Motto: "*Physiology is the only polar star we have*"
L. Gattinoni

Venue: Hotel Duo, Teplická 492, 190 00 Prague 9

Conference Committee:

- Martin Balík (CSIM)
- František Duška (CSIM)
- Jan De Waele (ESICM)
- Julia Wendon (ESICM)

Thursday 4 June - Day 1

10:30-11:00 Physiology Espresso (a morning shot of physiology fundamentals)
Fundamentals of respiratory physiology
chalk talk by J. Doorduin, moderated by M. Mlček

11:00-12:00 Lunch break

12:00-12:15 Official Opening and Welcome
Speakers: J. De Waele, M. Balík, J. Wendon & F. Duška

12:15-13:00 Luciano Gattinoni Memorial Lecture
Personalizing Mechanical Ventilation: From Baby Lung to Modern Bedside Physiology
Speaker: M.Tobin

The "baby lung" concept transformed our understanding of ARDS by focusing on the functional lung size rather than radiographic appearance. In this lecture, we will trace the journey from Gattinoni's pioneering work to contemporary physiology-based tools such as driving pressure, mechanical power, and recruitability assessment, and how to integrate these principles into personalized ventilation strategies at the bedside.

13:00-14:30 Test Chest Case challenge
Brief talks starting with a case (1-3 slides + live streaming from actual ventilator connected to a Test Chest) and a clinical question/dilemma. Auditorium votes and their vote is displayed. Then experts explain their view and reasoning.

Chairs: L. Horáková, L. Piquilloud
Case 1 (L. Horáková) = Patient with restrictive lung disease and rapid shallow breathing pattern

- Lung recruitment – mechanisms and benefits (J. Laffey)
- Lung recruitment – gas methods vs. PV curve vs. imaging-driven? (M. Mlček)
- Lung rest and limitations of the open lung concept (M. Balík)
- Wrap-up: what do I take home (L. Piquilloud)

14:30-15:45 Work of breathing, diaphragm and some physics for ICU
Chairs: L. Horáková, L. Piquilloud
14:30-14:45 The basics: Work of breathing in health and disease (M. Mlček)
14:45-15:00 Ventilator-induced diaphragm dysfunction (J. Doorduin)
15:00-15:15 Respiratory drive – mechanisms, measurements and consequences (J. Laffey)
15:15-15:30 Nebulisation therapy during invasive ventilation: physics vs reality (L. Piquilloud)
15:30-15:45 Wrap-up: what do I take home (L. Giosa)

15:45-16:15 Coffee break

16:15-18:00 ICU lessons from extremes of physiology
Chairs: L. Piquilloud, X. Monnet
16:15-16:30 Physiology on Mount Everest (M. Khosravi)
16:30-16:45 Survival in avalanches – physiology of unaided breathing to snow (S. Rauch)
16:45-17:00 Physiology of extreme pressures: from deep see diving to space (L. Horáková)
17:00-17:15 Mechanism of suffocation by pressurising the chest (M. Tobin)
17:15-17:30 Physiology of accidental hypothermia (M. Balík)
17:30-18:00 Wrap-up: what do I take home (L. Piquilloud)

18:00-19:30 How human body works on extracorporeal life support
Chairs: M. Cecconi, X. Monnet
18:00-18:20 Physiology on VV ECMO (L. Giosa)
18:20-18:40 Physiology on VA ECMO (M. Mlček)
18:40-19:00 Awake ECMO and practical troubleshooting on VV ECMO (M. Balík)
19:00-19:20 Practical troubleshooting (e.g. hypoxia and hypercapnia) VA ECMO (J. Bělohlávek)
19:20-19:30 Wrap-up: what do I take home (X. Monnet)

19:30-20:30 Networking event – Welcome Drink

Friday 5 June - Day 2

08:00-08:30 Physiology Espresso (a morning shot of physiology fundamentals**)**
Bedside cardiocirculatory physiology
chalk talk by X. Monnet, moderated by M. Balík

08:30-09:00 Arthur C. Guyton Keynote Lecture
Principles of Guytonian Haemodynamics: The Legacy of One of Physiology's Greatest Minds
Chairs: O. Hamzaoui, M. Balík
Speaker: J. Takala

Arthur Guyton changed our understanding of the circulation by shifting focus from the heart as the sole driver of flow to an integrated system where venous return, stressed volume, and vascular capacity play central roles. In this lecture, Jukka Takala will revisit the core principles of Guytonian haemodynamics, explaining how pressure–flow relationships, cardiac function curves, and systemic vascular dynamics interact to determine perfusion and demonstrate how these concepts remain crucial for guiding therapy in critically ill patients.

09:00-10:30 Shock
Chairs: O. Hamzaoui, M. Balík
09:00-09:15 Causes, stages and compensatory responses in shock (M. Cecconi)
09:15-09:30 Dynamic indicators of preload responsiveness under variable stroke and respiratory volumes (X. Monnet)
09:30-09:45 Stress-related myocardial dysfunction (M. Chew)
09:45-10:00 The difficult one: RV failure (M. Balík)
10:00-10:15 Rate, rhythm and output (S. Havránek)
10:15-10:30 White board wrap-up (O. Hamzaoui)

10:30-11:00 Coffee break

11:00-13:00 Case challenge
Refractory shock CPR case going through low flow shock (domain 1), vasoplegia of reperfusion sy (domain2) and arrhythmic storms later (domain 3)

Brief talks starting with a case (1-3 slides for each domain) leading to a clinical question/dilemma. Auditorium votes and their vote is displayed. Then experts explain their view and reasoning – it is of crucial importance that this session is case-based discussion, not a series of independent frontal lectures, disconnected from the case! Preparation of this session is very demanding and requires a teleconference and a lot of coordination.

Chairs: K. Jiroutková, M. Balík
Panellists: M. Cecconi, M. Chew, J. Bělohlávek, X. Monnet, O. Hamzaoui, S. Havránek

- Domain 1 (low flow stage): Experts comments on

Management of cardiogenic shock: beyond revascularisation (X. Monnet leads)
What cardiac index is the indicator of shock refractoriness (D-E stage SCAI) and should trigger VA-ECMO (J. Bělohlávek leads)
Impact of cannula type and positioning (M. Balík leads)

- Domain 2 (vasoplegia): Experts comment on

Refractory vasoplegia – plans A, B, C (M. Cecconi leads)
Mechanisms and side effects / impact of vasoconstrictors, incl. on heart and pulmonary vasculature (O. Hamzaoui leads)

- Domain 3 (arrhythmic storm). Experts comment on

Decatecholaminisation (M. Chew leads)
Choice of antiarrhythmics and how echo can help (M. Balík leads)
External cardiac pacing – also for LV? (S. Havránek leads)
White board wrap-up: What did I learn from this case (M. Cecconi)

13:00-14:00 Lunch break

14:00-15:30 Autoregulation of organ perfusion aka which MAP is right?
Chairs: C. Ince, J. Laffey
14:00-14:15 Regulation of tissue perfusion and oxygenation (C. Ince)
14:15-14:30 Autoregulation of cerebral perfusion (V. Newcombe)
14:30-14:45 Coronary blood flow and implications for managements of MI (J. Bělohlávek)
14:45-15:00 Tubuloglomerular feedback and implication for AKI management (M. Ostermann)
15:00-15:15 First victims of shock? Regulation of gut and liver perfusion (J. Wendon)
15:15-15:30 White board wrap-up (M. Khosravi)

15:30-17:00 Microcirculation
In this session you will learn what tissue perfusion and vascular permeability mean and how macro- and microcirculation are coupled, what is critical closing pressure, mean systemic filling pressure and role of sympathetic system on the capillary pressure, (in)dependence of capillary pressure from systemic pressure in normal case vs shock/sepsis. This will prepare the ground for using microcirculation as a clinical target and understanding Starling principles and the kinetics of i.v. fluids.

Chairs: C. Ince, J. Laffey
15:30-15:45 Oxygen intake by the cells and controversies of oxygen extraction deficit in sepsis (J. Takala)
15:45-16:00 How to monitor tissue perfusion at bedside? (O. Hamzaoui)
16:00-16:15 What target should we use for resuscitation at the bed side? (M. Cecconi)
16:15-16:30 Vascular permeability and fluid kinetics (R. Hahn)
16:30-16:45 Sorry we made a mistake, please give us back starches! (C. Ince)
16:45-17:00 Wrap-up: what do I take home (F. Duška)

17:00-17:30 Coffee break

17:30-19:15 Abdominal compartment syndrome
Opening lectures:
(panellists in their chairs)
17:30-17:45 Third-spacing effect of fluids (R. Hahn)
17:45-18:00 Intra-abdominal pressure – introducing the concept, measurement, definitions, principles of management (M. Malbrain)

18:00-19:15 Case challenge
Session is introduced by showing a young patient with background of ALD, now presenting with very severe early acute pancreatitis: intubated, difficult to ventilate, who received many litres of fluid, swollen, urinary out dwindling, norad requirements increasing. There is ascitic fluid on CT, but rather difficult to reach… Panellists are sat on the podium and comment on different aspects of the case. This could be supported by few slides (ideally visual rather than text-heavy), but there is only one ppt presentation for whole session, which contains case presentation, Slido questions and eventually speakers slide.

Case presenter: A. Le Roy
Panellists: M. Malbrain, L. Piquilloud, X. Monnet, M. Ostermann, P. Caironi, J. De Waele

Case presentation (A. Le Roy)
Slido: IAH or ACS?

Consequences of IAH on lung mechanics and gas exchange – implication on management/ventilator setting (L. Piquilloud)
Slido: Ventilator setting – experts' comment
Assessing fluid need and preload responsiveness in IAH (X. Monnet)
Back to case – audience is shown results of tests recommended by X. Monnet and vote on fluids. They are also given a choice. Experts do not comment in this case and we go straight for the next lecture.
Fluid management in ACS (P. Caironi)
Same question on fluid choice. Are the results any different? Experts comment.
Consequences of IAH on renal function (M. Ostermann)
Slido: question on MAP target and/or whether they would start RRT or not
Is there anything else we can do …. (J. De Waele)
Slido: Tap or not to tap, decompression

19:05-19:15 Wrap-up: my take home messages (J. Wendon)

Missing and expected audience may ask: analgesia, antibiotic stewardship – not physiology, but relevant, alteration of cough mechanisms with open abdomen.

Saturday 6 June - Day 3

08:00-08:30 Physiology Espresso (a morning shot of physiology fundamentals**)**
Essentials of physiology-based fluid management
chalk talk by M. Malbrain moderated by F. Duška

08:30-09:15 Claude Bernard Keynote Lecture
The Cell-Based Model of Coagulation: From Bench Concept to Bedside in Critical Care
Chairs: J. Wendon, J. De Waele
Speaker: N. Juffermans

The cell-based model of coagulation reframes haemostasis as a dynamic, cell-driven process rather than a simple enzymatic cascade. In this lecture, Nicole Juffermans will guide the audience through the three overlapping phases of initiation, amplification, and propagation, highlighting the roles of tissue factor–bearing cells, platelets, and the endothelium. She will explore how this model explains the complex interplay between bleeding and thrombosis in critically ill patients, from trauma and sepsis to COVID-19-associated coagulopathy, and discuss how the cell-based framework informs modern coagulation monitoring and targeted interventions in the ICU.

09:15-10:45 Trauma and life-threatening haemorrhage
Chairs: J. Wendon, J. De Waele
09:15-09:35 Haemodynamic targets, stressed and unstressed volumes and the controversy of vasopressor use in haemorrhagic shock (M. Cecconi)
09:35-09:55 Viscoelastography in trauma: translating physiology to diagnostics and management (J. Laffey)
09:55-10:15 Inflammatory response in trauma (N. Juffermans)
10:15-10:45 Discussion, white board wrap-up + filling the gaps (J. Wendon)

10:45-11:15 Coffee break

11:15-13:15 Case challenge - Trauma
Brief talks starting with a case (1-3 slides for each domain) leading to a clinical question/dilemma. Auditorium votes and their vote is displayed. Then experts explain their view and reasoning – it is of crucial importance that this session is case-based discussion, not a series of independent frontal lectures, disconnected from the case! Preparation of this session is very demanding and requires a teleconference and a lot of coordination.

Chairs : L. Galarza, A. Le Roy
Panellists : V. Newcombe, P. Caironi, N. Juffermans, M. Malbrain, F. Duška

A bleeding trauma patient with shock and coagulopathy, who need resuscitation and blood products. Then TBI dominates, polytrauma – management of TBI and ARDS - thromboembolic event risk creates the dilemma of how to find the right balance and monitor coagulation.

Possible questions in Slido:
What fluids to give when blood products temporarily run out/pending and the patient is profoundly hypotensive ("Give us starches back"?) What to give
Vasopressors in hypovolemia
What monitoring is useful
TEG-treatment pairing
Bicarb or not for lactic acidosis and coagulopathy
Management of brain – diffuse traumatic injury
Monitoring option CP monitoring and why (not)
Pulmonary contusions +++ ARDS / lung trauma management +/- abdominal trauma
Active intra-abdominal bleeding
Spleen and duodenum and small bowel, pancreatic contusion
Balance of organs hierarchy
Brain > lung (extracorporeal C02 removal) > abdomen / renal
When to start anticoagulation or insert IVC filter

13:15-14:15 Lunch break

14:15-15:45 Neurophysiology in action
Chairs: V. Newcombe, L. Galarza
14:15-14:30 Pathophysiology of subarachnoid haemorrhage? (L. Galarza)
14:30-14:45 Brain in acute liver failure (J. Wendon)
14:45-15:00 Status epilepticus: channels, receptors and drugs we use (V. Newcombe)
15:00-15:15 What is exactly hypoxic myoclonus? (L. Horáková)
15:15-15:45 Discussion, white board wrap-up + filling the gaps (F. Duška)

15:45-16:15 Keynote J.E. Purkyně lecture
Primum non nocere: guideline-driven vs. personalised, physiology-based intensive care
Speaker: Jan De Waele

16:15-16:30 Closing Remarks
Speakers: J. De Waele, J. Wendon, F. Duška & M. Balík