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

Materials on successful summer school accomplishment including guidelines for WP3

Deliverable D3.2

VirA project No. 952376

New trends in molecular and immunological detection methodology of persistent viral infections

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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Executive Summary

As the COVID situation stabilized during the summer period, the planned summer school "New trends in molecular and immunological detection methodology of persistent viral infections" was held within the framework of WP3 on July 11-15, 2022. This summer school focused on theoretical and practical knowledge (training) in molecular and immunological detection methods of persistent viral infections involved in autoimmune disease development.

The wet laboratory work part of the summer school took place only in person, but the theoretical-lecture and discussion part took place in a hybrid version - both in person and remotely, providing access to the summer school both for those colleagues and experts who nevertheless fell ill with COVID-19 and therefore could not come to Latvia, as well as for interested parties, who could not attend in person for other reasons.

There was a total of 56 participants in the summer school, of which 40 participated in person. The participants included both professors and leading researchers (22 in total), young scientists, students and doctoral students (18 in total), as well as, researchers, medical practitioners, residents and other interested parties.

The summer school was attended not only by representatives from the institutions directly involved in the VirA project, but also by participants from other RSU Departments, leading clinics, the Latvian Biomedical Research and Study Center, the Institute of Organic Synthesis, the Institute of Experimental Morphology, Pathology and Anthropology with Museum in Bulgaria and a biology student from Ukraine, who starts work at our institute (RSU Institute of Microbiology and Virology).

The attachment of this report contains workshop agenda, the list of participants, and the evaluation form. A full recording of the theoretical part-lectures of the summer school is available on the VirA project website, and anyone interested can listen to it at a time convenient to them (https://vira-twinning.eu/events/summer-school-new-trends-molecular-and-immunological-detection-methodology-persistent-viral; https://panopto.rsu.lv/Panopto/Pages/Viewer.aspx?id=beb19940-d44b-4b87-8dab-aed10071d51a;

https://panopto.rsu.lv/Panopto/Pages/Viewer.aspx?id=9e9fc629-afb6-45dc-8eb6-aed100708b4d; https://panopto.rsu.lv/Panopto/Pages/Viewer.aspx?id=b7f2fbf0-804b-472f-93c8-aeef007d6a38).

The summer school was opened by a short welcome address by the RSU Vice-Rector of Science – Agrita Kiopa and Coordinator of VirA project Assoc Prof, Lead Researcher at the Institute of Microbiology and Virology, RSU – Modra Murovska. Subsequently Lead Researcher Zaiga Nora-Krūkle - the Leader of WP3 Virology platform, organizer and moderator of the summer school, introduced participants with a workshop agenda and practical issues.

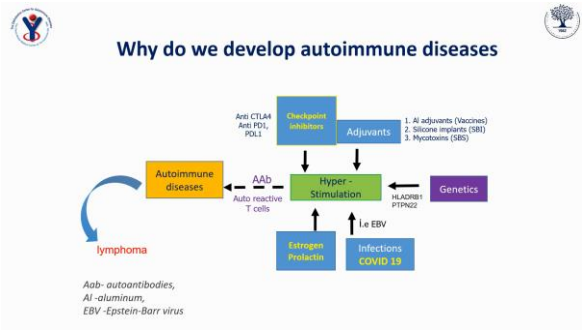
Overview of the lectures and practical workshops (wet lab.)

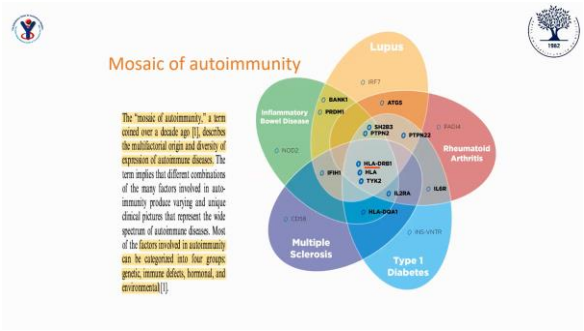
1st day of the Summer school

Experts from the partner institutions gave lectures on the first two days of the summer school and also on the last day. First day started with the lecture of Prof Yehuda Shoenfeld,

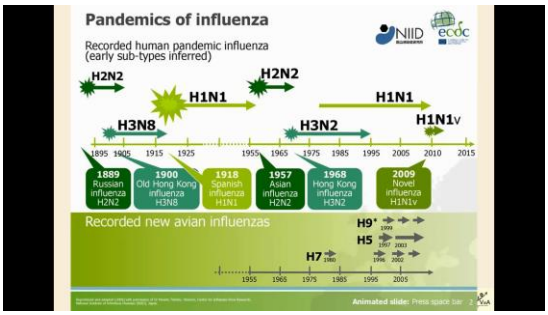
Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel-HaShomer, Israel. In his lecture on viruses and autoimmunity **Prof Shoenfeld** explained the causes and possible mechanisms of autoimmunity. He devoted part of his lecture to the topic of COVID-19, showing that SARSS-CoV-2 is indeed an autoimmunity-causing virus and the main mechanisms are: # hyper stimulation of the immune system in a genetically prone subjects and # molecular mimicry.

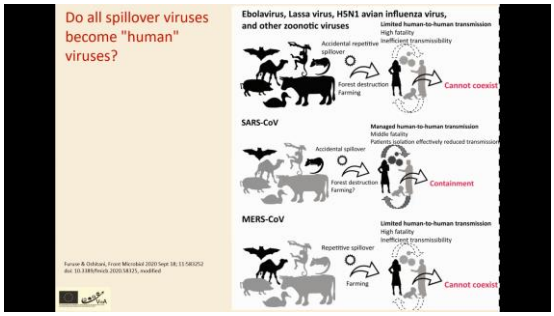
In the lecture, he also explained why SARS-CoV-2 does not cause autoimmune processes in all patients, showing the importance of HLA-DRB1 in this context and explaining the genetic markers recognized as protective or risk alleles of HLA-DRB1. He also explained the immune-related adverse events induced by immune checkpoint inhibitors and mechanisms of molecular mimicry that contributes to the synthesis of autoantibodies that possibly results in the new-onset of an autoimmune disease.



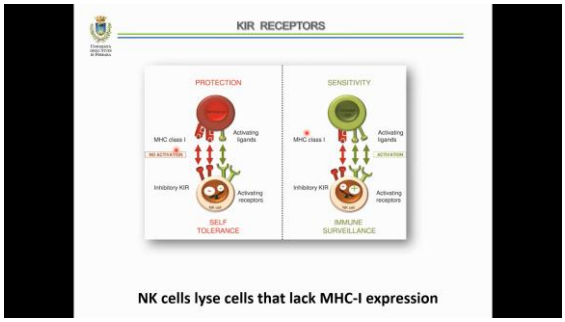


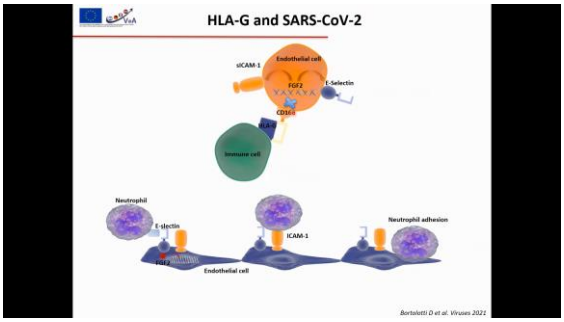
Next two lectures the overview on emerging viral infections was given remotely by **Prof Dario Di Luca**, Dept. Medical Sciences, University of Ferrara. The first lecture dealt with emerging viral diseases, providing examples of viral diseases that emerged in the most recent years, with different final outcomes (disappearing, becoming endemic, establishing epidemics and pandemics). The second lecture discussed possible mechanisms for emerging viral diseases, considering loss of biodiversity, anthropic factors, climate changes, natural causes. In particular, loss of biodiversity can be an expansion chamber for more adaptable animal species (e.i. bats), therefore leading to more probable spill over events, while anthropic and climatic factors can increase the number and range of vectors (e.i. mosquitoes). Final considerations focused on the possible hypothetical reasons according to which spill over zoonotic viruses may become "human" viruses.



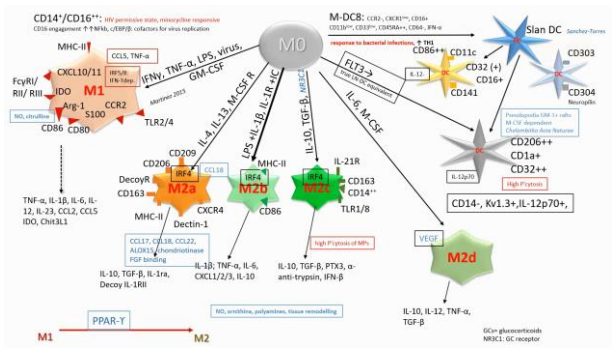


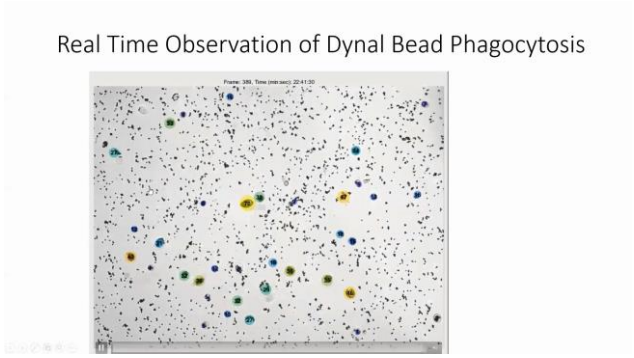
The summer school continued with the lecture “Innate immune control of viral infections” of **Prof Roberta Rizzo** Dept. Chemical, Pharmaceutical and Agricultural Sciences, University of Ferrara. The professor spoke about the fact that the role of SARS-CoV-2 components in innate immunity is still being studied. The investigation of the possible implication of pathogen-associated molecular patterns (PAMPs)-pattern recognition receptors (PRRs) interaction and the possible different effect of the SARS-CoV-2 variants of concern (VOCs) on innate immune response are of extreme importance. They evaluated: i) the activation of RNA sensors, transcription factors and cytokines/interferons (IFN) secretion in pulmonary organoids after SARS-CoV-2 infection; ii) the underlying mechanism leading to the emergence of variants, analyzing quasi-species interaction with host cells; iii) the changes in endothelial activation biomarkers’ profile and neutrophil adhesion. They observed that pulmonary SARS-CoV-2 infection induces the activation of TLR3 and TLR7 RNA sensor pathways and showed that SARS-CoV-2 infection activates different TLRs pathways and might enter host cells via fusion and/or endocytosis pathways, modifying innate immune cell activation. These results might suggest a deep impact of cell-intrinsic immunity in controlling SARS-CoV-2 infection and the emergence of SARS-CoV-2 variants with a higher capability than their ancestors to rapidly spread around the world.





Next speaker was **Prof Marion Schneider**, Head of the Division Experimental Anesthesiology, Ulm University Hospital, Department of Anaesthesiology and Intensive Care, Ulm, Germany. She talked about phagocytosis of inflammatory macrophages in autoimmune diseases. During the lecture, the Professor clearly demonstrated the various nature and mechanisms of action of macrophages in video format. She also explained the differentiation of macrophages and that M1 macrophages are increased in autoimmune diseases, but M2 – are associated with malignancies. During the lecture, she explained various laboratory methods and showed the results of research conducted under her supervision.

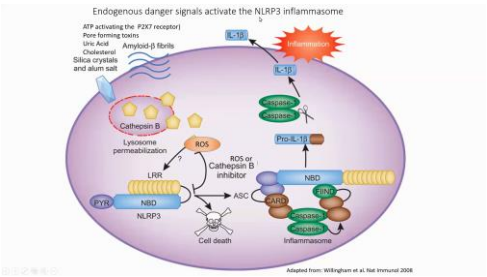


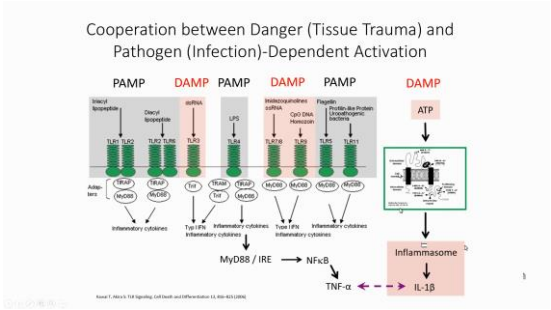


2nd day of the Summer school

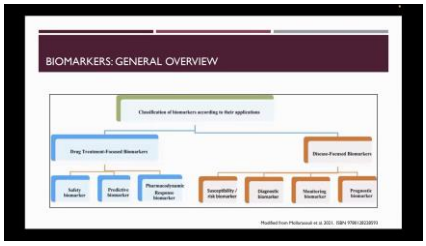
Second day started with the lecture on Big data analyses presented by **Prof Howard Amital**, Sackler Faculty of Medicine, Tel Aviv University; Head of the Department of Medicine B, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel. The professor presented the most important recent researches of his team, where the cross-sectional studies was conducted using Clalit Health Care database, the largest health maintenance organization in Israel with more than 4.4 million enrolees. The pros and cons of such research were also discussed, related to the different databases in each of the countries and also the legal issues that are still not resolved at the global level, as a result of which research using databases and big data processing approaches is hindered.

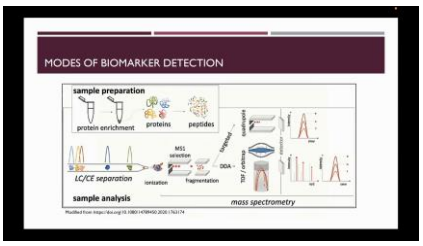
Next presenter was **Prof. Marion Schneider**, Head of the Division Experimental Anesthesiology, Ulm University Hospital, Department of Anaesthesiology and Intensive Care, Ulm, Germany with the second lecture and it was about cytokines' and P2X7 polymophisms in fibromyalgia patients. Professor showed results of experiments and highlighted the high P2X7 polymorphism also P2X7 SNPs and ion channel activities, genotype distribution in patients with FM and controls. Also, the scenario how ATP and P2X7 guide signalling and inflammation in the brain was discussed.

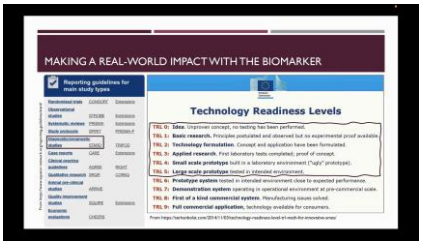




Following lecture on principles of biomarker detection was given remotely by **Kunal Garg**, **PhD student**, Division Experimental Anesthesiology, Ulm University Hospital, Department of Anaesthesiology and Intensive Care, Ulm, Germany. He explained the classification of biomarkers, types of biomarkers – for example: genomic, transcriptomic, proteomic etc. He showed examples of different lab. methods which can be used to detect biomarkers in different biological materials also discussed about very important point – how to select biomarkers and went through all 6 phases of biomarker evaluation.

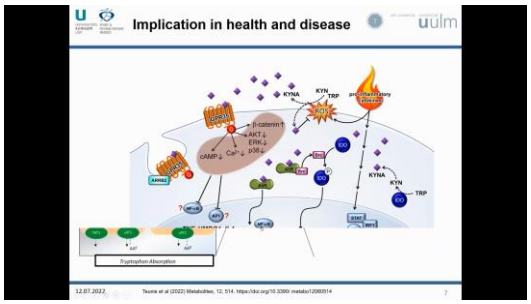


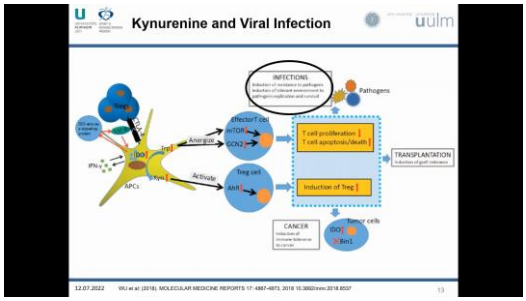




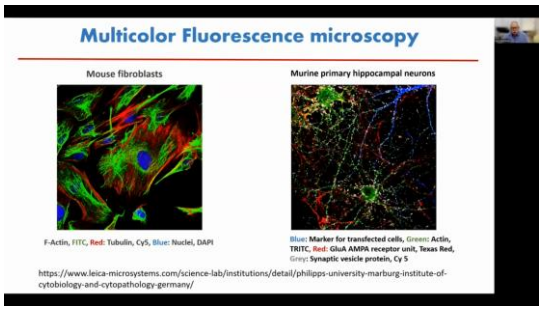
MD Daniel Alexander Bizjak, Division of Sports and Rehabilitation Medicine, Department of Medicine, Ulm, University Hospital, Ulm, Germany talked about IDO and kynurenine - Detection and implication in neurocognitive disorders, viral infection, exercise, CFS (and more).

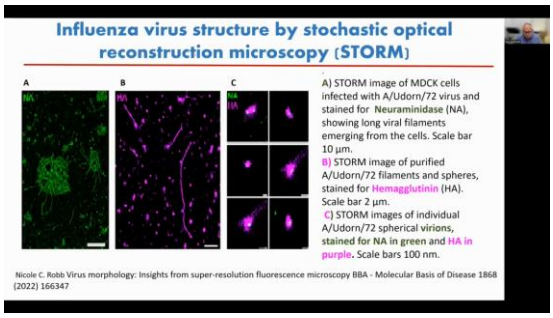
Inside the tryptophan metabolism, the kynurenine pathway (KP) plays a critical role in generating cellular energy in the form of nicotinamide adenine dinucleotide (NAD+). Especially during an immune response, energy requirements are substantially increased and the KP acts a key regulator of the immune system. Prolonged exposure by chemokines due to increased kynurenine levels may result in long-term brain impairment. Kynurenine metabolites itself are producing pro-oxidative and pro-inflammatory effects, resulting in impairment of cognitive function, enhanced oxidative stress and decreased brain-derived neurotrophic factor. The currently most prominent example of the virus-driven activation and not successfully downregulated innate immune response together or alone with a cytokine storm event is the so-called Long-COVID syndrome. The kynurenine pathway is extremely active in acute COVID-19, accompanied by reduced tryptophan and elevated kynurenine, and much more active in severe COVID-19 patients compared to mild or moderate patients. In addition, upregulated IDO-activation was found following Influenza, HIV, Herpes-virus, EBV, leading to pathological disorders like chronic fatigue syndrome, over-training syndrome, ALS, Alzheimer disease and dementia. The valid and reliable monitoring of kynurenine is possible in saliva as well as blood serum and may thus be used as clinical assessment marker for disease severity in virus-driven diseases.



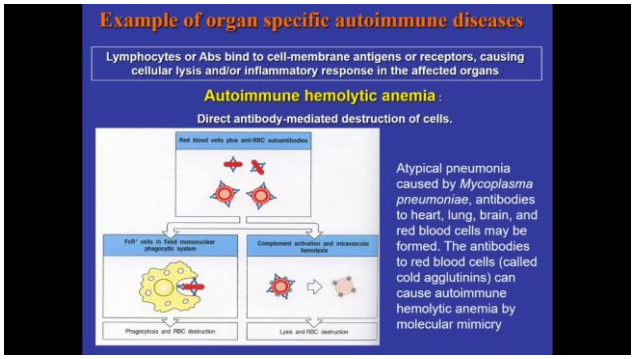


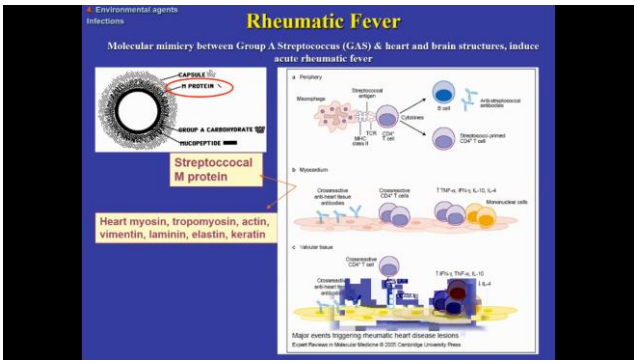
Next speaker MD, **PhD Boris Gilburd**, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel participated remotely. He presented lecture on the latest methods of cell analysis. Boris talked about history of fluorescence microscopy, also outlined the main components of a fluorescent microscope. He also showed examples of multicolour fluorescent microscopy. Also new super-resolution techniques were presented.





Following lecture on mechanisms leading to autoimmune diseases was given remotely by **Prof Miri Blank**, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel. Autoimmunity can lead to autoimmune diseases that are characterized by tissue/cell damage. Autoimmune diseases mean-breakage of mechanisms of self-tolerance. Tolerance is central and peripheral and occurs during lymphocyte development or after lymphocytes leaves the primary lymphoid organs respectively. Also, EBV genetic and association with the development of autoimmune diseases were discussed showing also examples and results of research projects. Additionally, mechanisms of molecular mimicry were described, for example – the autoantibody mimics the TSH activity, activating adenylate cyclase to produce thyroid hormones (thyroxine and triiodothyronine). Also, autoimmune mechanisms in case of rheumatoid arthritis and acantholysis were discussed.





3rd and 4th day of the summer school - practical work in the laboratory

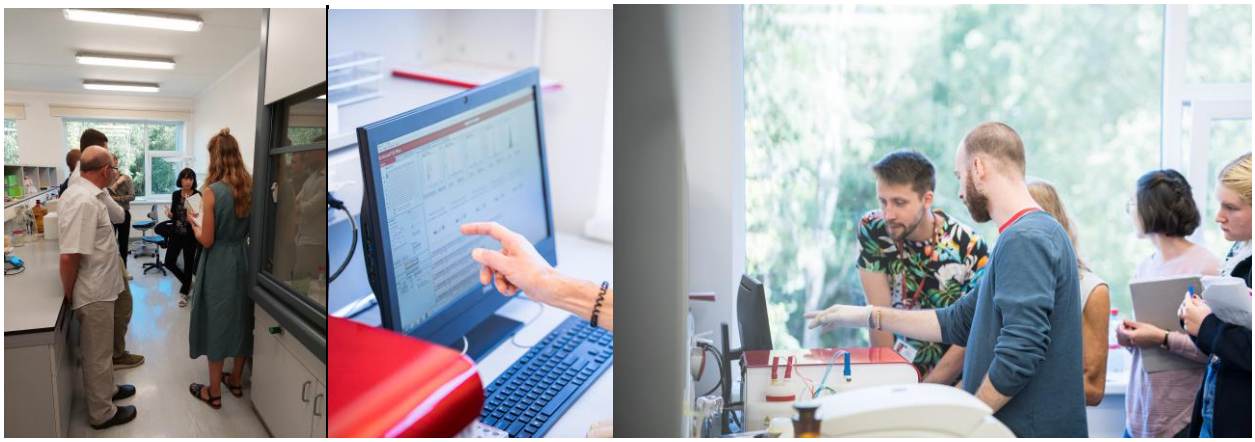
There were three practical works in the laboratory that ran in parallel, allowing the participants to choose the one they were most interested in. The practical work of cytometry took 1 day, so it was repeated again the next day, allowing to consolidate the acquired knowledge and giving the opportunity to more participants of the summer school to participate in this practical work.

Each of the laboratory's practical works was led by experts from partner institutions:
Workshop 1 – Practical work in the laboratory (BD Accuri C6 Plus) Use of flow cytometry for cell immunophenotyping. Practical use of FACS systems. In particular, acquisition and data analysis.

Led by **Prof Roberta Rizzo, University of Ferrara**, Dept. Chemical, Pharmaceutical and Agricultural Sciences.

Professor Rizzo gave a theoretical presentation on an overview of flow cytometry, explaining the principles of flow cytometry, compensation strategies and useful tips for successful work with FACS analysis. Isolation of human peripheral blood mononuclear cells (PBMCs) from whole blood of myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) patients was then performed using density gradient centrifugation. After cell counting using haemocytometer and light microscope was performed. The protocol of the experiment was adapted to measure T-cell activation by quantifying HLA-DR expression in PBMCs from ME/CFS patients on a BD Accuri™ C6 Plus personal flow cytometer using mouse anti-human fluorescence-labelled monoclonal antibodies: CD3, CD8, HLA-DR, CD - 45. The relevant protocol was established for fresh blood cells.

As a result, a protocol was created for working with fresh PBMCs, which can be used in the implementation of various projects by making appropriate adjustments for specific project tasks.



Workshop 2 – Isolation of IgG and Antigen-specific immunoglobulins using Dynabeads procedures.

Prof Marion Schneider, Head of the Division Experimental Anesthesiology, Ulm University Hospital,

Department of Anaesthesiology and Intensive Care, **Ulm, Germany**

Theoretical and practical experience on implementation of Dynabeads technology in autoimmunity studies were acquired. Theoretical part was focused on examination of different types of magnetic beads with different surface coatings and various possible protocols, which could be used for specific research, including, immunoprecipitation of antibodies, immunocompetent cells' sorting and phagocytosis of macrophages experiments.

Practical part provided complete experiment on IgG antibodies immunoprecipitation from donor's peripheral blood plasma, antibody elution from beads, eluted antibody purification and verification. For experiment Dynabeads™ M-270 Epoxy (ThermoScientific, USA) were used for coupling with protein G, using Dynabeads™ Antibody Coupling Kit (ThermoScientific, USA) to isolate total IgGs. For antibody elution from the beads – two different buffers were used (for gentle elution – salt based buffer and acidic glycine buffer for faster elution). Antibody purification was made using Zeba Spin Desalting Column (ThermoScientific, USA). Eluted antibody's functionality was tested by following immune reaction with coupled beads followed by incubation with appropriate FITC labelled secondary antibodies and run in BD Accuri C6 plus flow cytometer.

Mentioned above experiment gave opportunity to acquire necessary knowledge and practice in antibody precipitation, elution and purification. This protocol could be easily adapted for all kinds of research in autoimmune studies, for example, immunoprecipitation of specific autoantibodies for desirable experiments by coupling specific antigen to the magnetic beads.

Workshop 3 – Quantitative, multiplex detection of cytokines using quantitative array platform on glass slide

PhD Gilad Halpert and MD, PhD Boris Gilburd, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, **Israel**

During the practical work, a method was learned that allows the determination of multiplex cytokines, in our case, in blood plasma samples using Quantibody® Human Th1/Th2 Array 1 Kit. This particular test detects 10 Human Th1 and Th2 cytokines. The Quantibody® array, is multiplexed sandwich ELISA-based quantitative array platform that enables researchers to accurately determine the concentration of multiple cytokines simultaneously. It combines the advantages of the high detection sensitivity & specificity of ELISA and the high throughput of arrays. A capture antibody is first bound to the glass surface. After incubation with the sample, the target cytokine is trapped on the solid surface. A second biotin-labeled detection antibody is then added, which can recognize a different epitope of the target cytokine. The cytokine-antibody-biotin complex can then be visualized through the addition of the streptavidin-conjugated Cy3 equivalent dye, using a laser scanner. We used 4 blood plasma samples from practically healthy blood donors and 4 samples – of fibromyalgia patients.

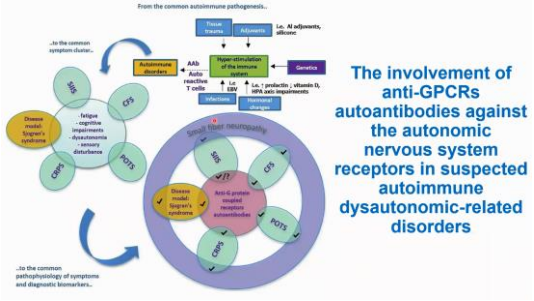
During this practical work, another method was learned to be applied when it is necessary to quantitatively analyze several cytokines in 1 sample.

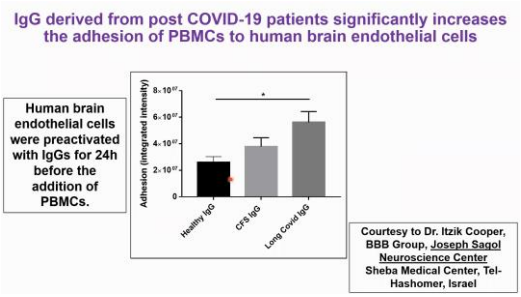
5th day of the summer school

There were two more lectures on the final day of the summer school:

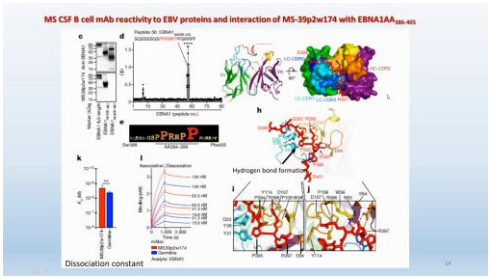
First lecture on the potential pathogenic effect of autoantibodies in acute/post COVID-19 patients was given by **PhD Gilad Halpert**, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel. Gilad Halpert was telling about evidences that has been described regarding neurological, subjective and autonomic-related clinical manifestations reported by Long COVID patients and that shared clinical symptoms and potential virus etiology for both chronic fatigue syndrome (CFS) and fibromyalgia syndrome (FMS), indicates clear similarity between these disorders and the development of Long COVID syndrome. The involvement of non-classical autoantibodies directed against GPCRs of the autonomic nervous system have been shown to play a significant role in the pathogenesis of various autoimmune diseases and in other suspected autoimmune dysautonomia-related disorders such as: chronic

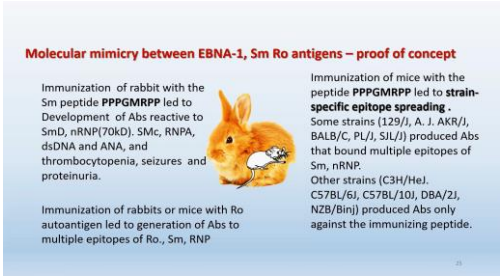
fatigue syndrome (CFS), fibromyalgia syndrome (FMS), silicone breast illness (SBI), postural orthostatic tachycardia syndrome (POTS) etc. As the involvement of unique IgG autoantibodies have been shown recently to play a significant role in the development of CFS and related disorders, they suggest that dysregulation in the level and functional activity of these type of non-classical autoantibodies, might serve an explanation to the panoply of subjective/autonomic/neurological symptoms reported in Long COVID patients.





Second lecture was given by **Prof Miri Blank**, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel. She was talking about EBV, molecular mimicry and autoimmune diseases. An interesting fact from the history of virus research was that EBV coexisted with humanity for more than 10 million of years. And of course, EBV is associated with many autoimmune diseases. In her presentation, the professor also gave several examples from the literature, where, based on research results, a clear association of the virus, for example, with causing MS, has been proven. EBV may act as initial trigger of future MS by activating MSRV, which would act as direct neuropathogenic effector before and during MS. Anti-EBV small capsid protein BFRF3 cross-react with cytoplasmic septin-9 BRRF2 binds mitochondrial proteins and are associated with demyelination. She in detail explained proof of concept of molecular mimicry. Professor Blank also explained the mechanisms of how HERVS is related to the etiopathogenesis of MS.





After the lectures, there were discussions in small groups where both the results of the practical work were discussed and we agreed on future cooperation in developing the research capacity of autoimmunity at the Institute of Microbiology and Virology.

Results of the evaluation questionnaire of the Summer School.

After the summer school, the participants had the opportunity to fill in the Summer School evaluation questionnaires. 26 out of 56 participants took part in the survey (Full evaluation form results are in the Appendix 3). The overall assessment of the event (from 1 = insufficient to 5 = excellent) was 4,73 – so close to the excellent. All participants stated that summer school achieved the program objectives. 92% of the respondents confirmed that the information and knowledge gained by participating in the summer school met expectations and 8% somehow met expectations. 58% of the participants will definitely use the acquired knowledge in their future work, 27% - mostly, but 15% of the participants will somehow use it in their work.

Regarding organization of the event (from 1 = insufficient to 5 = excellent) average number was 4.77.

Guidelines for WP3

- It is necessary to organize STSM in such a way that joint publications or at least scientific theses to be presented at conferences can be formed as a result of cooperation.

- Feedback on the acquired knowledge and results during STSM should also be available in each of the home laboratories, for example, in the form of a small seminar.
- More events in person should be performed, of course, if and when is possible, by meeting between the participants instead Online platforms. It promotes the formation of new collaborations at different levels.
- In the future, more emphasis should be placed on practical work in the laboratory. But in order to be able to do this successfully, such practical work should be organized in expert countries, where the particular method to be learned is their routine. Thus, greater expertise is gained and the planning and provision of practical work with relevant reagents and equipment is easy.

Conclusions

The 5-day summer school on new trends in molecular and immunological detection methodology of persistent viral infections provided theoretical and practical up-to-date knowledge on methods of detecting immunological changes caused by viruses. The practical work in the laboratory was very important not only because new knowledge was gained, but also because work protocols were prepared, which will be easily adapted to the work and applied to the implementation of the research tasks.

This summer school is definitely a success, given the high attendance and the feedback from the participants, where most indicate that the information and knowledge gained at the event will be useful in future work.

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

Summer School

New trends in molecular and immunological detection methodology of persistent viral infections

Rīga Stradiņš University, 16 Dzirciema Street, Riga
Hippocrates Lecture Theatre, Block A
and remotely via *Zoom* platform
11th, 12th and 15th July 2022

Rīga Stradiņš University, Institute of Microbiology and Virology, 5 Rātsupītes Street, Riga
13th and 14th July 2022

Summer School leader PhD, Lead Researcher Zaiga Nora-Krūkle

AGENDA

Day/ Date	Time GMT+3	Activity
Monday, 11 July	08.30 – 09.00	Registration
	09.00 – 09.20	Opening & Welcome **MD, PhD Modra Murovska**, Assoc. Prof., Project Coordinator, Institute of Microbiology and Virology, RSU, Latvia
	Session I	
	09.20 – 10.20	Lecture 1 – Viruses and autoimmunity **Prof. Yehuda Shoenfeld**, President of Ariel University, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel-Hashomer, Israel
	10.20 – 11.20	Lecture 2 – Emerging Viral Infections 1 **Prof. Dario Di Luca**, Dept. Medical Sciences, University of Ferrara
	11.20 – 11.30	*Coffee break*
	11.30 – 12.30	Lecture 3 – Emerging Viral Infections 2 **Prof. Dario Di Luca**, Dept. Medical Sciences, University of Ferrara
	12.30 – 13.30	*Lunch*
	13.30 – 14.30	Lecture 4 – Innate immune control of viral infections **Prof. Roberta Rizzo**, University of Ferrara, Dept. Chemical, Pharmaceutical and Agricultural Sciences

	14.30 – 15.30	Lecture 5 – Phagocytosis of inflammatory macrophages in autoimmune diseases **Prof. Marion Schneider**, Head of the Division Experimental Anesthesiology, Ulm University Hospital, Department of Anaesthesiology and Intensive Care, Ulm, Germany
	15.30 – 16.30	*Coffee break* / Q&A, discussions and networking
	Closing remarks of Day 1	
Tuesday, 12 July	Session II	
	09.00 – 10.00	Lecture 6 – Big Data analyses **Prof. Howard Amital**, Sackler Faculty of Medicine, Tel Aviv University; Head of the Department of Medicine B, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel
	10.00 – 11.00	Lecture 7 – Cytokines and P2X7 Polymophisms in Fibromyalgia patients **Prof. Marion Schneider**, Head of the Division Experimental Anesthesiology, Ulm University Hospital, Department of Anaesthesiology and Intensive Care, Ulm, Germany
	11.00 – 11.15	*Coffee break*
	11.15 – 11.55	Lecture 8 – Principles of biomarker detection **Kunal Garg**, PhD student, Division Experimental Anesthesiology, Ulm University Hospital, Department of Anaesthesiology and Intensive Care, Ulm, Germany
	11.55 – 12.15	Lecture 9 – Ido and kynurenine **MD Daniel Alexander Bizjak**, Division of Sports and Rehabilitation Medicine, Department of Medicine, Ulm University Hospital, Ulm, Germany
	12.15 – 12.30	Q&A
	12.30 – 13.30	*Lunch*
	13.30 – 14.30	Lecture 10 – The latest methods of cell analysis **MD, PhD Boris Gilburd**, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel
	14.30 – 15.30	Lecture 11 – Mechanisms leading to autoimmune diseases **Prof. Miri Blank**, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel
	15.30 – 16.30	*Coffee break* / Q&A, discussions and networking
	Closing remarks of Day 2	
Wednesday, 13 July; Thursday, 14 July	Practical work in the laboratory	
	09.30 – 9.45	Round of Introductions (participants)
	09.45 – 16.30	Workshop 1 – Practical work in the laboratory (BD Accuri C6 Plus) Use of flow cytometry for cell immunophenotyping. Practical use of FACS systems. In particular, acquisition and data analysis. **Prof. Roberta Rizzo**, University of Ferrara, Dept. Chemical, Pharmaceutical and Agricultural Sciences

	09.45 – 16.30	Workshop 2 – Isolation of IgG and Antigen-specific immunoglobulins using Dynal Bead procedures **Prof. Marion Schneider**, Head of the Division Experimental Anesthesiology, Ulm University Hospital, Department of Anaesthesiology and Intensive Care, Ulm, Germany **Prof. Miri Blank**, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel
	09.45 – 16.30	Workshop 3 – Quantitative, multiplex detection of cytokines using quantitative array platform on glass slide **PhD Gilad Halpert** and **MD**, **PhD Boris Gilburd**, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel
	11.00 – 11.20	*Coffee break*
	12.30 – 13.30	*Lunch*
	Session III	
Friday, 15 July	09.00 – 10.00	Lecture 12 – The potential pathogenic effect of autoantibodies in acute/post COVID-19 patients **PhD Gilad Halpert**, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel
	10.00 – 11.00	Lecture 13 – EBV, molecular mimicry and autoimmune diseases **Prof. Miri Blank**, Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Tel HaShomer, Israel
	11.15 – 12.00	Round table New trends in molecular and immunological detection methodology of persistent viral infections
	12.00 – 13.00	*Lunch*
	13.00 – 14.00	Future collaboration plans
		Closing remarks and Feedback

RĪGA STRADIŅŠ UNIVERSITY

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Summer School

New trends in molecular and immunological detection methodology of persistent viral infections

Rīga Stradiņš University, 16 Dzirciema Street, Riga
Hippocrates Lecture Theatre, Block A
and remotely via *Zoom* platform
11th, 12th and 15th July 2022

Rīga Stradiņš University, Institute of Microbiology and Virology, 5 Rātsupītes Street, Riga
13th and 14th July 2022

List of participants

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In person				
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55.	Teusa Marina	Latvian Institute of Organic Synthesis	Dr. chem.	
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Participant evaluation of the summer school

1. What is your overall assessment of the event (from 1 = insufficient to 5 = excellent)?
   Total 26 responses, average number 4,73.

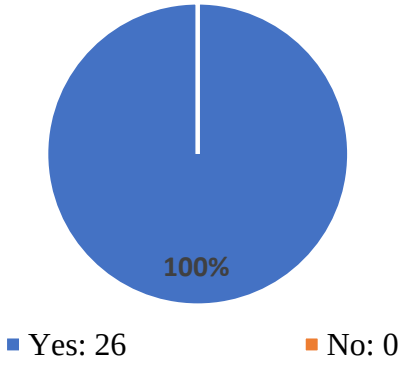
2. Which topics or aspects of the summer school did you find most interesting or useful?
   Total 25 responses.

    1. Practical question and role of viruses in autoimmune diseases.
    2. The different lectures from the professors.
    3. I found all topics and aspects of the summer school very interesting and useful, in different sub-fields and about realization of various goals.
    4. Autoimmunity.
    5. I can't really say that practical sessions or this/that lecture were more useful than other lectures. I think it was a great event altogether and there was a take-home message in presented every lecture.
    6. Opinion exchange.
    7. Emerging Viral Infections, Innate immune control of viral infections, Phagocytosis of inflammatory macrophages in autoimmune diseases, Quantification and Qualification of Phagocytosis and ion channel measurements using cLSM.
    8. Networking and practical work in the lab.
    9. Flow cytometry basics.
    10. Lectures of Marion Schneider.
    11. All topics were useful.
    12. Lectures and practical classes.
    13. Big Data analysis (Prof. Amital) and the Mosaic of autoimmunity (Prof. Shoenfeld).
    14. Practical lessons, where discussion with the professors were possible.
    15. Association between viruses and autoimmunity.
    16. Professor Rizzo lessons and speech.
    17. The combined action of students and advanced academic teachers were highly useful to disseminate knowledge and experiences.
    18. Prof. Roberta Rizzo lecture on Innate immune control of viral infections; Prof. Marion Schneider lecture on Phagocytosis of inflammatory

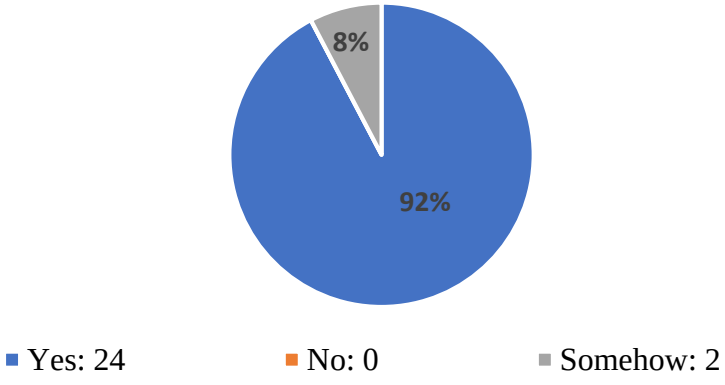
macrophages in autoimmune diseases, Prof. Howard Amital lecture on Big data analyses.

19. Viruses and autoimmunity.
20. Sorry due to my corona I participated only in part of the lectures which I enjoyed very much.
21. Quantitative, multiplex detection of cytokines using quantitative array platform on glass slide. Lectures.
22. Flow cytometry – practical work.
23. Lectures.
24. Practical part about flow cytometry.
25. Flow cytometry.

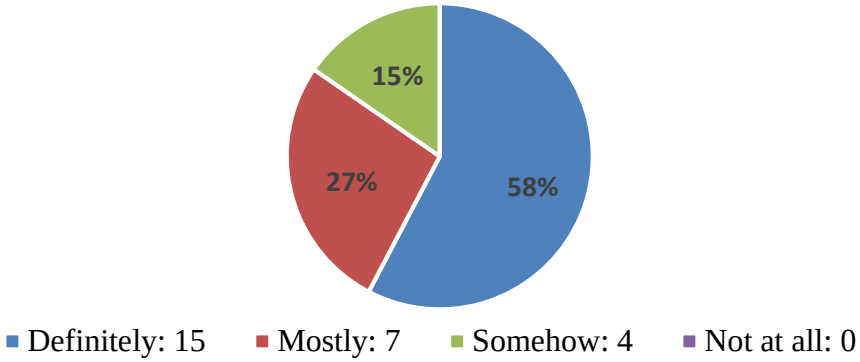
3. Did the summer school achieve the programme objectives?



4. Knowledge and information gained from participation at this event. Met your expectations?



5. Knowledge and information gained from participation at this event. Will be useful / applicable in my work?



6. Please comment on the organization of the event (from 1 = insufficient to 5 = excellent).
   Total 26 responses, average number 4,77.

7. Comments and suggestions (including activities or initiatives you think would be useful, for the future).

   - More events like these should be performed, of course, if and when is possible, by meeting between the participants instead Online, and in this relation, collaboration with anyone (no dependence who) from all the participants is very important about me, but also about my colleagues.

   - Shorter lectures.

   - Most likely miscommunication or some sort of error on my part – I didn't know that we have to apply separately for the weekend part of the summer school, so I missed that. Other than that – met new people, made some new contacts and visited a neighbouring research facility.

   - Many thanks!

   - Working in a safe environment could be improved somewhat by doing a COVID-19 antigen assay daily.