



The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952376



RĪGA STRADIŅŠ
UNIVERSITY

**Materials on successful summer school accomplishment
including guidelines**

Deliverable D5.2

Project number – 952376 – VirA

Project funded by the European Union		
Dissemination Level		
PU	Public	X
PP	Restricted to other program participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Introduction

A Summer School “**Clinical and Laboratory Data Management and Modelling**” was organised by Rīga Stradiņš University within the framework of the EU Research and Innovation Programme “Horizon 2020” project “Reducing networking gaps between Rīga Stradiņš University (RSU) and internationally leading counterparts in viral infection induced autoimmunity research” (VirA). It was held onsite from the 3rd to the 7th of July 2023.

The program covered a wide range of topics – from various issues related to detecting and quantifying various biomarkers not only in autoimmune diseases, but also other topical illnesses/conditions, to development of new medicines for managing autoimmune conditions, to various possibilities and solutions of data analysis and visualisation, complexities of big data analysis and developing policies based on compilation and comprehensible visualisation of such research data. The introduction of this Summer School was performed by Modra Murovska, Assoc. Professor, Project Coordinator from Institute of Microbiology and Virology in Latvia and Prof. Angelika Krūmiņa, the leader and principal organiser of the Summer School of this project. Presentations were provided by qualified global and European specialists in the field of autoimmune diseases and data management, including Prof. Marion Schneider from Ulm University (Germany), Prof. Miri Blank and Prof. Arnon Afek from Tel Aviv Sheba Medical Center (Israel), Prof. Alexandra Balbir from Rambam Health Care Campus (Israel), as well as other representatives from the Sheba Medical Center, Israel, Nicolaus Copernicus University in Tourun, Poland, Ulm University, Germany, University of Latvia and Riga Stradiņš University, Latvia.

Summary of the main ideas introduced in the Summer School – Day 1

Miri Blank, Professor, Sheba Medical Center, Israel. *Development of a new immunomodulatory drug for autoimmune diseases – from the bench to the patient.*

The lecturer reported on the paradox of autoimmunity and helminth/parasitic infestation: how helminths secrete immunomodulatory molecules, and usage of a novel immunomodulating helminth derived compound tuftsin-phosphorylcholine (TPC) in treatment of autoimmune diseases. The solution of this substance might be suppressing over-active and disbalanced immune system, including cytokine storm in COVID-19 infection.



Slawomir Kujawski, Doctor, Nicolaus Copernicus University in Torun, Poland. *A subjective review on modern software for statistical analysis.*

This presentation highlighted the problem and real-life various solutions of data analysis, various solutions if limited mathematic skills combined with a limited financial resource, as well as if time limitations for researchers/PhD students are very significant. The author analysed wide range of various programs to perform statistical analysis of the research data, including MS Excel, R program, Jamovi, Python, Orange, SAS, Cytoscape and other IT solutions, taking into consideration whether the program is free of charge or under subscription fee.



Gilad Halpert, Doctor, Sheba Medical Center, Israel. *Exploring the underlying mechanism of silicone breast implants illness using integrated clinical and laboratory data.*

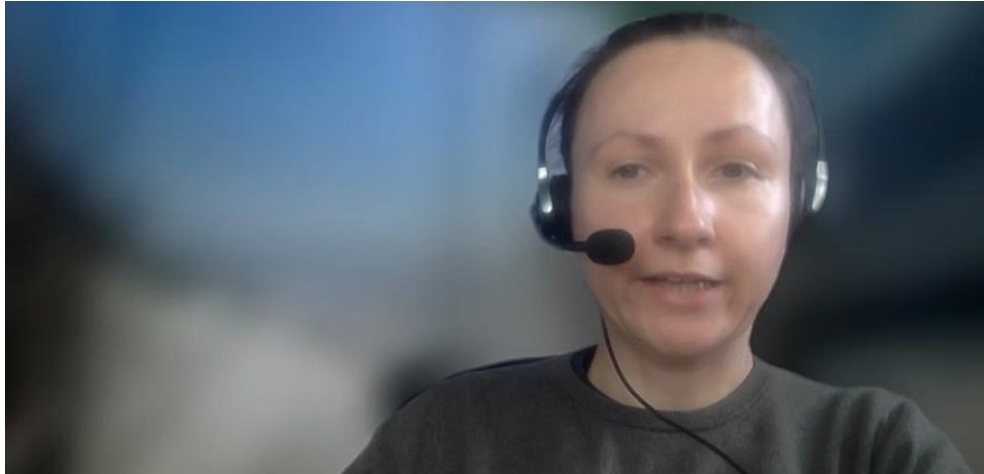
The lecturer presented on silicone implants and their immunogenic activity in human body. The breast implants are causing many dysfunction of immune system causing many autoimmune conditions and even lymphoma, especially if the implant is left in the body longer than 5–7 years. He stressed that information should be provided for the patients to be able to make more informed consent decisions before implantation of silicone implants. Silicone alters the function of autonomic nervous system through adrenergic receptors, causing various degrees of dysregulation of signalling, especially in patients with HLA-DRB1 polymorphism.



Baiba Vilne, PhD, Rīga Stradiņš University, Latvia. *Big data in biomedicine – Genome Data Analysis.*

The lecturer presented a research and overview of structuring the big data in biomedicine, including the information of genome and various other molecules of human organism, clinical imaging and medical data, lifestyle information. The presentation covered data analyses, interpretation, to identify relevant information about genomics – to identify essential variants

– the rare and the common variations. To adapt pharmacogenomics to patient genetic variations in pharmacogenesis. The author presented about various technological solutions of genotyping, taking into consideration strict control process and application of the most appropriate methods of such analysis.



Boris Gilburd, Doctor, Sheba Medical Center, Israel. *Pathophysiology of fibromyalgia syndrome – scientific evidence from clinical research.*

The lecturer reported on the pathophysiology of fibromyalgia, stressing out the various biological markers involved in proinflammatory phenotype, including explanation of the process of neuroinflammation in fibromyalgia. The expert presented the overview of detection methods of different biomarkers in the case of this autoimmune disease. The presenter explained the hypothesis of linkage of altered microbiota and consequential altered serum bile acid in patients with fibromyalgia, altered nociception as a result.



Slawomir Kujawski, Doctor, Nicolaus Copernicus University in Torun, Poland. *An introduction to a network analysis.*

The lecturer made a deeper insight into network analysis to detect interconnected variables during the study performed, the mapping of, e.g., character or keyword network. The presenter explained different examples applying network graphics, including a particular study of relationship of the behaviour of older participants with body composition change through cognition, education, recreational activities, nutrition, comorbidities, and functional capacity – how all those variables are interconnected, and the visualisation of these variables using network analysis/graph.

Summary of the main ideas introduced in the Summer School – Day 2

Alexandra Balbir, Professor, Rambam Health Care Campus, Israel. *Systemic sclerosis. Clinical trials, the hope, the reality, and the future.*

The lecturer presented on the process how new medicines are being placed into the market. Starting from the very beginning of research in laboratories, particularly paying attention to all phases of clinical studies – explaining the differences among phases I, II, III, IV. That is the process also for the medicines used in treating systemic sclerosis (SSc, scleroderma). The expert highlighted the clarifying SSc – what kind of disorders this disease cause in the human body, what kind of markers are involved in the development and flare ups of this disease. And the options of management considering that SSc is a very heterogenous disease with reduced lifespan and increased mortality. The expert presented about various medicines to treat patients, evaluating not only levels of biomarkers and objective outcomes, but also subjective patient data taking into consideration quality of life questionnaires. And the data from clinical trials are implemented into clinical routines.



Miri Blank, Professor, Sheba Medical Center, Israel. *EBV – the notorious autoimmune virus – from data to clinical practice.*

The lecturer presented about the Epstein-Barr Virus (EBV) and the influence of this virus on human health, including involvement of the development of autoimmune diseases, like multiple sclerosis, autoimmune thyroid diseases, Sjogren's syndrome. The author stressed out

the inclusion of molecular mimicry between EBV peptide and various human peptides. Possible vaccination against EBV might be a solution to avoid the infection and therefore possible development of autoimmune conditions in the future, caused by this virus.

Marion Schneider, Professor, Ulm University, Germany. *Clinical data managements and biomarkers in fibromyalgia patients (Part 1)*.

The lecturer presented about various biomarkers in fibromyalgia patients. The professor explained the conditions caused by this disease, the clinical signs and symptoms, the treatments and prognosis. The limiting factors is that the symptoms (depending on organ systems involved) are eased, but no possibilities to treat the disease itself. Professor explained the inflammation process in various organs, including fascia in fibromyalgia. Natural killers are involved in attacking endothelial cells, high concentration of homocysteine involved in autoimmune processes, especially in brain. The professor explained how vitamin Bs are critical for normal methylation and transsulfuration, to eliminate homocysteine both from brain and blood. And how other vitamins, fatty acids and amino acids are involved in balanced biochemical reactions to contain and decrease symptoms of fibromyalgia.



Alexandra Balbir, Professor, Rambam Health Care Campus, Israel. *Rheumatoid arthritis. Evolution of clinical trials*.

The lecturer provided an insight into the various clinical studies performed to improve the treatment of rheumatoid arthritis. Various criteria to evaluate the outcomes of the studies were explained. Also, the true commercial clinical trials are compared to real-life hospital patient clinical trials/observational studies. Reviews of various studies with biological therapies were explained. Biosimilar therapy was explained as well. The overall strategy is aimed to perform optimal control and optimisation of the therapeutic approaches in case of rheumatoid arthritis.

Marion Schneider, Professor, Ulm University, Germany. *Clinical data managements and biomarkers in fibromyalgia patients (Part 2).*

The lecturer presented the management of clinical data and biomarkers, focusing in purinergic signalling and activated macrophages in fibromyalgia. Expression of P2X7 receptor is involved in disfunction of complex signalling system causing various diseases in central nervous system, bringing also this disbalance to other parts of the body.

Slawomir Kujawski, Doctor, Nicolaus Copernicus University in Torun, Poland. *A brief overview on application of machine learning on tabular data.*

The lecturer focused on the topic about machine learning as a type of artificial intelligence on tabular data. The presenter focused on how the humanity could benefit from this process in obtaining more accurate medical diagnoses, improved patient outcomes, increased efficiency (in limited environment of various resources), more personalised treatment plans and early detection of diseases. The presenter focused on pros and cons of using such machine learning in medical data. Cons focusing on concerns of privacy, biased algorithms, lack of transparency, limited data availability and cost. Pros based on visualising the tabular data applying various statistical methods. The author introduced on tree-based models, compared the method with neuronal networks, decision tree, random forest, gradient boosting etc.

Summary of the main ideas introduced in the workshop/practical work – Day 3

Boris Gilburd, Doctor, and **Gilad Halpert**, Doctor, Sheba Medical Center, Israel. *Isolation of plasma-derived extracellular vesicles using size exclusion chromatography (SEC) technique and to learn how we can characterize these vesicles using transition electron microscopy (TEM) and western blot analysis.*

Both leaders of the work in the laboratory focused on isolation of plasma-derived extracellular vesicles using size exclusion chromatography technique. Extracellular vesicles in general have generated significant interest among the scientific community in the last few decades, owing to their important roles in immunology, cancer and viral infections. Exosomes are small extracellular vesicles (sEVs) which are released into the extracellular space, from almost every cell. Previous studies have demonstrated that exosomes are involved in intercellular communications and in the pathogenesis of inflammatory/autoimmune diseases. These days sEVs are being explored for their potential to serve as diagnostic biomarker for some diseases (cancer etc.) and are being explored for therapeutic purposes. The leaders of the practical laboratory work taught the participants the isolation of plasma-derived extracellular vesicles using size exclusion chromatography (SEC) technique and to learnt how to characterize those vesicles using transition electron microscopy (TEM) and western blot analysis. Materials for such lab work was Gen 2 Column (Izon), BCA kit for the measurement of protein concentration in EVs, two plasma samples from patients with osteoarthritis (1.5 ml volume of each sample), available TEM and negative staining-related materials.

Marion Schneider, Professor, Ulm University, Germany. *Quantification of circulating DNA and RNA in biological fluids using QUANTUS™.*

During the laboratory work, the leader of the workshop taught how to measure circulating DNA and RNA in plasma samples, the clinical data sets from patients with multiple sclerosis for machine learning was provided to be experimented on. The isolation of exosomes from plasma samples or other biological fluids was performed, preparation of cDNA and analysis with qPCR for HSV specific miRNA species was performed, the results of results of qPCR on HSV1 miRNA indicating latency were analyses. The kits of Qiagen for quantification of soluble-DNA and RNA (body fluids, cell culture supernatants, etc.) and exosome enrichment devices were used.

Summary of the main ideas introduced in the workshop/practical work – Day 4

Boris Gilburd, Doctor, and **Gilad Halpert**, Doctor, Sheba Medical Center, Israel. *Isolation of plasma-derived extracellular vesicles using size exclusion chromatography (SEC) technique and to learn how we can characterize these vesicles using transition electron microscopy (TEM) and western blot analysis.*

The leaders of the practical laboratory work taught the participants the isolation of plasma-derived extracellular vesicles using size exclusion chromatography (SEC) technique and to learnt how to characterize those vesicles using transition electron microscopy (TEM) and western blot analysis. Materials for such lab work was Gen 2 Column (Izon), BCA kit for the measurement of protein concentration in EVs, two plasma samples (1.5 ml volume of each sample), available TEM and negative staining-related materials. The quality and amount of isolated EVs was analysed by TEM.

Marion Schneider, Professor, Ulm University, Germany. *Isolation of Monocytes by Dynal-CD63 coupled beads to be identified by flow cytometry.*

During this laboratory work professor focused on preparation of monocytes, on their isolation from the biological material by Dynal-CD63 bead coupling, incubating and extracting the CD63-expressing monocytes, separating them from other non-expressing monocytes. The professor focused on extracting CD63 expressing monocytes, analysing them, acquiring relevant data, interpreting the results with relevant software. This process enables researchers to specifically isolate monocytes using Dynal-CD63 beads and accurately identify them via flow cytometry, contributing to a better understanding of immune responses and cellular functions.

Summary of the main ideas introduced in the Summer School – Day 4

Marion Schneider, Professor, Ulm University, Germany. *Monocyte subpopulations in sepsis patients with and without diabetes type II and obesity (Part 1).*

The lecturer presented about the circulating monocytes and their subpopulations in the organism. Professor explained inverse correlation of monocytes with body mass index in sepsis patients with diabetes, specifically CD-16 expression correlate with BMI in diabetic patients, but not in non-diabetic patients, which is involved in development of the autoimmune process. The author explained the process how various CD subsets downregulation or upregulation increase the proinflammatory process during septic shock.

Lynn Matits, PhD student, Ulm University, Germany. *Unpacking R: Introduction to R Markdown.*

The lecturer presented the introduction of applying program R in analysing research data. The author explained how to upload the data into R program, how to code, how to perform the analysis in R program. The presenter explained the outlook of the R window, various fields, how to use R-Markdowns. How to run the code, how to detect the errors, how to run the manuscript, to run the codes separately, while applying various methods of data analysis. The presenter explained the R-Markdown document, the contents of it, yaml and the output options of a document, as well as convenient visualisation options (graphs, tables, etc.).



Marion Schneider, Professor, Ulm University, Germany. *Monocyte subpopulations in sepsis patients with and without diabetes type II and obesity (Part 2).*

During this presentation the lecturer focused on the new combination of 5 markers gating strategy versus conventional CD16-CD14 gating system and explained the benefits of the best solution for identifying the human monocyte subsets, macrophages M1 or M2. The results of the study were performed and the benefits and disadvantages of the new strategy discussed.

Summary of the main ideas introduced in the Summer School – Day 5

Baiba Vilne, PhD, Rīga Stradiņš University, Latvia. *Big data in biomedicine – Proteome and microbiome data analysis.*

The lecturer focused on the data in biomedicine on proteome and microbiome, on the analysis of such data. The author explained that the big data is crucial for the next generation in medicine – personalised medicine adapted to each patient based on various genome variations. She focused on the proteome, the introduction of the importance of proteins and their role in the body; the importance of various amino acids, which compose proteins. The author introduced how to perform proteomics, how to obtain samples, how to analyse them, shotgun proteome analysis with various methods. How to analyse proteome with different software programs. The introduction of various protein databases was performed, e.g., Human Proteome Project and UniPort human database as a resource. The expert introduced on the microbiome, the impact on the research of the composition of microbiome to adapt the medical treatments in each specific case. The process of profiling microbiome was explained, the databases for identification were mentioned – Silva, Vsearch. Various initiatives are in place, e.g., NIH Human Microbiome Project, The American Gut Project.

Renārs Erts, Department of Statistics, University of Latvia. *Using the R program for big data analysis, Part 1 – working with SQL and databases.*

This presentation covered the information regarding working with SQL and databases. The expert explained the problematics of big data due to the huge amount of data itself, causing problems with, e.g., data storage and other objective limitations. He also provided the solutions how to chunk and analyse the data in R program. One solution is to use structured query language (SQL) and how to perform it, analysing only the data needed during particular analysis. One example of such analysis was performed – data reading with R program, data uploading, creating the code, suggestions how to use SQL depending on the performance of the computer, the operating systems of the computer.



Renārs Erts, Department of Statistics, University of Latvia. *Using the R program for big data analysis, Part 2 – work with data transformations, automation and visualization.*

During this presentation the author focused on using R program of the big data analysis, focusing on data transformations, automation and visualisation. The coding of a package, the

best options to avoid errors. The presenter explained how to extract various data packages, how to use useful functions of R program, how to visualise the big data in R program.

Arnon Afek, Professor, Sheba Medical Center, Israel. *From data to policy – Sheba Medical Center leadership in the time of COVID-19 pandemic.*

The lecturer focused on the topic how to use the clinical data into the national policy during the period of Covid-19 pandemic. The Professor explained the process how Sheba Medical Center was leading the Israel's response building the first COVID-19 ward in Israel, rapidly increasing the capacity of intensive care units. The Professor presented how the process of vaccination was organised, how the vaccine research was performed, obtaining the data from real-life observational studies, cohort studies on assessing COVID-19 infections (with different variations) among vaccinated/unvaccinated against SARS-CoV-2. Evaluation of efficacy of vaccines, depending on the number of shots performed.



Arnon Afek, Professor, Sheba Medical Center, Israel. *The future of healthcare professional education.*

During this presentation lecturer discussed the possible future of healthcare professional education based on the characteristics of the new generation and they perspective on study process, work-life balance, technological progress, and sustainability. The future physician will need to be a consultant, coordinator of care, comforter, and creator at the same time. Education and training pathway will be changed into simulation mode, with multi-tier curriculum, with involvement of various stake holders, including, e.g., medical device or pharmaceutical companies. The focus will be on teamwork with alternative thinking and embracing failure, to improve the outcomes of patients.

Rihards Pēteris Ročāns, Doctor, PhD student, Rīga Stradiņš University, Latvia. *Prediction models – Practical development and validation.*

The lecturer focused on the prediction models, how to practically develop and validate them. He focused on the rational basis of such prediction models. How to develop the model to predict the future events. Such models could improve the decisions regarding the treatment of patient. During invention of various prediction models, derivation, validation and impact analysis should be performed. The author explained various types of models.



Feedback

Analysis of the Summer School evaluation forms filled out by 23 respondents showed an overall assessment of the event as 4.39 (on a scale of 1 to 5, where 1 is insufficient and 5 is excellent). The organization of the event received a rating of 4.35.

Figures 1–3 depict answers to the following questions:

1. Did the Summer School achieve the program objectives?
2. Did the knowledge and information gained from participation in this event meet participants' expectations?
3. Will the knowledge and information gained from participation in this event be useful/applicable in participants' work?

Figure 1

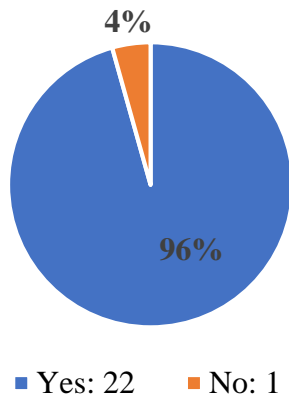


Figure 2

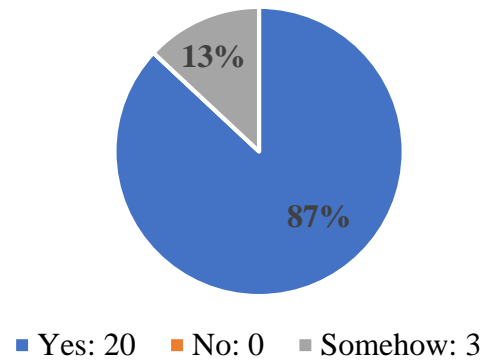
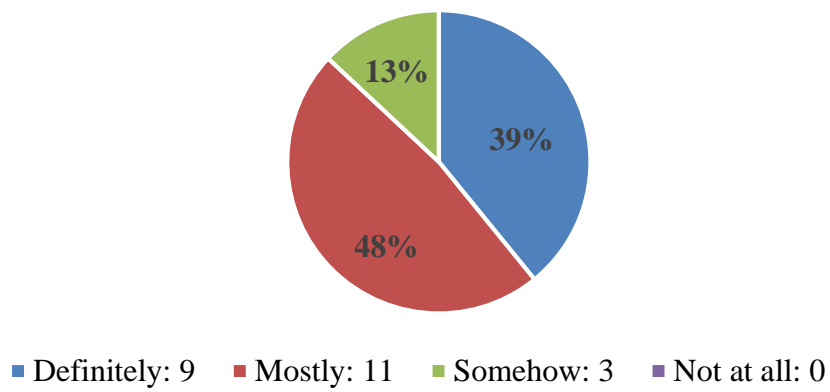


Figure 3



Dissemination of the Summer School

Facebook:

<https://www.facebook.com/RSURW/posts/pfbid02cNH75mmdxkxHpBUmzXvuoDJmb4Vcaoe9S4tZtTVS5zUPzaEaKixCx2krFmnm6Zu1l>



RSU webpage:

<https://www.rsu.lv/en/events/summer-school-clinical-and-laboratory-data-management-and-modelling>

Project's webpage:

<https://vira-twinning.eu/events/summer-school-clinical-and-laboratory-data-management-and-modelling>

Guidelines

Promoting Collaborative Outputs: prioritize organizing Summer Schools and Short-Term Scientific Missions (STSMs) in a manner that maximizes the potential for collaborative outcomes, including joint publications or, at a minimum, the development of scientific theses suitable for presentation at conferences. This encourages meaningful contributions and knowledge dissemination arising from collaborative efforts.

Balancing In-Person and Online Interaction: while embracing online platforms can enhance accessibility and flexibility, prioritize organizing in-person events whenever practicable. Face-to-face interactions among participants offer distinct advantages, particularly in terms of building new collaborations across diverse levels. Striking a balance between virtual and in-person interactions optimally supports the formation of enduring research networks.

Elevating Practical Laboratory Work: future Summer Schools could incorporate a heightened emphasis on hands-on laboratory work. For optimal learning and skill acquisition, ensure that the practical sessions are conducted by renowned experts for their proficiency in the specific techniques being acquired. This approach ensures that participants receive expert guidance, resulting in a deeper level of expertise. Furthermore, practical tasks involving essential reagents and

equipment can be seamlessly planned and executed within these expert environments. This approach ensures that participants receive expert guidance, resulting in a deeper level of expertise. Furthermore, future plans for practical tasks of collaboration can be planned and executed within these expert environments.

Feedback Integration in Home Laboratories: recognize the significance of incorporating feedback mechanisms for sharing the knowledge and outcomes obtained during Summer School. To achieve this, consider implementing mechanisms such as hosting small seminars within the respective home laboratories. These seminars provide a platform for Summer School participants to share insights and lessons learned with their colleagues, fostering a wider understanding of the gained expertise.

Quality Assurance and Reporting: it is recommended to establish a framework for quality assurance throughout the Summer Schools and STSMs process. This could involve regular evaluations of the collaborative outcomes, the effectiveness of feedback mechanisms, and the impact of both virtual and in-person interaction modes. Documentation and reporting should be comprehensive, highlighting not only the achieved results but also insights into the collaborative process and lessons learned.

Sustainability and Long-Term Impact: encourage sustainability by fostering enduring relationships beyond the duration of the project. Implement strategies for participants to maintain communication, share ongoing research developments, and possibly engage in follow-up collaborative initiatives. This long-term approach ensures that the benefits of Summer School continue to resonate and contribute to the broader scientific community.

Conclusions

Overall, 31 participants participated in the Summer School onsite. Altogether there were 21 lectures presented by 11 experts/specialists and different practical workshops performed. The Summer School program encompassed a wide spectrum of subject areas, ranging from the intricacies of biomarker detection and quantification in autoimmune disorders and other relevant medical conditions, to the development of innovative pharmaceutical interventions for the treatment of autoimmune ailments. Additionally, the event delved into the realm of data analysis and visualization, covering diverse approaches and solutions for handling large datasets, understanding complex data analytics, and shaping policies based on the synthesis and clear presentation of research data.



Summer School
Clinical and laboratory data management and modelling

Rīga Stradiņš University, 16 Dzirciema Street, Riga
 Hippocrates Lecture Theatre, Block A
 and remotely via *Zoom* platform

3–7 July 2023

Summer School leader Professor Angelika Krūmiņa

AGENDA

Day/ Date	Time GMT+3	Activity
Monday, 3 July	9.00 – 9.30	Registration
	9.30 – 9.45	Opening and welcome
	09.45 – 10.30	Prof. Miri Blank (Sheba Medical Center, Israel) Development of a new immunomodulatory drug for Autoimmune diseases – from the bench to the patient.
	10.30 – 11.00	Dr Slawomir Kujawski (Nicolaus Copernicus University in Torun, Poland) A subjective review on modern software for statistical analysis.
	11.00 – 11.20	<i>Coffee break</i>
	11.20 – 12.05	Dr Gilad Halpert (Sheba Medical Center, Israel) Exploring the underlying mechanism of Silicone breast implants illness using integrated clinical and laboratory data.
	12.05 – 12.50	Baiba Vilne, PhD (Rīga Stradiņš University, Latvia) Big data in biomedicine – Genoma Data Analysis.
	12.50 – 13.50	<i>Lunch</i>
	13.50 – 14.35	Dr Boris Gilburd (Sheba Medical Center, Israel) Pathophysiology of fibromyalgia syndrome – scientific evidence from clinical research.
	14.35 – 15.05	Dr Slawomir Kujawski (Nicolaus Copernicus University in Torun, Poland) An introduction to a network analysis.
15.05 – 16.00	<i>Coffee break / Q&A, discussions and networking</i>	

Day/ Date	Time GMT+3	Activity
Tuesday, 4 July	09.30 – 10.15	Prof. Alexandra Balbir (Rambam Health Care Campus, Israel) Systemic sclerosis. Clinical trials, the hope, the reality and the future.
	10.15 – 11.00	Prof. Miri Blank (Sheba Medical Center, Israel) EBV – the notorious autoimmune virus – from data to clinical practice.
	11.00 – 11.20	<i>Coffee break</i>
	11.20 – 12.05	Prof. Marion Schneider (Ulm University, Germany) Clinical data managements and biomarkers in fibromyalgia patients (part 1).
	12.05 – 12.50	Prof. Alexandra Balbir (Rambam Health Care Campus, Israel) Rheumatoid arthritis. Evolution of clinical trials.
	12.50 – 13.50	<i>Lunch</i>
	13.50 – 14.35	Prof. Marion Schneider (Ulm University, Germany) Clinical data managements and biomarkers in fibromyalgia patients (part 2).
	14.35 – 15.05	Dr Slawomir Kujawski (Nicolaus Copernicus University in Torun, Poland) A brief overview on application of machine learning on tabular data.
	15.05 – 16.15	<i>Coffee break / Q&A, discussions and networking</i>
Wednesday, 5 July	9.30 – 12.30	<i>Practical work in laboratory (RSU Institute of Microbiology and Virology, 5 Rātsupītes Street)</i> Dr Boris Gilburd, Dr Gilad Halpert (Sheba Medical Center, Israel) Isolation of plasma-derived extracellular vesicles using size exclusion chromatography (SEC) technique and to learn how we can characterize these vesicles using transition electron microscopy (TEM) and western blot analysis.
	12.30 – 13.30	<i>Lunch</i>
	13.30 – 16.30	<i>Practical work in the laboratory (RSU Institute of Microbiology and Virology, 5 Rātsupītes Street)</i> Prof. Marion Schneider (Ulm University, Germany) Quantification of circulating DNA and RNA in biological fluids using QUANTUS™.

Day/ Date	Time GMT+3	Activity
Thursday, 6 July	9.00 – 12.00	<i>Practical work in the laboratory (RSU Joint Laboratory of Electron Microscopy, 9 Kronvalda Boulevard)</i> Dr Boris Gilburd, Dr Gilad Halpert (Sheba Medical Center, Israel) Isolation of plasma-derived extracellular vesicles using size exclusion chromatography (SEC) technique and to learn how we can characterize these vesicles using transition electron microscopy (TEM) and western blot analysis.
	9.00 – 12.00	<i>Practical work in the laboratory (Institute of Microbiology and Virology, 5 Rātsupītes Street)</i> Prof. Marion Schneider (Ulm University, Germany) Isolation of Monocytes by Dynal-CD63 coupled beads to be identified by flow cytometry.
	12.00 – 12.45	<i>Transfer to RSU</i>
	12.45 – 13.45	<i>Lunch in RSU</i>
	13.45 – 14.30	Prof. Marion Schneider (Ulm University, Germany) Monocyte subpopulations in sepsis patients with and without diabetes type II and obesity (part 1).
	14.30 – 15.00	Lynn Matits, PhD student (Ulm University, Germany) Unpacking R-A short introduction to R-Markdown.
	15.00 – 15.45	Prof. Marion Schneider (Ulm University, Germany) Monocyte subpopulations in sepsis patients with and without diabetes type II and obesity (part 2).
	15.45 – 16.15	<i>Coffee break / Q&A, discussions and networking</i>
Friday, 7 July	9.30 – 10.15	Baiba Vilne, PhD (Rīga Stradiņš University, Latvia) Big data in biomedicine – Proteome and Microbiome Data Analysis.
	10.15 – 11.00	Renārs Erts, PhD (University of Latvia) Using the R program for Big data analysis, Part 1 – working with SQL and databases.
	11.00 – 11.20	<i>Coffee break</i>
	11.20 – 12.05	Renārs Erts, PhD (University of Latvia) Using the R program for Big data analysis, Part 2 – work with data transformations, automation and visualization.
	12.05 – 12.50	Prof. Arnon Afek (Sheba Medical Center, Israel) From data to policy – Sheba Medical Center leadership in the time of COVID-19 pandemic.

Day/ Date	Time GMT+3	Activity
	12.50 – 13.50	<i>Lunch</i>
	13.50 – 14.35	Prof. Arnon Afek (Sheba Medical Center, Israel) The future of healthcare professional education.
	14.35 – 15.20	Dr Rihards Pēteris Ročāns (Rīga Stradiņš University, Latvia) Prediction Models – Practical Development and Validation.
	15.20 – 15.35	<i>Q & A</i>
	15.35 – 16.00	<i>Coffee break / Summary and Feedback</i> Prof. Angelika Krūmiņa (Rīga Stradiņš University, Latvia)



Summer School

CLINICAL AND LABORATORY DATA MANAGEMENT AND MODELLING

Rīga Stradiņš University, 16 Dzirciema Street, Riga
Hippocrates Lecture Theatre, Block A

3–7 July 2023

List of participants

No.	Surname, name	Organisation	Position	Contact information
Lecturers				
1.	Afek Arnon	Sheba Medical Center	Professor	afekarnon@gmail.com
2.	Balbir Alexandra	Rambam Health Care Campus	Professor	a_balbir@rmc.gov.il
3.	Blank Miri	Sheba Medical Center	Professor	Miri.Blank@sheba.health.gov.il

No.	Surname, name	Organisation	Position	Contact information
4.	Erts Renārs	University of Latvia	PhD	Renars.Erts@lu.lv
5.	Gilburd Boris	Sheba Medical Center	PhD, MD	Boris.Gilburd@sheba.health.gov.il
6.	Halpert Gilad	Sheba Medical Center	PhD	Gilad.Halpert@sheba.health.gov.il
7.	Krūmiņa Angelika	RSU Department of infectology	Professor, leading researcher	Angelika.Krumina@rsu.lv
8.	Kujawski Slawomir	Nicolaus Copernicus University in Toruń, Poland	professor	skujawski@cm.umk.pl
9.	Matits Lynn	Ulm University	PhD student	Lynn.Matits@uni-ulm.de
10.	Murovska Modra	RSU Institute of Microbiology and Virology (IMV)	Associate professor, leading researcher	Modra.Murovska@rsu.lv
11.	Ročāns Rihards Pēteris	RSU	PhD student	rihards.rocans@gmail.com
12.	Schneider Marion	Ulm University	Professor	Marion.Schneider@uniklinik-ulm.de
13.	Vilne Baiba	RSU Bioinformatics Lab	Head of Laboratory	Baiba.Vilne@rsu.lv
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