made available to the consortium. This facility is restricted and controlled at all times and workers are under medical surveillance. As a result, experimentation can take place on live SARS-CoV-2 virus samples.

**Self-Sterilizing Facemasks Using Anti-Bacterial Graphene**
Dr. Chris Arnusch, of BGU’s Zuckerberg Institute for Water Research, works on water purification by developing membranes with anti-bacterial and anti-viral properties. For the past five years, he has concurrently been working on air filters with enhanced anti-viral properties. The air filters could then be incorporated into individual face masks that are self-sterilizing. They could also be adapted for ventilation systems in buildings and for use in vehicles. Dr. Arnusch is teaming-up with immunology experts to test the air filters and their anti-viral effectiveness.

**Rapid COVID-19 Detection**
Prof. Gabby Sarusi, Department of Electo-Optics Engineering, is collaborating with a German group to develop a rapid and portable detection system of COVID-19 using resonance spectroscopy. The project includes the design of a special disposable chip that will carry the viruses and a fixed system that will illuminate the chip, analyzing the results within seconds.

**A 5-Minute Definitive Self-Test for Coronavirus**
Dr. Hadar Ben-Yoav is a member of the Department of Biomedical Engineering. Incorporating biology, electrochemistry, engineering, and materials science, he is working on a device that will allow individuals to test themselves for COVID-19 with definitive results within five minutes. He is collaborating with medical researchers with access to and expertise in naturally produced antibodies.
Responding to the Elderly
With a deep concern for the elderly who are especially vulnerable, this project team of geriatric physicians and specialists, emergency medical response personnel, and public health experts (Prof. Mark Clarfield, M.D., Dr. Stav Shapira, Prof. Limor Aharonson-Daniel, and Dr. Paula Feder-Bubis) have already begun to establish a system to identify, map and assist elderly people in need of care in the event of a natural disaster. This initiative is being repurposed for the current corona crisis, and is incorporating innovative technological applications to customize an effective care system for the elderly.

Distress, Compliance and COVID-19
A team of researchers spearheaded by Prof. Golan Shahar from the Department of Psychology is studying the behavioral unfolding of COVID-19 in Israel. The team has contacted a representative sample of Jewish Israeli adults prior to the entry of COVID-19 to Israel, and is assessing them every week, focusing on their anxiety, perception of the crisis, attitudes toward the Ministry of Health, and compliance with the ministry’s instructions. Four assessments have already been conducted, and many more are planned during this unparalleled, sophisticated study. Results will inform policy makers on emotional responses of the Israeli public in the face of the ongoing medical crisis.

Medical Emergency Drones
Dr. Jessica Cauchard is a member of the Department of Industrial Engineering and Management. Dr. Stav Shapira is a member of the School of Public Health. They are currently conducting research that focuses on integrating drones in emergency healthcare and delivering relief supplies such as food, water and medications to vulnerable populations during large-scale public health emergencies, such as the current COVID-19 eruption. The study is exploring the socially sensitive acceptance of medical relief drones among older persons and ethnic minorities. Their ultimate goal is to develop effective strategies for minimizing exposure among at-risk populations, as well as to prevent the potential deterioration of patients with chronic illness during acute events such as a viral pandemic.

Bioinformatics and Algorithms Designed for Coronavirus
Dr. Nir Nissim, of BGU’s Cyber Security Research Center, is an expert in machine-learning and bioinformatics. He is customizing computer algorithms for COVID-19 by incorporating medical data (gender, age, blood stats) and time stamps. Dr. Nissim is collaborating with medical researchers with access to the appropriate data sets.

Automatic Sanitizer for Public Objects
Graduate students in BGU’s Department of Mechanical Engineering are building a device that can be attached near any door knob/handle, elevator buttons and other high-access objects that will automatically sanitize them (using alcohol or other substance) after the object is touched. This device can be relatively inexpensive and can be easily integrated into public institutions, hospitals and malls to help minimize the spread of viruses. The project is a collaboration with Prof. Ilana Nisky and Dr. David Zarrouk.

AI Analysis of Verbal Characteristics to Aid in Early Diagnosis
Vocal characteristics of speech are affected by emotional and physical states. Prof. Julie Cwikel, of BGU’s Center for Women's Health Studies and Promotion, and Dr. Tal Sobol-Shikler, a researcher in artificial intelligence (AI) and machine-learning, are using AI to identify in real time changes in vocal patterns that can be used as an early warning system for detecting emotional or physical distress that requires rapid intervention. The system will monitor both medical personnel who are working at or over capacity and persons in isolation who may be developing symptoms.
Analyzing COVID-19 in Wastewater
Dr. Oded Nir, Zuckerberg Institute for Water Research, is testing the occurrence of COVID-19 in wastewater treatment plants as a complementary method to assess the progress and dynamics of the epidemic. He will also test the effectiveness of standard and advanced wastewater treatment methods in mitigating the virus. Prof. Ariel Kushmaro, Department of Biotechnology Engineering, is studying the general distribution of COVID-19 and corona virus viromes abundance and diversity in the urban sewage system and water cycle.

Drug Repurposing Using Machine Learning
Applying existing drugs to target COVID-19 could dramatically shorten the time and reduce the cost compared to new drug discovery. Prof. Lior Rokach, Department of Software and Information Systems Engineering, is overseeing a team to develop supervised antiviral drug repurposing and combinations using a multimodal machine learning model. The model will input various known aspects of drugs, such as molecular structure, drug targets, related human proteins, known indications, side effects, and more. Potential drugs and drug combinations that might be useful in treating the virus will be ranked.

Examining the Antiviral Components of Microalgae
Microalgae is a potent and renewable resource of antiviral compounds. Prof. Inna Khozin-Goldberg, French Associates Institute for Agriculture and Biotechnology of Drylands, will produce, fractionate and test the activities of microalgae-derived compounds.

Risk Perception and Impact on Tourism and Travel
Prof. Yaniv Poria is researching how the tourism industry can overcome major upheavals such as the coronavirus crisis, including exploring solutions to address the economic and social impact of massive employee layoffs. Dr. Galia Fuchs is examining tourism, tourist behavior, travel, and vacation consumption patterns in light of risk perception. Her work incorporates the process of forming risk reduction strategies, rationalization and tactics to minimize danger when visiting highly volatile destination points. Both researchers are members of the Guilford Glazer Faculty of Business and Management.

New Media and Healthcare Professionals’ Experience
Dr. Odeya Cohen is a member of Department of Nursing and serves as the head of the masters’ program in emergency medicine. She is collaborating with communication experts and researchers from the Department of Software and Information Systems Engineering to (1) crosscheck formal publications and conversations in social media on a timeline related to coronavirus crisis phases and (2) understand the experience and difficulties of professional health teams worldwide by analyzing the narrative that is reflected in social media.

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