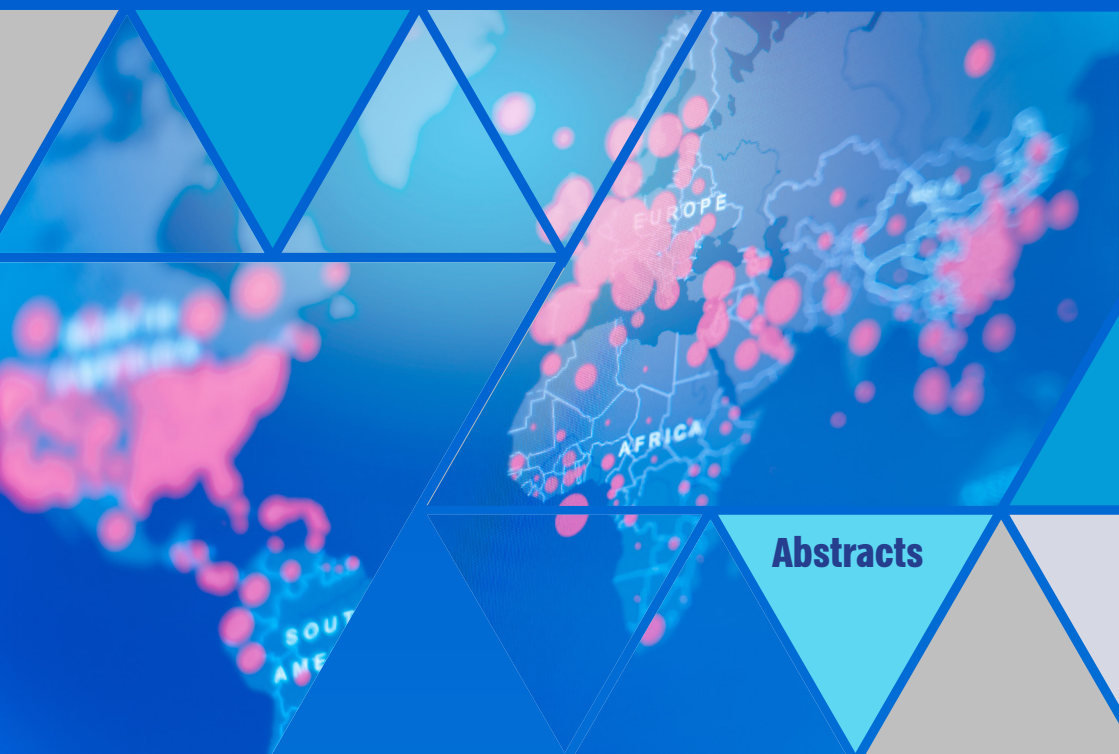




The Center for Combating Pandemics
Tel Aviv University

1st conference of the **Tel Aviv University Center for Combatting Pandemics (TCCP)**



Abstracts

The Steinhardt Museum of Natural History
Tel Aviv University

Wednesday, March 30, 2022

Abstracts

The Steinhardt Museum of Natural History

Tel Aviv University, Wednesday, March 30, 2022

08:30-09:00 **Reception hall** | registration and coffee

09:00-09:10 **Auditorium** | **OPENING STATEMENTS:**

Prof. Dan Peer, TAU VP

Prof. Itai Benhar, Director of the TCCP

THE FIRST ANNUAL CONFERENCE OF THE TAU CENTER FOR COMBATING PANDEMICS

Tel Aviv University's Center for Combating Pandemics (TCCP) brings together the university's top experts in all scientific disciplines, with the goal of promoting research and assisting the Israeli government to cope with crisis situations stemming from epidemic outbreaks.

Established in September 2020 against the backdrop of the worldwide devastation and disruption due to COVID-19, the Center builds on TAU's innovation record, interdisciplinary culture, and strong links with hospitals, industry and government. Members and affiliates of the multidisciplinary Center include experts from all 9 faculties of Tel Aviv University, including in the fields of epidemiology, public health, biology, mathematics, computer sciences, physics, statistics, economics, engineering, urban planning, sociology, psychology, management, education, and others.

The program of today's conference program is a real testimony to our diversity and multidisciplinary.

I welcome you to the 1st annual conference of the TCCP.

I thank the donors of the center for making its existence and activities possible, and I thank you for joining us in this event.

09:10-09:50 **Auditorium** | **Plenary Lecture:**

Prof. Galia Rahav, Sheba Medical Center

COVID-19: PAST, PRESENT AND FUTURE

09:50-10:10 **Reception hall** | Coffee break

SESSION 1

CLINICAL ASPECTS OF COVID-19

Auditorium | Chair: **Daniel Cohen**, Faculty of medicine,
Tel Aviv University

10:15-10:35 Ori Elkayam, Tel Aviv Sourasky Medical Center

COVID19 IN PATIENTS WITH AUTOIMMUNE INFLAMMATORY RHEUMATIC DISEASES: PREVALENCE AND PREVENTION

Victoria Furer, Tali Eviatar, Hagit Peleg, David Hagin, Tal Freund, Daphna Paran, David Levartovsky, Ilana Kaufman, Adi Broyde, Ofir Elalouf, Ari Polachek, Joy Feld, Amir Haddad, Tal Gazzit, Muna Elias, Nizar Higaz, Fadi Kharouf, Smadar Gertel, Sara Pel, Sharon Nevo, Devy Zisman, Ori Elkayam

Methods

A prospective multicenter study investigated serum anti-SARS-CoV-2 S1/S2 IgG titer at 2-6 weeks (AIIRD n=720, controls n=122) and 6 months (AIIRD n=628, controls=116) after the 2nd vaccine, and 2-6 weeks after the 3rd vaccine doses (AIIRD n=169, controls n=45). T-cell immune response was evaluated in 28 patients and 9 controls prior and after the 3rd vaccine dose.

Results

The two-dose vaccine regimen induced a higher humoral response in controls compared to patients, post-vaccination seropositivity rates of 100% vs 84.72%, $p<0.0001$, and 96.55% vs 74.26%, $p<0.0001$ at 2-to-6 weeks [1] and at 6 months, respectively. The 3rd vaccine dose restored the seropositive response in all controls and the majority of AIIRD patients (100% vs 80.47%, $p=0.0028$). Patients treated with methotrexate monotherapy, anti-cytokine biologics, abatacept, and JAK inhibitors restored the humoral response after the 3rd vaccine compared to only third of those treated with rituximab, which was associated with a 14.3-fold risk for a negative humoral response, $p\leq 0.0001$. Cellular immune response was preserved prior to and after the 3rd vaccine dose and was similar to controls.

Conclusions

Over 6 months, the two dose-regimen BNTb262 vaccination was associated with a similar extent of the humoral immune response waning in AIIRD patients and controls. The 3rd vaccine dose restored the response in all controls and the majority of patients. Treatment with rituximab significantly impaired humoral response at all time points.

10:35-10:55 **Shiran Shapira, Tel Aviv Sourasky Medical Center**

EXOSOMES DISPLAYING CD24 (EXO-CD24) IN COVID-19: FROM IDEA TO PATIENTS CURE

A small but significant proportion of patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) develop life threatening disease, and a pathologic hyper-inflammatory state known as “the cytokine storm”. EXO-CD24 combines the immune checkpoint protein CD24 as the drug, with exosomes as the carrier.

Objective: To evaluate the safety of EXOCD24 in patients with moderate/severe COVID-19 disease

Design: The objective of this study was to evaluate the safety and efficacy of EXO-CD24 in-vitro, in-vivo and in clinical trials. This phase Ib/Ila, prospective, single-center trial was conducted at Tel-Aviv medical center. Thirty-five eligible patients, mostly comprised of males (65.7%), with a mean age of 57.5 (± 11.46) years were enrolled in four dose cohorts. Exosomes were given once daily for 5 days as add-on to standard of care. A median follow-up of 14 (95% CI, 12-26) months. A total of 35 matched historic controls were used for comparison

Results: In-vitro, EXO-CD24 reduced cytokine/chemokine secretion from DAMPS but not PAMPs. In-vivo, EXO-CD24 was found to be safe in mice following single and multiple exposures and effective in various diseases associated with immune-system over-activation. A single-arm phase Ib/Ila study, demonstrated the safety of EXO-CD24 for the treatment of COVID-19.

Administration of the drug resulted in a rapid reduction in inflammatory markers with concomitant improvement of lymphopenia. Compared to matched historical controls treatment decreased the duration of hospitalization, need for mechanical ventilation and mortality across all groups.

Conclusions: EXO-CD24 represents a game-changer as it decreases inflammation while allowing pathogen clearance.

11:00-11:20 **Daniel Cohen, Faculty of Medicine, Tel Aviv University**

CORRELATES OF IMMUNE RESPONSE AND RISK OF REINFECTION WITH SARS-COV-2 VARIANTS IN RECOVERED COVID-19 INDIVIDUALS

COVID-19 pandemic has been so far responsible for 6 million deaths worldwide. There are also around 400 million individuals who recovered from the disease. It is of much importance to understand to what extent SARS-Cov-2 laboratory-confirmed infection protects against reinfections (asymptomatic, mild or severe disease and death) when these are caused by the homologous initially infective viral strain or by

subsequently emerging variants of concern (VOC). To date many of the recovered COVID-19 individuals were also vaccinated with one or more vaccine doses (in Israel almost exclusively with doses of the BNT162b2 COVID-19 mRNA vaccine) and the effectiveness of hybrid immunization has to be assessed as well.

The immune response to natural infection induced by the original Wuhan SARS-CoV2 strain and the new VOCs (Alpha, Beta, Gamma, Delta, and Omicron) has been used as reference for the development of the current anti-COVID-19 vaccines and immunotherapeutics. Host and virus-related factors impact the immune response to SARS-CoV-2. The interplay between protection conferred by infection (enhanced or not by vaccines) or vaccines alone and the magnitude and functionality of the humoral and cellular immune responses is continuously assessed toward the establishment of putative immunological correlates of protection at individual and population levels. This will be critical for upcoming non-inferiority studies of the new generation of COVID-19 vaccines when the performance of placebo-controlled efficacy trials will not be ethically acceptable.

Aspects related to SARS-CoV-2 infection and reinfection mentioned above will be exemplified with data from cohort studies of recovered COVID-19 individuals that we have completed or are underway.

11:20-11:40 Daniel Nevo, Faculty of Exact Sciences, Tel Aviv University

YOU CAN'T ALWAYS GET WHAT YOU WANT: ESTIMATING VACCINE CAUSAL EFFECTS FROM OBSERVATIONAL DATA

Following the development and distribution of vaccines, trustworthy and carefully considered analyses have shown to be paramount. Nevertheless, the extent to which causal conclusions can be drawn has been central to the public debate. In this talk, I will highlight challenges in interpreting vaccine effectiveness analysis results as causal and discuss remedies for some of these challenges. The discussion will be accompanied by three vaccine effectiveness observational studies I have been involved in, each illustrates different type of challenges in selecting the appropriate analysis and interpreting its results: vaccine effects among inflammatory bowel disease patients, vaccine effects among pregnant women, and a study of the indirect protection of unvaccinated children through parental vaccination.

11:40-12:00 **Khitam Muhsen, Faculty of Medicine, Tel Aviv University**

COVID-19 VACCINES EFFECTIVENESS AMONG RESIDENTS OF LONG-TERM CARE FACILITIES

Khitam Muhsen, Nimrod Maimon, Ami Mizrahi, Boris Boltzansky, Omri Bodenheimer, Zafira Hillel Diamant, Lea Gaon, Dani Cohen, Ron Dagan

Residents of long-term care facilities (LTCFs) comprise the most vulnerable groups for severe and fatal COVID-19. To protect this population, the Israeli government launched a designated national task force by the beginning of April 2020, for the containment of outbreaks, via routine SARS-CoV-2 screening to health care workers and LTCF residents (the “Senior Shield” taskforce). Senior-Shield taskforce is also responsible of COVID-19 vaccination in these facilities.

We evaluated the vaccine effectiveness (VE) of BNT162b2 COVID-19 vaccine against overall infection, hospitalizations for mild-moderate and severe-to-critical COVID-19 and COVID-19 related deaths among residents of LTCFs, during the surge of the Delta variant (study 1 [August-October 2021]) and Omicron variant (study 2 [January-February 2022]).

In study 1, we compared the cumulative incidences of overall infection, COVID-19 related hospitalizations for mild-moderate and severe-to-critical COVID-19 and deaths among residents who received 3 doses BNT162b2 vaccine (N=16,082) to recipients (N=2529) of 2 doses ≥ 5 months earlier.

In study 2, we compared the incidences of these endpoints among recipients of 4 doses (N=24,124) to those who received 3 doses only (N=11,694) ≥ 4 months earlier. We obtained hazard ratios (HRs) from multivariable Cox regression models. VE was calculated as $(1 - HR) * 100$

The adjusted VE of the third dose vs. 2 doses of BNT162b2 vaccine against the Delta variant was 89% (95% CI 85%, 93%) for infection, and 93% (85%, 97%), 90% (76%-96%) and 96% (84%, 99%), for hospitalization due to mild-to-moderate, severe illness and deaths respectively, ≥ 7 days following vaccination with the third dose. The adjusted VE (95% CI) of the fourth dose of BNT162b2 vaccine vs. 3 doses against infection with Omicron was 44% (40%, 47%) and 74% (67%, 80%) and 77% (69%, 82%) against hospitalizations for mild-moderate and severe-critical illness, respectively, and 73% (50%, 80%) against deaths.

In conclusion periodic booster vaccination with the original formulation of BNT162b2 vaccine provided high protection against infection and severe illness caused by the Delta variant among the frail population of residents of LTCFs. The VE of the fourth dose against the Omicron variant was lower, but still high against COVID-19 hospitalizations and deaths.

12:00-12:20 **Yftach Gepner, Faculty of Medicine, Tel Aviv University**

SAFETY ASSESSMENT TO A NEW VACCINE - MOVING FORWARD TO OBJECTIVE EVALUATION

Background: Safety of vaccines primarily based on self-reported questionnaires, despite the tremendous technological advances in recent years of continuous and objective assessment of physiological measures.

Methods: We conducted a prospective observational study during the mass vaccination campaign in Israel. 160 participants >18 years who were not previously found to be COVID-19 positive and who received the BNT162b2 COVID-19 vaccine were equipped with an FDA-approved chest-patch sensor and a dedicated mobile application. The chest-patch sensor continuously monitored: heart rate, blood oxygen saturation, respiratory rate, systolic and diastolic blood pressure, pulse pressure, mean arterial pressure, heart rate variability, stroke volume, cardiac output, cardiac index, systemic vascular resistance and body temperature. The mobile application collected daily self-reported questionnaires on local and systemic reactions, sleep quality, stress levels, physical activity, and mood levels.

Results: We identified continues and significant changes following vaccine administration in nearly all vitals. Markedly, these changes were observed even in presumably asymptomatic participants who did not report any local or systemic reaction. Changes in vitals were more apparent at night, in younger participants, and in participants following the second vaccine dose.

Conclusion: The considerably higher sensitivity of wearable sensors can revolutionize clinical trials by enabling earlier identification of abnormal reactions with fewer subjects.

SESSION 2

SOCIAL ASPECTS OF COVID-19

ERDI Gallery | Chair: **Aeyal Gross**, Faculty of Law, Tel Aviv University

10:15-10:35 **Carmit Katz**, Bob Shapell School of Social Work, Faculty of Social Sciences, Tel Aviv University

CHILD MALTREATMENT DURING COVID-19: INTERNATIONAL EXAMINATION

Two years have passed since COVID-19 began disrupting systems. Although children are not considered a risk population for the virus, there is accumulating knowledge regarding children's escalating risk for maltreatment during the pandemic. The current study is part of a larger initiative using an international platform to examine child maltreatment (CM) reports and child protective service (CPS) responses in various countries. The study presents data across 12 regions via population data (Australia [New South Wales], Brazil, United States [California, Pennsylvania], Colombia, England, Germany, Israel, Japan, Canada [Ontario, Quebec, South Africa]).

Across all the countries, COVID-19 had a substantial negative impact on the operation of CPSs and the children and families they serve by disrupting in-person services. New reports of CM varied across the regions. In some, the impact of COVID-19 on CPS was low to moderate, while in others, more significant changes created multiple challenges for CPS services.

COVID-19 created a barrier for CPS to access and protect children.

The dramatic variance between the regions demonstrated how social, economic and structural contexts impact both CM reports and CPS responses.

10:35-10:55 **Isaac Sasson**, Department of Sociology and Anthropology, Faculty of Social Sciences, Tel Aviv University

DEMOGRAPHIC CHALLENGES AND INSIGHTS ON COVID-19 MORTALITY

Age is the most fundamental demographic variable.

Yet, early accounts of the COVID pandemic failed to incorporate age in population-level statistics of morbidity and mortality.

To address this lacuna, the BMI Demography Lab at Tel Aviv University joined in April 2020 an international collaborative effort (COVERAGE-DB) to collect and harmonize data on COVID-19 cases and deaths by age.

In addition to describing the international database, made available to the research community, the talk will showcase two demographic insights on the COVID pandemic based on these data: (1) understanding how population age structure accounts for variation in COVID mortality across countries; (2) contextualizing the relationship between COVID mortality and age in relation to other causes of death.

11:00-11:20 Zehava Solomon, Faculty of Social Sciences, Tel Aviv University

תגובות נפשיות לקורונה: תפקידן של טראומות קודמות

האם מי שחוו בעבר טראומות קשות מוכנים יותר להתמודד בהצלחה עם לחצי מגפת הקורונה ממי שלא חוו טראומות קשות בעברם?
בהרצאה תבחן שאלה זו לאור ממצאי מחקר אורך בן 29 שנים שבחן בחמישה גלים פדויי שבי ממלחמת יוה"כ.
בחנו האם שבי במלחמה והתסמונת הפוסט טראומטית שעלולה להתפתח בעקבותיו תורמים לפחד מקורונה, לתגובת דחק, לתפיסת בריאות, לגיל סובייקטיבי ולמידת השימוש בחומרים ממכרים בעת מגפת הקורונה.
פדויי שבי ולוחמים דומים ממלחמת יוה"כ רואינו 42,35,18 ו-47 שנים אחרי המלחמה. בעוד פדויי השבי ומשתתפי קבוצת הביקורת לא נבדלו אלה מאלה ברמת החשיפה והאיום לקורונה, פגיעות מוגברת של פדויי השבי נחשפה בעת המגפה והתבטאה בפחד רב יותר מהקורונה, תגובת דחק אקוטי עוצמתית יותר, תפיסת בריאות פחותה וגיל סובייקטיבי גבוה וכן בשימוש מוגבר יותר בחומרים ממכרים בעת המגפה. הממצאים מצביעים על החשיבות של התסמונת הפוסט טראומטית, בקרב פדויי השבי, בהסתגלות למשבר הקורונה. נראה שטראומה קשה בבגרות הצעירה מותירה צלקות והופכת את הניצולים לפגיעים למצבי דחק גם שנים רבות מאוחר יותר.

11:20-11:40 Aeyal Gross, Faculty of Law, Tel Aviv University

"כמו חלום בלהה דיסטופי" - זכויות אדם ודמוקרטיה בצל משבר הקורונה בישראל והעולם

צעדים רבים שננקטו כתגובה למגפת הקורונה פגעו בזכויות אדם בצורות ישירות ועקיפות. מאמר זה בוחן את הפגיעות בזכויות אדם בישראל שנעשו בשם המאבק בקורונה ואת הכלים המשפטיים דרכם נעשו הפגיעות. המאמר בוחן בהרחבה את הדרך שבה התמודד בנ"ץ עם פגיעות השונות על זכויות רווחה. המאמר בוחן בהרחבה את הדרך שבה התמודד בנ"ץ עם פגיעות אלו בעתירות רבות שהגיעו לפתחו. בגל הראשון של העתירות שעסקו בסגרים ובהכרזה על "אזורים מוגבלים", דחה בנ"ץ את העתירות השונות תוך שהוא נוקט בגישה של הנסגת דעת כלפי הרשויות. פסיקות אלו התאפיינו לרוב באיזון אופקי בו הציב בנ"ץ את הפגיעה בזכויות שנפגעו אל מול הזכות לחיים. המאמר מבקר גישה זו ומציע במקום עריכה של איזון אנכי של הפגיעה אל מול בריאות הציבור – גישה שתאפשר לקחת בחשבון שיקולים רחבים כולל אלו של השפעת הסגר על רווחה ובריאות. בגל שני של פסיקות, שניתנו בשלב מאוחר יותר פסל בנ"ץ הן תקנות שהגבילו הפגנות והן תקנות שהגבילו כניסה לישראל – ויציאה ממנה – של אזרחים ישראלים. אף כי בג"ץ התערב במקרים אלו התערבותו הוגבלה לבחינה של מידתיות

האמצעים, וכך נמנעה הכרעה בשאלת תכליתם. בהמשך לכך דן המאמר בפוליטיזציה של הבריאות, ועל הדרך שבה השתלב המשבר הרפואי במשבר חוקתי שנוצר עקב שלוש מערכות בחירות ללא הכרעה. הן הבטחוניזציה והן הפוליטיזציה של הבריאות אינם ייחודים לישראל. המאמר דן בדרך בה ממשליות הבריאות הגלובלית מתאפיינת בבטחוניזציה של הבריאות שבאה לידי ביטוי בתקנות הבריאות הבינלאומיות של ארגון הבריאות העולמי. כמו כן נדונה הדרך שבה מנהיגים סמכותניים ופופוליסטים ברחבי העולם השתמשו במגפה לביצור כוחם תוך פניה לשיח הביטחוני.

11:40-12:00 **Miri Shefer Mossensohn, Faculty of Humanities, Tel Aviv University (recorded lecture)**

לברוח או לא לברוח? תגובות למניפות במזרח התיכון המוסלמי והשפעותיהן ארוכות הטווח

במזרח התיכון המוסלמי הטרור-מודרני מגיפות היו מציאות נורמטיבית. מחלות מדבקות היו שכיחות, ובני האיזור ציפו לחוות מציאות זו במהלך ימי חייהם. מגיפת הדבר הגדולה שפרצה באימפריה הביזנטית במאה ה-6, «מגיפת יוסטיניאנוס», הפילה קורבנות בקרב הערבים המוסלמים שכבשו את המזרח התיכון במאה ה-7. מגיפת הדבר של המאה ה-14 הפכה אנדמית במזרח התיכון והתפרצה שוב ושוב באופן מקומי עד המאה ה-18. מעבר למגיפות הדבר הקטלניות במיוחד, היו שכיחות במזרח התיכון מגיפות שהתבטאו כמחלות עור, עיניים, מעיים, ועוד ועוד. מציאות כזו מחייבת התמודדות; מה עשו בני האיזור וכיצד הבינו את אשר הם עושים? בהתבסס על מסמכים ארכיוניים, פרוטוקולים של בתי המשפט וכרוניקות מקומיות, נתחקה בהרצאה זו אחר הצעדים בפועל של תושבי המזרח התיכון, מברחה ועד סגר עצמי, מפטליזם ועד תפילה ותחנונים, כיצד הסבירו לעצמם את התועלת בצעדים השונים מבחינה רפואית ודתית, ומה היו המשמעויות החברתיות והתרבותיות ארוכות הטווח.

12:00-13:00 **Lunch for Auditorium audience will start at: 12:20**

SESSION 3

BIOLOGY OF SARS-COV-2

Auditorium | Chair: **Adi Stern**, Faculty of Life Sciences,
Tel Aviv University

13:00-13:20 **Jonny Gershoni**, Faculty of Life Sciences, Tel Aviv University

VAXED – THE REAL CHALLENGE

22/2/22 was a special date, Israel passed the 10,000 deaths mark for COVID-19 victims! This is certainly a grim and sad reality - no one should die from a preventable disease.

The Corona vaccination Campaign began in December 2020 and Israel was the first country in the world to be 50% vaccinated by March 2021.

Yet since then, vaccination has been met with opposition, suspicion, fake news, conspiracy theories and hesitancy for multiple reasons. How is it that over 50 countries, including most of Europe, have greater vaccine coverage compared to our 70% as of February 22?

Agreed, having accessible vaccines is important, however protection requires that people get jabbed! VaxEd, educating people about vaccines and their use and importance is imperative in our fight against emerging pandemics.

Educating our kids about vaccines should start early on - a critical imperative in our preparedness towards fighting the next pandemic!

13:20-13:40 **Natalia Freund**, Faculty of Medicine, Tel Aviv University

ANTIBODY RESPONSES TO SARS-COV-2

Ruofan Li, Michael Mor, Bingting Ma, Moshe Dessau, Meital Gal-Tanamy, Ben A. Croker, Ye Xiang, and Natalia T. Freund

As new variants of SARS-CoV-2 continue to emerge, it is important to assess the neutralizing capabilities of naturally elicited antibodies against the virus. We evaluated the activity of nine anti-SARS-CoV-2 monoclonal antibodies (mAbs), isolated from convalescent donors infected with the Wuhan-Hu-1 strain, against the SARS-CoV-2 variants of concern (VOC) Alpha, Beta, Gamma, Delta, and Omicron. We first tested binding to an array of spike receptor binding domain (RBD) proteins containing single, double, and triple mutations, as well as cell-expressed spike proteins from VOCs. We found that mAbs specific to the ACE2 binding site (ACE2bs) neutralized potently only the Wuhan-Hu-1 strain and the Alpha variant, while most of them lost their ability to neutralize Beta, Gamma, Delta and Omicron VOCs as pseudoviruses, or as the authentic SARS-CoV-2 VOCs in culture. On the other hand, two mAbs that did not compete

with ACE2 for binding to RBD were less sensitive to viral mutations, retaining potent neutralizing ability against all tested VOCs. To investigate the various mechanisms of anti-SARS-CoV-2 mAb neutralization and viral escape, we performed epitope characterization of four neutralizing mAbs. The structures of two ACE2bs mAbs TAU-2303 and TAU-2212 with the SARS-CoV-2 spike trimer and RBD, were solved using Cryo-electron microscopy and X-ray crystallography.

The structures reveal that while TAU-2303 assumes a similar mode of binding to that between of the ACE2 receptor, TAU-2212 mAb binds an exclusively quaternary epitope, and exhibits a unique, flexible mode of neutralization that involves transitioning between five different conformations, with both arms of the antibody recruited for cross-linking intra- and inter-spike RBD subunits. We then used phage display random libraries, molecular docking and site directed mutagenesis to decipher the epitopes of the two non-ACE2bs mAbs TAU-1109 and TAU-2310, revealing new neutralizing sites, located distantly from the ACE2 recognition area. Our study provides new functional-structural understanding about how naturally produced antibodies neutralize SARS-CoV-2 and its emerging variants.

13:40-14:00 Yariv Wine, Faculty of Life Sciences, Tel Aviv University

THE LONGITUDINAL KINETICS OF THE ANTIBODY RESPONSE IN COVID-19 RECOVERED PATIENTS

The idea guiding vaccinology is that an ideal vaccine should induce immunity similar to the immunity produced by natural infection.

A vaccine is designed to “train” the immune system in a way that it will mimic the stimulation necessary for immune development, yet not produce active disease. Understanding the persistence of antibodies in patients following recovery from natural infection with SARS-CoV-2 will help to highlight the differences between the breadth of the antibody responses following natural infection and vaccination and may inform us whether the vaccine “training” will effectively stimulate the immune system to provide long-lasting immunity.

We followed the persistence of antibodies in COVID-19 recovered patients and found an association between the antibody levels in proximity to recovery and the rate of decay.

In addition, we found that the decay rate of antibodies in BNT162b2 vaccinees was significantly faster than that in recovered patients, suggesting that there are fundamental differences between the mechanisms of activation of the adaptive arm of the immune response following vaccine and natural infection. While natural infection involves full systemic activation, this activation may be incomplete with an mRNA vaccination, thereby affecting the capacity of the immune system to maintain an antibody reservoir over time.

14:00-14:20 **Ron Shamir**, Faculty of Exact Sciences, Tel Aviv University

EARLY PREDICTION OF DETERIORATION IN COVID-19 INPATIENTS

Joint work with Omer Noy, Dan Coster, Maya Metzger (TAU), Itay Atar, Shani Shenhar-Tsarfaty, Shlomo Berliner, Ori Rogowski (Ichilov) and Galia Rahav (Sheba).

It is currently a clinical challenge to predict which COVID-19 hospitalized patients will deteriorate.

Several studies suggested that taking early measures for treating patients at risk of deterioration could prevent or lessen condition worsening and the need for mechanical ventilation.

We developed a model for early prediction of patients at risk for clinical deterioration by retrospective analysis of electronic health records of COVID-19 inpatients at the two largest medical centers in Israel.

Our model employs machine learning methods and uses routine clinical features. Deterioration was defined as a high NEWS2 score adjusted to COVID-19.

In the prediction of deterioration within the next 7-30 hours, the model achieved an area under the ROC curve of 0.84 and an area under the precision-recall curve of 0.74.

In external validation of data from a different hospital, it achieved values of 0.76 and 0.7, respectively.

14:20-14:40 **Adi Stern**, Faculty of Life Sciences, Tel Aviv University

THE EVOLUTIONARY FATE OF SARS-CORONAVIRUS-2 VARIANTS

In some immunocompromised patients with chronic SARS-CoV-2 infection, dramatic adaptive evolution occurs, with substitutions reminiscent of those in variants of concern (VOCs). Here, we searched for drivers of VOC-like emergence by consolidating sequencing results from a set of twenty-seven chronic infections. Most substitutions in this set reflected lineage-defining VOC mutations, yet a subset of mutations associated with successful global transmission was absent from chronic infections.

The emergence of these mutations might dictate when variants from chronic infections can dramatically spread onwards. Next, we tested the ability to predict antibody-evasion mutations from patient- and viral-specific features and found that viral rebound is strongly associated with the emergence of antibody-evasion.

We found evidence for dynamic polymorphic viral populations in most patients, suggesting that a compromised immune system selects for antibody evasion in particular niches in a patient's body. We suggest that a trade-off exists between antibody evasion and transmissibility that potentially constrains VOC emergence and that monitoring chronic infections may be a means to predict future VOCs.

POST DOC FLASH SESSION

14:40-14:45 Keren Constantini, Faculty of Life Sciences, Tel Aviv University, post doc

SHORT-TERM EFFECTS OF BNT162B2 MRNA COVID-19 VACCINATION ON CONTINUOUSLY MEASURED PHYSIOLOGICAL MARKERS

Background: With the necessity to rapidly develop, and approve, a vaccination against COVID-19, there was a lack of scientific evidence on objective physiological changes post-vaccination.

Methods: This study evaluated the short-term effects of the BNT162b2 COVID-19 vaccine on physiological parameters using an FDA-approved chest-patch sensor that continuously measured 13 physiological indices. We followed a cohort of 160 participants who received the second dose of the BNT162b2 vaccine for 96hr: from 24hr prior to vaccine administration, until 72hr after the inoculation.

Results: Following vaccine administration, nearly all physiological parameters showed significant ($p < 0.05$) changes compared to baseline. For example, heart rate, systolic blood pressure and diastolic blood pressure increased by 9.9%, 3.9%, and 3.8%, respectively. Following the initial 48hr, these changes faded, with measurements returning to baseline levels. Participants >60 years old demonstrated milder, albeit not significant, alterations than those <60 years old in nearly all indices. No sex differences were observed. Additionally, physiological changes were evident even in asymptomatic participants who did not report any (subjective) local or systemic reactions.

Conclusion: Our findings emphasize the importance of using technological advances to measure physiological signs continuously and objectively in clinical trials to more accurately understand the invisible impact of vaccines on the various bodily systems.

14:45-14:50 **Yair Daon, Faculty of Medicine, Tel Aviv University, post doc**

POOLING STRATEGIES FOR PCR TESTING OF SARS-COV-2

I will present a method for improving accuracy and throughput of SARS-CoV-2 tests. I will show how Bayesian experimental design gives rise to DOPE (D-Optimal Pooling Experimental design), a novel testing scheme for SARS-CoV-2. First, I will present the Bayesian formulation of SARS-CoV-2 testing. Then, I will define a Bayesian D-optimal design as maximizing information gain. I will conclude with simulation results demonstrating DOPE's superiority over several common benchmarks.

14:50-14:55 **Matan Ben Zion, Exact Sciences, post doc, Soft and Complex Matter Lab, Department of Condensed Matter Physics, School of Physics and Astronomy and Center for Physics and Chemistry of Living Systems, Tel Aviv University**

TOWARDS VIRION SEQUESTERING USING POLYMERIC MULTIVALENT CARRIERS

Matan Ben Zion, Yoav Lahini

Typical drug development relies on atomic scale matching of a molecule to a single antigen epitope. Such an approach suffers from slow turnaround times, requiring detailed molecular scale characterization of the antigen, as well as design and synthesis of a highly matching molecule.

The process is particularly exhaustive, as the affinity of a single molecule tends to be low, with poor efficacy, requiring a high dosage, and leading to side-effects from off-target binding. We propose a novel approach for anti-viral drug design and viral detection by geometrically matching a polymeric multivalent carrier platform (PMC) to target virions.

The PMC platform can tether several (N) antiviral molecules to an extended substrate, with an exponential increase in binding effectiveness even for a partially specific drug-molecule.

The binding free energy, ΔG , scales as the number of binding sites, $\Delta G_{PMC} \propto N$, instead of the much slower logarithmic increase for isolated molecules $\Delta G_{ISO} \propto \log(N)$.

In a tissue where the viral load is greatest, the PMC can agglutinate virions to trigger phagocytosis of the innate immune system.

SESSION 4

MODELING COVID-19 SPREAD

ERDI Gallery | Chair: **Dan Yamin**, Faculty of Engineering,
Tel Aviv University

13:00-13:20 **Dan Yamin**, Department of Industrial Engineering, Faculty of Engineering, Center for Combatting Pandemics, Tel Aviv University

TERMINATING PANDEMICS WITH WEARABLE DEVICES

Various efforts for early detection and prompt isolation of the COVID-19 pandemic are pivotal to breaking transmission chains and containing outbreaks. We developed a multi-layer modeling approach to detect infection with COVID-19 in real-time. To achieve this goal, we conduct a prospective observational trial in a cohort of >4,000 participants for a horizon of two years. Participants are equipped with smartwatches, fill in a daily questionnaire on wellbeing and observed symptoms via a dedicated mobile application we developed, and grant access to their electronic medical records for the past ten years. In addition, we utilize primary data from the electronic medical records of 250,000 anonymized members of Maccabi health services. In the talk, I will present our modeling architecture and provide general methodological 'tips' for a useful implementation of anomaly detection in healthcare settings.

Bio: Dr. Yamin (Ph.D.) is a faculty member at the Department of Industrial Engineering at Tel Aviv University, and a former faculty member in the Center of Infectious Disease Modeling and Analysis, in the school of public health at Yale University. Dr. Yamin's studies contributed in shaping health policy against influenza in Israel, and offered novel strategies to eliminate Ebola that were implemented in Liberia. He recently advised the Ministry of Health and the Ministry of Finance to identify hotspots and apply effective strategies against the COVID-19 Pandemic in Israel. The research of this talk is funded by Dr. Yamin's European Research Council (ERC) grant #949850

13:20-13:40 **Eran Toch**, Faculty of Engineering, Tel Aviv University

HOW MASS SURVEILLANCE CROWDS OUT INSTALLATIONS OF COVID-19 CONTACT TRACING APPLICATIONS

During the COVID-19 pandemic, many countries have developed contact tracing technologies to curb the spread of the disease by locating and isolating people who have been in contact with coronavirus carriers.

Subsequently, understanding why people install and use contact tracing applications is becoming central to their effectiveness and impact. This paper analyzes the Israeli situation in which centralized mass surveillance technology was deployed simultaneously with a voluntary contact tracing mobile app. We use this simultaneous deployment in Israel as a natural experiment that tests how attitudes toward the mass surveillance tool affect people's installation of the contact tracing app. Based on a representative survey of Israelis ($n=519$), our findings show that positive attitudes toward mass surveillance were related to a reduced likelihood of installing contact tracing apps and an increased likelihood of uninstalling them.

These results also hold when controlling for privacy concerns, attitudes toward the app, trust in authorities, and demographic properties. We discuss the impact of these findings on the overall effectiveness of COVID-19 contact tracing. More generally, we suggest a framework of analyzing how voluntary participation in data collection systems can be crowded out by involuntary systems.

Joint work with Oshrat Ayalon

13:40-14:00 Itzhak Benenson, Faculty of Exact Sciences, Tel Aviv University

SPATIALLY-EXPLICIT MODELING OF THE SARS-COV-2 TRANSMISSION BETWEEN POPULATION GROUPS IN JERUSALEM

Age is the most fundamental demographic variable. Yet, early accounts of the COVID pandemic failed to incorporate age in population-level statistics of morbidity and mortality.

To address this lacuna, the BMI Demography Lab at Tel Aviv University joined in April 2020 an international collaborative effort (COVERAGE-DB) to collect and harmonize data on COVID-19

cases and deaths by age. In addition to describing the international database, made available to the research community, the talk will showcase two demographic insights on the COVID pandemic based on these data: (1) understanding how population age structure accounts for variation in COVID mortality across countries; (2) contextualizing the relationship between COVID mortality and age in relation to other causes of death.

14:00-14:20 **Irad Ben-Gal**, Department of Industrial Engineering, Faculty of Engineering, Tel Aviv University

USING HUMAN MOBILITY PATTERNS AND SOCIO-DEMOGRAPHIC DATA TO ANALYZE LOCAL SPREAD OF COVID-19

Location data is continuously being collected at an increasing rate from a multitude of devices and sensors, enabling the analysis and the development of new use cases. In this talk, we analyze aggregated, anonymized health data, Socio-Demographic data, and cell phone mobility data from Israel during the COVID-19 spread.

We develop predictive models for daily new cases and the test-positivity rate over different geographic regions.

We show how modeling of human mobility patterns during pandemic times, can be used to analyze the potential effect on the spread and the control of the disease, as well as ways to reduce the spread.

Joint work with Grace Guan, Yotam Dery, Matan Yechezkel, Dan Yamin and Margaret L. Brandeau

14:20-14:40 **Eran Yashiv**, The Eitan Berglas School of Economics, Tel Aviv University

WHEN TO LOCK, NOT WHOM: MANAGING CURRENT AND FUTURE EPIDEMICS USING TIME-BASED RESTRICTIONS

Yinon Bar-On, Weizmann Institute of Science, Israel; **Tanya Baron**, Ben Gurion University, Israel; **Ofer Cornfeld**, BFI, Israel; **Eran Yashiv**, Tel Aviv University, Israel and CfM; (London School of Economics), UK

We present normative and positive analyses of novel epidemic related NPI tools. Rather than use prevalent population restrictions, they are based on time restrictions. The analysis relates to the timescales of virus transmission. key findings are that the new tools significantly improve social welfare, substantially lessening the trade-offs involved; optimally- derived timings of interventions suppress the disease, while maintaining reasonable economic activity; and outcomes are superior to actual experience of New York State and Florida over the course of 2020.

With the advent of SARS-COV-2 variants and with possible future pandemics, this modelling is likely to remain highly relevant in economic research.

14:40-15:00 **Saharon Rosset**, Faculty of Exact Sciences, Tel Aviv University

MODELING SARS-COV-2 MUTATIONAL PROCESSES: PREDICTING THE NEXT VARIANT

We build statistical models to describe the substitution process in the SARS-CoV-2 as a function of explanatory factors describing the sequence, its function, and more. These models serve two different purposes:

First, to gain knowledge about the evolutionary biology of the virus; and second, to predict future mutations in the virus, in particular, non-synonymous amino acid substitutions creating new variants. We use tens of thousands of publicly available SARS-CoV-2 sequences and consider tens of thousands of candidate models.

Through a careful validation process, we confirm that our chosen models are indeed able to predict new amino acid substitutions: candidates ranked high by our model are eight times more likely to occur than random amino acid changes.

We also show that named variants were highly ranked by our models before their appearance, emphasizing the value of our models for identifying likely variants and potentially utilizing this knowledge in vaccine design and other aspects of the ongoing battle against COVID-19.

This is joint work with Keren Levinstein Hallak.

15:00-15:20 **Reception hall** | Coffee break

SESSION 5

VIRUS DETECTION AND DISINFECTION

Auditorium | Chair: **Hadas Mamman**, School of Mechanical Engineering Faculty of Engineering, Tel Aviv University

15:20-15:40 **Hadas Mamane**, School of Mechanical Engineering, Faculty of Engineering, Tel Aviv University.

UV DISINFECTION OF CORONAVIRUS: WAVELENGTH EFFECT

As the global prevalence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreaks increases, there is a dire need for novel disinfection technologies. Our vision is to enable close-to-normal life conditions even at times of high pandemic risk, by providing reliable means to reduce the risk of infection in confined spaces, through light-based ultraviolet (UV) technologies.

The common mercury-based ultra-violet (UV) technologies are widely used in water, surface, and air treatment; however, they contain mercury, emit specific spectrum, and are sometimes difficult to integrate as they are enclosed in a quartz tube, similar to fluorescent lamps. UV-light emitting diodes (LEDs) are a novel technology that allows tuning the wavelength according to the pathogen and allows flexible design due to their size.

The pandemic has created momentum for the UVC LED industry, with a market projection of \$2.5 billion in 2025. However, UVC LEDs have low output power making higher wavelengths or combinations more attractive.

The knowledge and insights gained through research will enable the smart design of UV-LEDs in the disinfection of hospital rooms, air conditioning systems, surfaces, and water, utilizing the benefits of UV-LEDs and contributing to the fight against the COVID-19 pandemic as well as future pandemics.

15:40-16:00 **Gili Bisker**, Faculty of Engineering, Tel Aviv University

OPTICAL NANO SENSORS FOR DISCRIMINATIVE SARS-COV-2 VIRAL MUTATIONS FOR RAPID DIAGNOSIS

The novel Coronavirus disease (COVID-19), caused by the severe acute respiratory coronavirus 2 (SARS-CoV-2), has been rapidly spreading globally since its outbreak in late 2019.

Stopping the spread of the virus requires broad-scale diagnostic testing to isolate

the confirmed cases and their contacts and support nationwide strategic decisions. We propose a new platform for rapid, accurate, and cost-effective diagnosis of COVID-19 positive cases, using fluorescent single-walled carbon nanotube (SWCNT) sensors for a discriminative sequence of the SARS-CoV-2 viral genome. Specifically, we target highly conserved, short, and discriminative sequences, absent from any other known microorganisms and the human genome, based on complete COVID-19 sequences obtained from confirmed cases. The detection platform relies on functionalized-SWCNT, rendered an optical sensor for the identified viral-genome target. Accelerating the testing procedure will support the prevention of the virus spread.

16:00-16:20 **Raya Sorkin, Faculty of Exact Sciences, Tel Aviv University**

UNVEILING CORONAVIRUS FUSION, ONE VESICLE AT A TIME

In this talk, I will present a unique approach that provides population characterization of protein-membrane interactions, which allows insight into the fusion mechanism of coronaviruses. Specifically, I will show how we combine a system of optical tweezers dedicated to accurate force measurements (with pN force resolution) with confocal fluorescence microscopy to study membrane fusion. I will describe a new tool we developed, where we form membrane bilayers supported on polystyrene microspheres which can be trapped and manipulated using optical tweezers.

This method allows working with membrane proteins of interest within a background of native membrane components where their correct orientation is preserved.

We demonstrate successful measurements of the interaction forces between the Spike protein of SARS CoV-2 and its human receptor, ACE2.

We further reveal that fusion protein exposure after Spike proteolytic cleavage leads to very strong binding to the target membrane, also in the absence of ACE2.

Our approach for quantitative screening of interactions between proteins and membrane interfaces is broadly applicable to various viral infection studies.

16:20-16:40 **Dor Salomon, Faculty of Medicine, Tel Aviv University**

A SYNTHETICALLY ENGINEERED PLATFORM FOR ANTIBACTERIAL BIO-TREATMENTS

Bacterial pathogens are a major risk to human, animal, and plant health.

To counteract the spread of antibiotic resistance, alternative antibacterial strategies are urgently needed. To address this need, we have constructed a proof-of-concept

customizable, modular, and inducible antibacterial toxin delivery platform. By engineering a type VI secretion system (T6SS) that is controlled by an externally induced on/off switch, we transform the safe bacterium, *Vibrio natriegens*, into an effective antibacterial weapon.

Furthermore, we demonstrate that the delivered toxin repertoire, and thus the toxicity range of this platform, can be easily manipulated and tested. We believe that this platform can serve as a foundation for novel antibacterial bio-treatments, as well as a unique tool to study antibacterial toxins.

16:40-17:00 Alex Goldberg, Porter School of Environment and Earth Sciences, Faculty of Exact Sciences, Tel Aviv University.

NEWS FROM THE SEA: ANTI-COVID19 COMPOUNDS FROM SEAWEEDS

Alexander Golberg, Shai Shefer, Arthur Robin, Alexander Chemodanov, Mario Lebendiker, Bob Bostwick, Lynn Rasmussen, Michael Lishner, Michael Gozin

Due to the global COVID-19 pandemic, there is a need to screen for novel compounds with antiviral activity against SARS-COV-2.

Here we compared chemical composition and the in vitro anti- SARS-COV-2 activity of two different *Ulva* sp. crude Ulvan extracts: one obtained by an HCl-based and another one by ammonium oxalate-based (AOx) extraction protocols.

The composition of the crude extracts was analyzed, and their antiviral activity was assessed in a cytopathic effect reduction assay using Vero E6 cells. We show that the extraction protocols have a significant impact on the chemical composition, anti-SARS-COV-2 activity, and cytotoxicity of these Ulvan extracts.

The Ulvan extract based on the AOx protocol had a higher average molecular weight, higher charge, and 11.3-fold higher antiviral activity than HCl-based extract. Our results strongly suggest that further bioassay-guided investigation into bioactivity of compounds found in *Ulva* sp.

Ulvan extracts could lead to the discovery of novel anti-SARS-CoV-2 antivirals.

**17:00-17:20 Benny Da'adoosh Computer-Assisted Drug Design Unit,
BLAVATNIK CENTER for Drug Discovery, Tel Aviv University**

**With Ehud Gazit from Life Sciences and Haim Wolfson from the
Faculty of Exact Sciences.**

INHIBITION OF TMPRSS2 BINDING TO ACE2

We present two methods for preventing the activity of the Transmembrane Protease, Serine 2 (TMPRSS2). TMPRSS2 plays a major role in the entering of the COVID-19 into the cell: 1) Cleaving of the Spike protein by TMPRSS2 activates it, and thus the Spike can bind to ACE2; 2) Cleavage of the ACE2 receptor by TMPRSS2 facilitates the entrance of the Spike-ACE2 complex into the cell.

In addition, inhibition of TMPRSS2 can combat other viral diseases (e.g. influenza, metapneumovirus) as well. Notably, TMPRSS2-deficient mice showed no apparent phenotypic abnormality.

We propose two approaches for blocking the activities of TMPRSS2: (1) blocking the ACE2 binding site to TMPRSS2, (2) blocking the active site of TMPRSS2. Our strategy includes design of cyclic peptides based on one of the known serine protease inhibitors SFTI-1 cyclic peptide (Sunflower Trypsin Inhibitor 1).

By computational methods (pharmacophore, docking, molecular dynamics) we predicted a set of inhibitors with high (computational) binding affinity for each one of these sites. These peptides are being synthesized in order to test them in-vitro.

SESSION 6

LEGAL AND PSYCHOLOGICAL PERSPECTIVES

ERDI Gallery | Chair: **Bruria Adini**, Faculty of Medicine,
Tel Aviv University

15:20-15:40 **Moran Bodas**, Faculty of Medicine, Tel Aviv University

THE DISASTER PSYCHOLOGY OF THE COVID-19 OUTBREAK

פסיכולוגיה של מגפה

למרות מאמצים רבים של רשויות ההגנה האזרחיות, מוכנות אוכלוסיות לחירום נותרת ברמה נמוכה ובלתי מספקת. נראה שבמקרים מסוימים, במיוחד בחשיפה מוגברת לאיום, מתפתחת תמונה מורכבת יותר סביב נושא המוכנות לחירום. אנשים רוצים לחיות את חייהם בשלווה ובשקט ולדאוג לדברים הפשוטים של חיי היום-יום. האם אנחנו באמת מצפים מהם לשים הכל בצד ולהקדיש זמן ומרץ להתכונן לתרחיש אימים שהם לא מבינים עד הסוף? ומה בנוגע לפחד וחרדה שכרוכים בהתנהגות הזו? מגפת הקורונה נותנת לנו הזדמנות מיוחדת להציץ אל נכחי הפסיכולוגיה האנושית בהקשרי מצבי חירום ואסון. נדרשת חשיבה "מחוץ לקופסה" כדי לקדם מוכנות לחירום ולהגביר את החוסן של הציבור להתמודד עם מצבי חירום ומשבר. החדשות הטובות הן שיש פתרונות יצירתיים. החדשות הרעות הן שלאף אחד לא ממש אכפת...

15:40-16:00 **Daphna Hacker**, Faculty of Law, Tel Aviv University

הפקולטה למשפטים והתוכנית ללימודי נשים ומגדר, אוני ת"א

משבר הקורונה כהזדמנות לבחינה מחודשת של גבולות המשפחה המשפטיים

בספרי האחרון, Legalized Families in the Era of Bordered Globalization (CUP, 2017), טענתי כי לא ניתן להבין כיום משפחתיות מבלי להבין את הזיקות שבין כוחות גלובליים לגבולות לאומיים. דרך עדשת המשפט בחנתי את האופנים שבהם משפחות ברחבי העולם נוצרות, פועלות ומתפרקות תוך חציית גבולות בין מדינות. משבר הקורונה הוכיח עד כמה פגיעות המשפחות הטרנס לאומיות ועד כמה המענה המשפטי הקיים כיום לא מגן על זכותם של בני המשפחות הטרנס לאומיות, על סוגיהן השונים, לחיי משפחה. במחקר הנוכחי (בתמיכת הקרן הלאומית למדעים) אני מתמקדת בארבעה סוגי משפחות כאלה: זוגות טרנס לאומיים (שכל אחד מבני הזוג חיי במדינה אחרת), הורים מיעודים שנעזרו בפונדקאות טרנס לאומית; סבים וסבתות החיים במדינה אחרת מזו שבה חיים הנכדים והנכדות; ובני משפחה שנעזרים במהגרת עבודה לטיפול בהורה סיעודי, שמותירה את משפחתה במדינת המוצא. הממצאים הראשוניים של המחקר מלמדים שכל סוגי המשפחות הללו נפגעו קשות בגין רגולציית הקורונה. בהרצאתי אתמקד במקרה של ילדים של ישראלים החיים בחו"ל שלא הורשו להיכנס לביקור משפחתי בישראל ללא התחייבות להתאזרחות, כדוגמה לניצול משבר הקורונה להקשחת הגבולות הלאומיים במחיר כבד למשפחות טרנס לאומיות, וללקחים שניתן

16:00-16:20 Yael Elster, Economics, University of Haifa, Former post-doc at TAU School of Management

AGREEMENTS MUST BE KEPT? RESIDENTIAL LEASES DURING COVID-19

מאמר זה בוחן מוסר תשלומים במסגרת חווי השכרת דירות למגורים בתקופה המוקדמת של מגפת הקורונה. מתוך סקר שערכנו בקרב משקי בית השוכרים דירות בישראל עולה כי כמעט 1 מתוך 8 משקי בית לא שילמו שכר דירה מלא במהלך הסגר הראשון במרץ-אפריל 2020. משקי הבית האלו לא שילמו בממוצע שני שלישים משכר הדירה המצוין בחוזה. בפרט, משקי בית שבריריים מבחינה פיננסית שהכנסותיהם נפגעו משמעותית שילמו חלק קטן יותר משכר הדירה.

בנוסף, הן היבטים פורמליים והן מערכת היחסים הבלתי-פורמלית בין בעלי הדירות והשוכרים השפיעו על התשלומים: השוכרים שילמו יותר מדמי השכירות אם חווי השכירות שלהם כללו סעיפים רשמיים נגד אי תשלום, אך שילמו פחות דמי שכירות אם הייתה להם מערכת יחסים קרובה עם בעלי הדירות, הנמדדת לפי מפגשים תכופים עם בעל הבית ותקופת שכירות ארוכה יותר. אנחנו משתמשים בתיאוריות לגבי מיקוח וחוויים כדי להסביר את הממצאים הללו.

16:20-16:40 Bruria Adini, Emergency & Disaster Management department Sackler Faculty of Medicine, Tel Aviv University.

LESSONS LEARNT FROM THE COVID-19 PANDEMIC CONCERNING RESILIENCE: THE POWER OF US

COVID-19 pandemic has substantially impacted the global populace. In an attempt to contain the ongoing spread of the virus, there is paramount importance of cooperation and population engagement in reducing disease infection rates and relieving the outbreak's burden on society. A longitudinal study was conducted among the Israeli population throughout the pandemic, assessing the levels of individual and societal resilience, distress symptoms, perceived threats, sense of danger, hope, morale and well-being.

The political threat was perceived as the highest risk throughout the pandemic, followed by the economic risk, while the health risk was much lower (Mean 3.51, 3.03, 2.62 out of 5, respectively; updated 01.02.2022). Societal resilience, sense of danger, anxiety and depressive symptoms were found in February 2022 to be lower, compared to March 2020, whereas individual resilience was similar in the two timeframes. Jewish respondents reported significantly higher levels of national resilience, trust in state institutions, individual resilience and morale compared to Arab respondents. Societal resilience was found to be the best predictor of vaccine

hesitancy and vaccine uptake (.448 & .300, $p < .001$, respectively).

Considering the needs and expectations of the varied populace is vital in achieving compliance of the population to measures directed by the authorities.

16:40-17:00 Shoshana Shiloh, Faculty of Social Sciences, Tel Aviv University

התמודדות עם מגפת הקורונה: פרספקטיבה פסיכולוגית

שושנה שילה, שירה פלג, גבריאל נודלמן

המרכיב הנפשי-התנהגותי ממלא תפקיד מרכזי ביותר בהתמודדות עם מגפת הקורונה והשפעותיה.

בין אפריל 2020 (סמוך לתחילת המגפה) לבין מרץ 2021 (לאחר זמינות החיסון) בצענו מחקר אורך על מדגם מייצג של האוכלוסייה הישראלית הבוגרת. בארבעה גלים של איסוף נתונים באמצעות שאלונים מקוונים נבדקו משתנים קוגניטיביים, אמוציונאליים, אישיותיים והתנהגותיים הקשורים לשאלות המחקר המרכזיות: (1) לאור היותה של מחלת הקורונה מחלה חדשה, אילו ייצוגים קוגניטיביים ורגשיים שלה התפתחו בנבדקים, מה השפיע על היווצרותם, וכיצד הם השפיעו על היענות הנבדקים להנחיות באשר להגנה מהמחלה ולמניעת הפצתה? (2) מה הקשר בין היענות להנחיות בזמן המגפה לבין ביצוע התנהגויות מקדמות בריאות לפנייה? (3) האם היענות להנחיות התנהגותיות בזמן המגפה הושפעה יותר מגורמים קוגניטיביים או מגורמים אמוציונאליים? (4) אילו משתנים ניבאו התחסנות נגד המחלה? (5) אילו גורמים מסבירים הבדלים בינאישיים במצוקה נפשית בתקופת המגפה? אציג את הממצאים העיקריים של מחקר זה ואדון בהשלכותיהם המעשיות.

17:00-17:20 Udi Sommer, Faculty of Social Sciences, Tel Aviv University

פוליטיקה וקורונה: היבטים התנהגותיים של הפוליטיקה של המגיפה

אודי זומר ואור ראפל-קרויזר

Does a state of emergency necessarily contract human behavior?

In times of security crises, for instance, citizens overcome their divides.

Our analysis explores the relationship between county-Level partisanship in the United States during COVID-19 and Mobility. We provide an original theoretical analysis to distinguish Pandemic politics from politics in times of emergency as we had Known them. Our framework helps reconcile previous contradictory Findings about this type of emergency politics. Such a frame is Needed as it has been a century since the last major global Pandemic and COVID-19 may not be the last. There are five Reasons to distinguish COVID-19 from previously familiar types of Emergency politics: psychological, national sentiments, policy Related, elite related, and time related.

Our extensive mobility big Data (462,115 county*days from March–August 2020) are uniquely Informative about pandemic politics.



In times of pandemic, people Literally vote with their feet on government actions. The data are Highly representative of the U.S. population. At the pandemic Outbreak, our exploratory innovative analysis suggests political Divides are exacerbated. Later, with mixed messages about the Plague from party leadership, such exceedingly partisan patterns Dissipate. They make way to less politically infused and more Educationally, demographically, and economically driven behavior.

17:20-17:40 **Reception hall** | Coffee break

SESSION 7

VIRUS BIOLOGY AND BIOINFORMATICS

Auditorium | Chair: **Noam Shomron**, Faculty of Medicine,
Tel Aviv University

17:40-18:00 **Marcelo Ehrlich**, Shmunis School of Biomedicine and Cancer
Research, Faculty of Life Sciences, Tel Aviv University

HARNESSING CELL STRESS RESPONSES FOR ANTIVIRAL THERAPY

**Marina Shenkman, Sarah Dellac, Rinat Semyatich, Gerardo
Lederkremer and Marcelo Ehrlich.**
**Shmunis School of Biomedicine and Cancer Research,
Faculty of Life Sciences, Tel Aviv University**

Infection of viruses in general, and that of RNA viruses (such as Coronaviruses or the vesicular stomatitis virus, VSV) in particular; involve multi-layered effects on the integrated stress response (ISR) and on the phosphorylation of its main effector, eukaryotic initiation factor 2 α (eIF2 α).

The central role performed by ISR in infection stems from the absolute dependence of viruses and of antiviral mechanisms on cellular anabolic machineries (e.g., for protein synthesis).

Thus, the timing of onset and the intensity of such responses hold the potential of regulating the productivity of the infection process and the fate of the infected cell. Importantly, eIF2 α phosphorylation integrates the sensing of different sources of cell stress, being mediated by distinct kinases with dependence on cell context (e.g. PKR in infection, or PERK in the unfolded protein response, UPR).

Based on the discovery by the Lederkremer lab of a unique small molecule activator of the eIF2 α kinase PERK, MK-28, we tested its effects on infection of VSV and in parallel on SARS-CoV-2 (with our collaborator Raul Andino at UCSF). MK28-reduced viral production for both viruses and inhibited maturation of a VSV glycoprotein, suggesting the potential of inhibiting viral infection through the harnessing of eIF2 α -based responses.

18:00-18:20 Noam Shomron, Faculty of Medicine, Tel Aviv University

GENOMICS AIDING PANDEMIC RESEARCH

In the past two-year millions of SARS-CoV-2 genomes were shared publicly. This data allowed extensive research on viral evolution and genomic surveillance in an unprecedented scale.

It is common to infer a single “consensus sequence” of a virus sample, but one should also consider the variation between viral populations the ones which lead to intra-host variation within each individual.

Using the raw sequencing data of over 10,000 SARS-CoV-2 samples, we demonstrate the potential of intra-host analysis for clinical and epidemiological purposes. Low-frequency variants are relatively rare and subjected to weaker selective pressure.

We present a machine learning model that accurately detects probable primary and secondary transmission events using minor variant, creating an approximate chain of transmission. A similar model is then used to assess the probable source of infections found in COVID-19 individuals, sampled at the Israeli airport.

In addition, we present a method for specialized viral genome-wide association analysis and present associations with clinical parameters from the electronic health record of the infected host. Our methods overcome common issues of viral diversity analysis by using a specialized variant calling workflow, down-sampling sequencing depths, and relying on the unbiased sequence diversity statistic.

18:20-18:40 Ben Maoz, Faculty of Engineering, Tel Aviv University

EFFECT OF SARS-COV-2 PROTEINS ON VASCULAR PERMEABILITY

SARS-CoV-2 infection leads to severe disease associated with cytokine storm, vascular dysfunction, coagulation, and progressive lung damage. It affects several vital organs, seemingly through a pathological effect on endothelial cells.

The SARS-CoV-2 genome encodes 29 proteins, whose contribution to the disease manifestations, and especially endothelial complications, is unknown. We cloned and expressed 26 of these proteins in human cells and characterized the endothelial response to overexpression of each, individually. Whereas most proteins induced significant changes in endothelial permeability, nsp2, nsp5_c145a (catalytic dead mutant of nsp5) and nsp7 also reduced CD31 and increased von Willebrand factor expression and IL-6, suggesting endothelial dysfunction. Using propagation-based analysis of a protein–protein interaction (PPI) network, we predicted the endothelial proteins affected by the viral proteins that potentially mediate these effects. We further applied our PPI model to identify the role of each SARS-CoV-2 protein in other tissues affected by COVID-19. While validating the PPI network model, we

found that the tight junction (TJ) proteins Cadherin-5, ZO-1 and b-catenin are affected by nsp2, nsp5_c145a and nsp7 consistent with the model prediction. Overall, this work identifies the SARS-CoV-2 proteins that might be most detrimental in terms of endothelial dysfunction, thereby shedding light on vascular aspects of COVID-19.

18:40-19:00 Tal Pupko, Faculty of Life Sciences, Tel Aviv University

IDENTIFYING TYPE III EFFECTORS IN PATHOGENIC BACTERIA USING MACHINE-LEARNING

Many Gram-negative pathogenic bacteria rely on a type III secretion system to inject effector proteins to host cells and thus promote disease. We develop machine learning (ML) algorithms to predict effectors in various bacteria. Moreover, we show that our ML algorithms are more accurate than competing approaches. Several of our predicted effectors were later validated experimentally.

Following the repeated successful application of our ML approach, we further promoted the usage of our algorithms by launching the Effectidor web server. Effectidor allows the features learning of each specific pathogen, based on known effectors and known non-effectors from the studied pathogen, and thus provides a probabilistic prediction for each ORF in the genome. In my talk, I will describe the algorithms for predicting effectors and their application that led to the identification of novel type III effectors.

Finally, I will discuss future research directions.

Session 8

SOCIAL OF SOCIETAL EFFECTS OF COVID-19

ERDI Gallery | Chair: **Miri Yemini**, Faculty of Humanities,
Tel Aviv University

17:40-18:00 **Miri Yemini**, Faculty of Humanities, Tel Aviv University

הוראה ולמידה מרחוק בעתות של ריחוק חברתי. חקר אורבני-סוציולוגי

מירי ימיני ונויה דהאן

מטרת המחקר היא לאתר, לזהות, להבין ולהמשיג את השימוש שעשו המורות/ים והתלמידות/ים בבתי הספר היסודיים, בסביבות השונות בתוך הבתים ומחוצה להן במהלך תקופת הקורונה, בין החודשים מרץ 2020 ועד מרץ 2021, בהם בתי הספר היו סגורים רוב הזמן, ותהליכי הוראה ולמידה התקיימו באמצעות 'למידה מרחוק', זאת מנקודת מבטן של המלמדות/ים והלומדות/ים בכיתות ה-4 בבתי הספר היסודיים בעיר תל אביב יפו. כמו כן, המחקר מנסה לפענח מהם הערכים, התפיסות והמגבלות שבאו לידי ביטוי במהלך התקופה כפי שאלו משתקפים בעדויות של מורות/ים ותלמידות/ים. הנתונים נותחו באמצעות ניתוח נושאי איכותני תוך שימוש בתיאוריות ארבעת המרחבים הלוקחה מתחום הגיאוגרפיה המרחבית אשר מגדירה ארבעה מרחבים עיקריים בחלל: המרחב האמפירי, המרחב הפתוח, המרחב המאוייר והמרחב כמקום.

מן המחקר עולים פערם משמעותיים בעיר תל אביב יפו בין תלמידות/ים הלומדות/ים בבתי ספר הנמצאים בשכונות האשכול החברתי-כלכלי הגבוה או בתי ספר על איזורים לבין תלמידות/ים הלומדות/ים בבתי ספר הנמצאים בשכונות האשכול החברתי-כלכלי הבינוני והנמוך. פערם אלה באים לידי ביטוי בעיקר ברמת השימוש ואופן השימוש אשר נעשה במרחבים אורבניים במהלך תקופת הלמידה מרחוק למטרות למידה. זאת ועוד, המחקר מלמד על המשמעות וההשפעה של כלל המרחבים ששימשו להוראה ולמידה והשינויים הדחופים בשימוש בהם, עבור המורות/ים והלומדות/ים בשגרה בבית הספר ובמהלך תקופת הלמידה מרחוק כאשר הלמידה התקיימה מהמרחב הביתי או האורבני. חשיבות מחקר זה טמונה בהבנת השפעתן של התמורות במערכת החינוך כתוצאה ממצב חירום על למידת התלמידות/ים, על המורות/ים ועבודתן/ם על אי השוויון בין קבוצות תלמידות/ים במערכת החינוך.

18:00-18:20 **Arnon Hershkovitz**, Faculty of Humanities, Tel Aviv University

המופע של שיא הרגש-לקחים מהוראה ולמידה מרחוק בימי חירום

בשנתיים האחרונות חוות מערכות חינוך ברחבי העולם שיגרה של אי-וודאות ובתוך השיבושים התכופים משולבת טכנולוגיה בעוצמה ובאופנים שלא נצפו קודם לכן. האפקט המרכזי של מגפת הקורונה על מערכות חינוך היה סגירה של מבני המוסדות ומעבר להוראה מרחוק עתירת-טכנולוגיה למשך תקופה ממושכת - תופעה אשר הקיפה כמעט את

כל העולם והשפיעה על תלמידים, סטודנטים, מורים, מרצים, והמשפחות של כל אלו. מן המחקרים הרבים שנערכו בנושא בימי הקורונה, ניתן ללמוד רבות על הוראה בשילוב טכנולוגיה ועל הוראה בימי חירום - שתי תצורות שאינן חדשות כלל ועיקר - ובכך חשיבותם. בהרצאה זו אציג ממצאים ממספר מחקרים כמותיים ואיכותניים שערכנו בימי הקורונה, בישראל ובעולם. בין היתר, אתיחם לשאלות הבאות: אילו גורמים אישיים ומערכתיים קשורים לתחושות הצלחה ומסוגלות בהוראה מרחוק בחירום בקרב מורים? באילו נתונים עושים שימוש מורים ומרצים בהוראה מרחוק בימי חירום כדי לקדם את תלמידיהם? כיצד תופסים מרצים וסטודנטים את תצורת הלמידה בה חלק מן הלומדים נמצאים בכיתה וחלקם מתחברים לשיעור מרחוק?

18:20-18:40 **Amir Teicher, Faculty of Humanities, Tel Aviv University**


מפיצי על (super-spreaders): היסטוריה מושגית, חברתית ופוליטית

המושג "מפיצי על" הופיע לראשונה בספרות הרפואית בראשית שנות השבעים. עיסוק בשונות של יכולת ההדבקה של פרטים שונים החל מתפתח בעשור שלפני כן וכלל ניסיון להגדיר מושגים חדשים ולספק הסברים חדשים לתופעה. ההרצאה תסקור כמה מהניסיונות המוקדמים הללו, תזהה את הרגע שבו המונח הגיע לעולם, ותעקוב אחר המשמעויות השונות שהוצמדו לו בעשורים שקדמו למגפת הסארס הראשונה. כפי שנראה, אלה כללו מודלים סטוכסטיים וסימולציות לחיזוי ושיפור מדיניות חיסונים במגפת שפעת, אירועי הדבקה בחצבת ואבעבועות שחורות בקרב אוכלוסיות מחוסנות, תהיות הנוגעות לפרדיגמות הבסיסיות של המחשבה האפידמיולוגית, עיסוק בארוסוליציה, וגם חשש ממחלות מין ומאידס. המעקב אחר האופן שבו המונח התעצב עוד קודם למגפת הסארס מאפשר להבין טוב יותר חלק מהבעיות הנוכחיות בשימוש במונח זה. בנוסף, מבט משווה על השימוש במונח "מפיצי על" במדינות שונות בשנתיים האחרונות חושף את הפוליטיזציה של המושג ואת האופן שבו המחשבה הרפואית והמחשבה החברתית כרוכות זו בזו.

18:40-19:00 **Yoav Ram, Faculty of Life Sciences, Tel Aviv University**

INFERRING THE EFFECTIVE START DATES OF NON-PHARMACEUTICAL INTERVENTIONS DURING COVID-19 OUTBREAKS.

During Feb-Apr 2020, many countries implemented non-pharmaceutical interventions, such as school closures and lockdowns, with variable schedules, to control the COVID-19 Pandemic caused by the SARS-CoV-2 virus. Overall, these interventions seem to have reduced the spread of the pandemic. We hypothesized that the official and effective start date of such interventions can be noticeably different, for example, due to slow adoption by the population, or because the authorities and the public are unprepared. We fitted an SEIR model to case data from 12 regions to infer the effective start dates of interventions and contrast them



with the official dates. We found mostly late, but also early effects of interventions. We demonstrated that differences between the official and effective start of NPIs can lead to underestimating their impact and suggested potential causes and consequences of our results.

CLOSING REMARKS