NEUROPROGNOSTICATION IN STROKE

Cathy J. PRICE

UNIVERSITY COLLEGE LONDON, LONDON, UNITED KINGDOM

Biosketch

Cathy Price is Director of Wellcome Centre for Human Neuroimaging and an expert in the use of structural and functional brain imaging for understanding cognitive processing in the neurologically healthy and damaged brain. Her basic training was in Physiology and Psychology and she has a PhD in cognitive neuropsychology. Since 1997, she has been funded by the Wellcome Trust to build a functional anatomical model of auditory and visual word processing that will predict language outcome after brain damage. Currently, her focus is on the clinical translation of her science. In particular, she is developing a clinical tool that uses lesion site to predict and understand the most likely outcome and recovery of language abilities after stroke.

PREDICTING RECOVERY FROM APHASIA AFTER STROKE

Not being able to speak to family and friends is one of the most devastating consequences of stroke. And patients desperately want to know if they will recover. Currently, clinicians can't provide accurate predictions because it hasn't been known which patients will or will not recover from severe aphasia. The work I will discuss predicts recovery based on where in the brain the damage has occurred. Using a novel approach based on neuroimaging and behavior assessments from hundreds of stroke patients who are tested at different times post stroke, we have identified which brain regions are consistently associated with persistent aphasia and which set of brain regions need to be preserved to support recovery. The findings have important implications for the types of therapy a patient needs. For example, if we know a patient has the capability to recover then therapy can focus on speeding up that recovery. On the other hand, if recovery is likely to be slow and challenging then patients need to be prepared for this and helped to learn new ways of communicating. With this work, we hope to improve the quality of life for many patients after stroke.

Charlotte ROSSO

SORBONNE UNIVERSITY, PARIS (FRANCE)

Biosketch

Charlotte Rosso is a stroke specialist working at the Pitié-Salpêtrière Hospital. She completed her PhD in 2009 on diffusion MRI biomarkers on stroke patients' outcome prediction. During her post doc at the ICM, she developed her skills with functional MRI and non-invasive brain stimulation techniques (NIBS) to study brain plasticity after stroke and in order to apply individualized treatments to patients. She already completed several research programs as a PI in acute and chronic stroke.

PREDICTION OF MOTOR RECOVERY AFTER ISCHEMIC STROKE

Predicting motor outcome has become one of the most important questions in stroke research. The initial severity of a given deficit has been shown to highly correlate to its final severity; however, clinical scales used to evaluate residual neurological function suffer from a poor specificity- sensitivity trade off. In particular, initially minor deficits will almost always resolve themselves in the long run, whereas patients with mild-to-severe deficits exhibit highly variable recovery trajectories, making their final outcomes difficult to predict. This is one of the reason why a « one size fits all approach » in rehabilitation treatments could fail, and why it is crucial to identify biomarkers that could improve patients outcome prediction. Stroke biomarkers include quantitative characterisation of the stroke lesion itself, as well as the structure and function of the non-lesioned areas using neurophysiological and neuroimaging biomarkers that can be studied using electroencephalography or transcranial magnetic stimulation, and magnetic resonance imaging (by structural or functional sequences) respectively.

NEUROPROGNOSTICATION IN CARDIAC ARREST

Denis VIVIEN

INSERM PARIS / GIP CYCERON CAEN, FRANCE

Biosketch

Professor of Cell Biology - Caen Medical School -University Caen-Normandie
Professor Caen University Medical Center (CHU Côte de Nacre) - Department of Clinical Research
Professor senior Institut Universitaire de France IUF (2009)

Head UMR-S U1237 "Physiopathology and Imaging of Neurological Disorders" PhIND
INSERM / EFS / Univ. Caen-Normandie
Team A leader "tPA and neurovascular disorders"
GIP CYCERON
Head « Centre de Ressources Biologiques - InnovaBIO » et Cellule Innovation Diagnostique et Thérapeutiques - CIDT, Centre Hospitalier Universitaire de Caen Normandie

PATHOPHYSIOLOGY OF ISCHEMIC BRAIN INJURIES

Although recent technical advances in thrombectomy have revolutionised acute stroke treatment, prevalence of disability and death related to stroke remain high. Therefore, plasminogen activators - eukaryotic, bacterial, or engineered forms that can promote fibrinolysis by converting plasminogen into active plasmin and facilitate clot breakdown - are still commonly used in the acute treatment of ischaemic stroke. Hence, plasminogen activators have become a crucial area for clinical investigation for their ability to recanalize occluded arteries in ischaemic stroke and to accelerate haematoma clearance in haemorrhagic stroke. However, inconsistent results, insufficient evidence of efficacy, or reports of side-effects in trial settings might reduce the use of plasminogen activators in clinical practice.
Additionally, the mechanism of action for plasminogen activators could extend beyond the vessel lumen and involve plasminogen-independent processes, which would suggest that plasminogen activators have also non-fibrinolytic roles. Understanding the complex mechanisms of action of plasminogen activators can guide future directions for therapeutic interventions in patients with stroke.

Robert D STEVENS

JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE, BALTIMORE, USA

Biosketch

Robert David Stevens is an Associate Professor in Johns Hopkins University with appointments in Anesthesiology and Critical Care Medicine, Neurology and Radiology. He is faculty in the Institute for Cell Engineering, the Kennedy Krieger Institute's Kirby Center for Functional Neuroimaging, and in the Institute for Computational Medicine. Dr Stevens' vision is to deploy Precision Medicine for the benefit of critically ill and injured patients. His research seeks and validates patient-specific signatures associated with trauma, surgery and acute conditions such as stroke, cardiac arrest, and sepsis. To achieve this, he engages with an interdisciplinary group of basic and systems neuroscientists, biomedical and computer engineers, data scientists, and neuroradiologists. Dr Stevens is the principal investigator of the Neuroimaging for Coma Emergence and Recovery (NICER) project which examines the brain connectome to enhance classification and prediction in patients recovering from severe brain injury. Other projects from Dr Stevens' group analyze features captured through neurophysiologic monitoring, blood-based biomarkers and wearable sensors, with the goal of building models for outcome prediction and treatment selection. In the lab, Dr Stevens' group studies molecular and cellular determinants of injury and recovery in experimental models of brain injury, with a special emphasis on host responses and cellular regeneration.

FUNCTIONAL AND STRUCTURAL MRI FOR NEUROPROGNOSTICATION AFTER CARDIAC ARREST

This talk will discuss major studies completed using brain MRI in post-cardiac arrest phase, highlighting new biological insights and advances in diagnosis and neurologic prognostication. Recent technological and analytical advances have enabled detailed mapping of regional structure, function and physiology. Available findings suggest a model in which changes in the post-cardiac arrest brain are linked to modifications in cellular homeostasis and in the anatomical and functional connectivity of distributed neuronal systems. Detailed analysis of these systems can significantly increase the performance of models for classification and prediction.

Michel Van PUTTEN

UNIVERSITY OF TWENTE & MEDISCH SPECTRUM TWENTE, ENSCHEDE, THE NETHERLANDS

Biosketch

Michel J.A.M. van Putten MD MSc PhD
Medisch Spectrum Twente & University of Twente
Enschede, the Netherlands
m.j.a.m.vanputten@utwente.nl

EARLY EEG FOR NEUROLOGICAL PROGNOSTICATION OF POSTANOXIC COMA IN THE ICU

I will shortly review which processes fail during hypoxia/ischaemia, focusing on synaptic transmission, membrane potentials and cell volume regulation. I will discuss to which extent these processes are reversible and which time scales are involved.

I will discuss the relation of the pathophysiology and continuous EEG, and explain why the EEG is an excellent measurement tool to monitor potential recovery of neuronal function.

I will present the most common EEG patterns that can be observed in comatose patients after cardiac arrest, based on our prospective cohort of over 800 patients. I will review the prognostic relevance of continuous EEG, both for predicting good and poor neurological outcome, illustrated with various clinical examples. I will stress the importance of evaluation of EEGs with respect to the time of cardiac arrest and show that early recordings (< 24 h) have the best prognostic value with sensitivities of 30-40% at specificity of 95% for good outcome (CPC 1-2) and sensitivities of 40-50% at specificity 100% for poor outcome (CPC 3-5). In closing, I will present how deep learning can assist in the interpretation of these EEG patterns.

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Alain CARIOU

PARIS DESCARTES UNIVERSITY, FRANCE

Biosketch

Alain Cariou is Professor of intensive care medicine and therapeutic at Paris Descartes University, and senior physician at the Medical ICU of Cochin University Hospital (APHP) in Paris, France. He is also associate researcher at INSERM, U970 in the Paris Cardiovascular Research Center (PARCC), in which he is involved in the Sudden Death Expertize Center. He is an expert in the field of post-resuscitation care as reflected by his past and present clinical research activities regarding early coronary reperfusion and targeted temperature management in this population. He also recently leaded a research program focusing on pharmacological protective effect of erythropoietin analogs in post-cardiac arrest patients.

PRAGMATIC APPROACH OF PROGNOSTICATION AFTER CARDIAC ARREST

A vast majority of patients who are resuscitated from a cardiac arrest (CA) are still comatose after return of spontaneous circulation (ROSC) because of either transient or definitive anoxic-ischemic brain injury. Among these comatose patients, a significant proportion of them remain unconscious after rewarming from targeted temperature management (TTM) and discontinuation of sedation. Despite the improvement of post CA care, most of these comatose patients will die following withdrawal of life-sustaining treatment (WLST) for irreversible post-anoxic encephalopathy. Early identification of neurologic outcome is one of the most challenging issues in this situation, facing both the risk of prolonging futile care or instituting inappropriate WLST. European Resuscitation Council and European Society of Intensive Care Medicine guidelines recommend to delay the initiation of WLST until exclusion of potential confounders, focusing mostly on residual sedation (3, 4). Indeed, predictive value of clinical indicators can be influenced by remaining effects of sedatives, as illustrated by clinical studies that reported a high rate of delayed awakening (5, 6). Consequently, a combination of prognostic tools that are independent of sedation should always be combined to avoid premature WLST. The aim of the presentation will be to discuss updated that may be used for neuroprognostication after cardiac arrest.

NEUROPROGNOSTICATION IN TRAUMATIC BRAIN INJURY

Jonathan COLES

UNIVERSITY OF CAMBRIDGE, CAMBRIDGE, UNITED KINGDOM

Biosketch

Jonathan Coles is a Consultant working within the Neurosciences Critical Care Unit (NCCU) at Addenbrooke's Hospital and Lecturer within the University Department of Anaesthesia, University of Cambridge, UK. He completed his clinical and research training in Cambridge, and was awarded a PhD in the field of neuro-imaging following clinical head injury based within the NCCU and Wolfson Brain Imaging Centre (WBIC) in Cambridge in 2004. He conducts a program of research that examines mechanisms responsible for secondary neuronal injury, their temporal profile, and implications for eventual neurocognitive recovery following traumatic brain injury.

PATHOPHYSIOLOGY OF TRAUMATIC BRAIN INJURY

Oxygen-15 positron emission tomography (PET) following early traumatic brain injury (TBI) has identified a variable, but significant, volume of reversible ischemia despite adequate surgical and intensive care management. In addition, severe derangements in metabolism and tissue hypoxia can occur despite adequate blood flow and oxygenation. This is consistent with mitochondrial dysfunction, microvascular injury and a failure of oxygen delivery leading to tissue hypoxia and metabolic crisis. PET imaging studies using a variety of different ligands demonstrate evidence of tissue hypoxia, non-ischaemic hyperglycosis, inflammation, excitotoxocity and selective neuronal loss following TBI. Such processes may result from, or lead to, evidence of spreading depolarization, peri-infarct depolarisations and seizures which are associated with poor outcome. Understanding the temporal and spatial profile of pathophysiological derangements in clinical TBI may help refine current management and provide targets for novel therapeutic interventions that aim to improve functional outcome for patients.

Hester LINGSMA

ERASMUS MEDICAL CENTER, ROTTERDAM, THE NETHERLANDS

Biosketch

Dr. Hester Lingsma is associate professor of Medical Decision Making in the department of Public Health in the Erasmus MC in Rotterdam, the Netherlands. She leads a multidisciplinary research group of >20 researchers involved in prediction research, comparative effectiveness research, and quality of care research. Her main clinical field of application is acute neurological diseases, including ischemic and haemorrhagic stroke and traumatic brain injury. Dr. Lingsma has co-authored over 250 international peer reviewed publications and has a H index of 48.

EPIDEMIOLOGICAL RESEARCH ON PROGNOSTICATION OF TBI OUTCOME

Jacques LUAUTE

HOSPICES CIVILS DE LYON, LYON, FRANCE

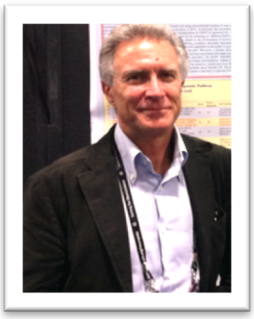
Biosketch

Jacques Luauté is a specialist in physical medicine and rehabilitation at Lyon university hospital, head of a department of neuro-rehabilitation which includes a post-intensive rehabilitation unit where post-comatose awakening patients are admitted after intensive care. Since 20 years, he has been interested in improving coma prognostication using multivariate models. Improving awareness detection with functional imaging, neurophysiological tools, drugs, brain stimulation and personalized stimulus is another field of research developed in the department in collaboration with intensivists, neurologists and researchers. This background of research lead to the conviction that prognostication of coma, especially after traumatic brain injury, is a very complex and multifaceted issue.

LONG TERM IMPROVEMENT AFTER TBI

Long term prognostication after traumatic brain injury is a very complex issue given the multiplicity of determinants potentially involved: brain lesion volume, lesion location and type, age at the time of injury, delay of awakening, severity of initial impairments, cognitive level and social environment before injury. The nature of the outcome studied is also a key factor: awakening, disability, quality of life, social reintegration… After a brief overview of the literature, the talk will focus on the results of our group showing the utility of a multifactorial approach including evoked potentials and long-term functional outcome.

NEUROPLASTICITY



Maurizio POPOLI

UNIVERSITY OF MILAN, MILAN, ITALY

Biosketch

Maurizio Popoli is a Professor of Pharmacology at the University of Milano (Italy). At present, he is member of Governing Board of Italian Society for Neuroscience (SINS), and of Sci. Program Committee of ECNP. He received postdoctoral training at Dept. of Psychiatry, Washington University, (St. Louis, MO). His studies have contributed to characterization of cellular/molecular mechanisms involved in pathophysiology of neuropsychiatric disorders and psychotropic drug action. Current research topics are stress-related neuronal and synaptic dysfunction in brain pathophysiology, and investigation of new targets for treatment.

STRESS-INDUCED MECHANISMS OF NEUROPLASTICITY IN PATHOPHYSIOLOGY OF BRAIN DISEASES

Stress-related brain disorders are among major causes of disability worldwide and represent one of the great therapeutic challenges for the 21st century. The present times are characterized by unprecedented social, economical and geopolitical changes, progressing at increasingly faster pace. In developed countries, deep changes involve work organization and interpersonal relationships transformed by social media. In underdeveloped countries, war, mass migration and terrorism affect the life of millions. In both cases, the impact on prevalence and burden of brain disorders is expected to be remarkable, and poses great challenges to neuropsychopharmacology. Understanding the dynamic nature of pathophysiological mechanisms underlying stress/trauma-related psychiatric disorders is crucial for the development of effective therapies.
New experimental protocols for the dynamic dissection of acute and long-term stress response, allowing the identification of different trajectories of resilience versus vulnerability, will be shown.

Diego GAZZOLO

"CESARE ARRIGO" CHILDREN'S HOSPITAL, ALESSANDRIA, ITALY

Biosketch

Diego Gazzolo (1959) is the Director on the NICU at the AO SS Antonio, Biagio, C. Arrigo, in Alessandria, Italy. He is Director of the NICU in Alessandria from 2008 to date and Coordinator of the Italia-Olanda International Research Program (IO PhD) from 2010 to date. His clinical and experimental field of interest regard: perinatal brain damage, neurobiomarkers, perinatal asphyxia, brain development.

EARLY MARKERS OF PERINATAL BRAIN DAMAGE

Early detection of perinatal brain damage in preterm and term infants still constitutes a huge challenge for neonatologists. Intraventricular hemorrhage, periventricular leukomalacia and hypoxic-ischemic encephalopathy secondary to perinatal asphyxia are the major complications accounting for perinatal mortality and morbidity. Despite clinical, laboratory and ultrasound perinatal monitoring procedures, the post-insult period is crucial because at a time when monitoring parameters are of no avail, brain damage may already be at a subclinical stage. Against this background, the measurement of brain constituents able to detect sub-clinical lesions when standard monitoring procedures are still silent could be particularly useful.

The food and drug administration (FDA), the European medicines agency (EMA) and, more recently, the national institutes of health (NIH) are supportive of research to identify biomarkers able to offer early identification of patients at risk.

The present review offers an up-to-date overview of the most promising developments in the use of neurobiomarkers such as S100B protein, adrenomedullin, activin A, neuron specific enolase, oxidative stress markers, glial fibrillary acidic protein, and ubiquitin carboxyl-terminal hydrolase-L1 in the perinatal period.

John ROTHWELL

UNIVERSITY COLLEGE LONDON, LONDON, UNITED KINGDOM

Biosketch

John Rothwell is Professor of Human Neurophysiology at University College London. His main interest is the neurophysiology and pathophysiology of human movement, particularly in relation Movement Disorders and Stroke. He is one of the pioneers of non-invasive methods for stimulating the human brain.

PLASTICITY AND CONNECTIVITY – DETECTION AND STIMULATION WITH TMS

After stroke, patients recover a large proportion of the movements that were lost in the acute period. However, we have little information on the underlying physiology of this "spontaneous recovery" in humans. Animal models suggest that the initial weeks after stroke are characterised by a period of enhanced synaptic plasticity in which changes in synaptic strength and connectivity occur more easily than in the normal adult brain. We recently conducted a trial in stroke patients to examine whether this a similar phenomenon occurs in humans. Plasticity was measured using transcranial magnetic stimulation (TMS). TMS evokes synaptic activity in the brain and therefore repeated TMS (rTMS) activates the same synapses respectively which causes temporary changes in their strength, often referred to as synaptic plasticity. The data show that it is easier to induce changes in plasticity in the early weeks after stroke than at six months later. It seems that as in animal data, there is in humans a window of enhanced plasticity early after stroke that may underlie the period of spontaneous clinical recovery.

NEUROPROGNOSTICATION OF CONSCIOUSNESS

Aurore THIBAUT

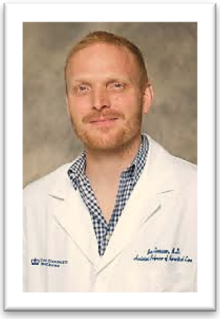
UNIVERSITY OF LIEGE, LIEGE, BELGIUM

Biosketch

Dr. Thibaut has a master in Physical Therapy and Rehabilitation and did a specialization in Neuroscience (University of Liege in Belgium). She did her PhD with the Coma Science Group (Pr. S. Laureys, GIGA Research, University of Liege, Belgium) and currently has a FNRS post-doctoral position.
Since 2011, she has been studying potential treatments for patients in an altered state of consciousness, such as non-invasive brain stimulation. She is also working with positron emission tomography (PET scan) and electroencephalography in combination with clinical evaluations in order to improve patients' diagnosis and uses this technique to develop biomarkers of good or poor prognosis.
Dr. Thibaut is the leader of the IBIA DOC-SIG treatment subgroup aiming at improving DOC patients' cares and management. She recently received the IBIA young investigator award (2019) for her contribution to the field of brain injury science.

CLINICAL EVALUATION OF CONSCIOUSNESS IN THE ICU

At present, the assessment of post-comatose patients remains a daily challenge for medical teams. Such clinical evaluations are even more complicated when they have to be done in the intensive cares units because of the numerous confounding factors. Some of these patients will recover a normal level of consciousness, while others will only partially recover. The population is generally classified into two distinct groups according to the signs of consciousness they demonstrate: the unresponsive wakefulness syndrome (UWS) and minimal consciousness state (MCS). UWS patients are awake but do not present any signs of intentional behaviour, while MCS patients demonstrate oriented behaviors such as visual pursuit or command following. From a clinical point of view, an amalgam is often made between UWS and MCS patients and people presenting a locked-in syndrome (LIS) that can appear clinically similar. Various behavioral scales have been developed to evaluate the level of consciousness of post comatose non-communicative patients. Early diagnosis of signs of consciousness is crucial given the difference in prognosis in patients who recover or not a sign of consciousness early after the injury. In addition, it will have great implication in patients' management, cares but also possible end-pf-life decisions. It is therefore very important to use a sensitive scale to assess these patients at the bedside. In this presentation, we will describe the scales most commonly used in the intensive care units to assess patients' level of awareness, developing the advantages and disadvantages of each of them.



Jan CLAASSEN

COLUMBIA UNIVERSITY, NEW YORK, USA

Biosketch

Dr. Claassen is a nationally and internationally recognized expert in the treatment of neurological intensive care. He is an expert in status epilepticus and brain hemorrhages. He is the co-chair for guidelines development for the Neurocritical Care Society. Dr. Claassen received a PhD in neurophysiology studying evoked potentials after traumatic brain injury. He has published more than 150 journal articles, book chapters, and reviews. He has championed the use of innovative brain monitoring techniques including continuous EEG monitoring. He has published more than 150 journal articles, book chapters, and reviews. His research characterizes physiologic changes following acute brain injury, focusing on novel treatment approaches to potentially improve patient outcomes.

UNCOVERING CONSCIOUSNESS IN UNRESPONSIVE ICU PATIENTS: TECHNICAL, MEDICAL AND ETHICAL CONSIDERATIONS

Mario ROSANOVA

UNIVERSITY OF MILAN, MILAN, ITALY

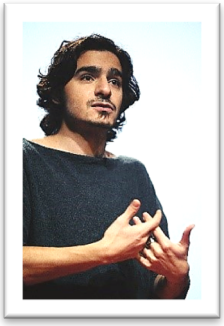
Biosketch

Mario Rosanova (1974) is associate professor of human physiology at the University of Milan, Milan, Italy. In 2001, after graduating in Medicine and Surgery at the University of Milan with full marks, he started a Ph.D. in human physiology. As a research assistant at the Neurophysiology Laboratory of the Laval University, Quebec City, Canada, led by Igor Timofeev and Mircea Steriade, world's experts in intracellular recording technique and sleep, he studied the activity of cortical neurons in an in vivo animal model of deep sleep (Rosanova & Timofeev, J Physiol 2005). He graduated with a doctoral thesis titled "Dynamics of the cortical electrical activity during slow wave sleep", he obtained a postdoctoral fellowship from the prestigious Institute of Physiology at the University of Bern, Switzerland, where he applied whole patch-clamp in vitro to study neuronal plasticity during deep sleep (Rosanova & Ulrich, J Neurosci 2005). Since 2005, he works in the laboratory led by Marcello Massimini and Maurizio Mariotti at the University of Milan. In this lab he contributed to the development of Transcranial Magnetic Stimulation combined with Electroencephalogram (TMS/EEG) for the study of human cortical circuits in in physiological conditions, such as wakefulness (Rosanova et al., J Neurosci 2009) and sleep, and diseases such as coma, vegetative state (Rosanova et al., Brain 2012; Rosanova et al., Nat Comm 2018) and cerebral stroke. He has co-authored 47 scientific publications in international peer-review journals (https://scholar.google.com/citations?user=6li4Ay0AAAAJ&hl=en) and seven book chapters

PROBING EEG COMPLEXITY IN CONSCIOUSNESS DISORDERS

Severe brain injuries can lead to coma, a condition in which the patient lies with eyes closed and cannot be awakened. Then, the patient can wake up, but without recovering consciousness of both internal and external world. This condition is known as Unresponsive Wakefulness Syndrome (UWS, previously Vegetative State) in which only reflex movements are present and a sleep-wake cycle recover. Surprisingly, the brain of most UWS patients is active and reactive, but is stuck in a state of low-complexity, as measured by the Perturbational Complexity Index (PCI), a metric that is based on measurements performed by means of the Transcranial Magnetic Stimulation combined with EEG (TMS/EEG). Indeed, recent electrophysiological studies revealed that in non-REM (NREM) sleep, anesthesia, and severely brain-injured patients, cortical networks fail to engage into complex interactions when directly perturbed, a theoretically necessary requirement for consciousness to arise. Why is this so?

DECISION MAKING IN HIGH DEGREE OF UNCERTAINTY



ALBERT MOUKHEIBER

CHIASMA, PARIS, FRANCE

Biosketch

Dr. Albert Moukheiber is a neuroscientist and clinical psychologist. He has worked for 10 years in the psychiatry department at the Pitié-Salpêtrière Hospital, focusing mainly on anxiety disorders and resilience. He now works as a clinician at his practice and teaches at the University Paris 8 in the clinical psychology department. He has also founded Chiasma, a structure that is interested in how our brain reconstructs reality to confirm our prior beliefs and how to promote mental flexibility. Chiasma focuses on how we form opinions and the impact of these mechanisms on our decision making. Albert is also a lecturer and a lead workshop developer for businesses and shares the latest scientific discoveries on behavior and cognition and how they impact our daily lives. He currently works on the factors that impact decision making such as motivated reasoning or cognitive biases.

GENERAL INTRODUCTION TO DECISION MAKING

We do not see the world as it is, rather, we reconstruct it in our mind. This interpretation of the world is highly subjective and various elements influence the way we acquire knowledge and form opinions.
During this talk, we will explore the building blocks of our cognition and behavior that are involved in acquiring knowledge, forming opinions or taking decisions.
We will look at how we reconstruct the world at a perceptual level and confabulate stories to attribute it meaning based on our priors and how these priors impact the decision we take. We will finally try to see what we can do to mitigate the negative effects of these various elements through self-doubt, thinking about thinking, learning to learn and learning to unlearn.

Niklas KELLER

CHARITÉ-UNIVERSITÄTSMEDIZIN, BERLIN, GERMANY

Biosketch

Niklas Keller (1981) is an organizational psychologist at the Charité University Medicine's Clinic for Anesthesiology and Intensive Care Medicine, Berlin, Associate Researcher at the Harding Centre for Risk Literacy of the Max-Planck-Institute of Human Development, Berlin, and founding member and CEO of Simply Rational Ltd. Berlin. In his work at the Charité, he conducts studies on decision support (post-operative patient allocation) and mnemonic support (post-operative patient handovers to the ICU) tools in clinical practice and how to integrate human factors psychological insights with data science to produce what he refers to as Translational Data Science: a data science that is attuned to end-user needs and robust to sources of clinical friction.

HOW TO IMPROVE MEDICAL DECISION MAKING UNDER PRESSURE / UNCERTAINTY?

Many medical decisions take place within a tight net of constraints: they need to be transparent in order to be communicated to patients and other healthcare teams, or if the need to justify a decision arises. They often need to be made under time pressure and the consequences of a mistake can be very grave. Making medical decisions should also contribute to the development of competence and expertise and, ideally, should function independent of the degree of IT-infrastructure in a particular setting as to overcome interface issues when transferring patients from, e.g., intensive to ambulatory care. To date, very few decision support tools pay heed to these requirements: black-box algorithms dominate the medical decision support landscape. One type of algorithm, so-called "Simple Heuristics" meet many of these requirements present in the medical domain: they are easily understood, remembered and communicated, they can be applied quickly and under time pressure, and they require any IT-infrastructure. At the same time, they are constructed based on sophisticated data scientific methods, allowing in depth analyses and strategic performance projections under varying conditions. Dr. Keller will outline his vision of "digitalization through laminated pocket cards" and how it may support medical decision making across multiple levels of healthcare organizations.

Christos LAZARIDIS

UNIVERSITY OF CHICAGO, CHICAGO, USA

Biosketch

Dr. Lazaridis is a neurointensivist, and an associate professor in the departments of neurology, and neurosurgery at the University of Chicago. His clinical training includes a neurology residency at the University of Texas, Southwestern Medical School, neurocritical care fellowship at Johns Hopkins University, and sub-fellowships at Cambridge, and Toronto Universities. His main interests focus on the critical care monitoring and management of acutely brain-injured patients, and on ethical issues pertaining to their care. Dr. Lazaridis has authored/co-authored over 70 peer-reviewed manuscripts in the areas of critical care, neurology, neurosurgery, stroke, and medical ethics

THE KEY ROLE OF UNCERTAINTY IN DECISIONS TO WITHDRAW LIFE-SUSTAINING TREATMENTS

Withdrawal of life-sustaining treatments (WOLST) is the leading proximate cause of death in patients with perceived devastating brain injury. There are reasons to believe that a potentially significant proportion of WOLST decisions, in this setting, are premature and guided by a number of assumptions that falsely confer a sense of certainty. In this talk I propose that these assumptions face serious challenges, and that we should replace unwarranted certainty with an appreciation, and toleration, of the great degree of multi-dimensional uncertainty involved.

NEUROPROGNOSTICATION IN STROKE (FOLLOW)

BRAIN DEATH:
CONCEPTS AND CHALLENGES

Giuseppe CITERIO

MILANO BICOCCA UNIVERSITY, MILAN, ITALY

Biosketch

Professor of Anesthesia and Intensive Care at the Milano Bicocca University, School of Medicine and Surgery.
Director of Anesthesia and Neurosurgical Intensive Care, San Gerardo Hospital, Monza.
He started Neurointensive and Neuroanesthesia in the early '90 at San Gerardo Hospital in Monza, after an early experience at San Raffaele Hospital in Milano. He trained since that time the staff and residents.
The Neurosurgical Intensive Care actively participated in national and international networks, such as BrainIT and CenterTBI.
All the teaching and research activities have been strongly based on pathophysiology basis.
Research activities are focused on TBI, subarachnoid hemorrhage, neuroanesthesia, neurointensive care and brain death/organ donation.
Publications indexed> 275, available at orcid.org/0000-0002-5374-3161.
He participated in the development of international guidelines on the treatment of patients with subarachnoid hemorrhage and neuromonitoring.
He has developed more than 50 courses in Italy and Europe on Neurointensive Care topics, last but not least a Summer School UNIMIB - NeuroIntensive Care 2017.
Publisher of the book "Oxford Textbook of Neurocritical Care" (Oxford University Publisher, 2016).
After six years as associate editor, from 2013 since today, six years as Senior Deputy Editor, he is the Editor-in-Chief of INTENSIVE CARE MEDICINE (IF 15).

VARIABILITY OR CONSISTENCY OF BRAIN DEATH CRITERIA?

Definitions of brain deaths across Europe
Death by neurologic criteria is an irreversible sequence of events culminating in permanent cessation of cerebral func- tions. In this context, there are no responses arising from the brain, no cranial nerve reflexes nor motor responses to pain stimuli, and no respiratory drive. The diagnosis of death by neurologic criteria implies that there is clinical evidence of the complete and irreversible cessation of brainstem and cerebral functions. The diagnosis, confirmation, and certification of death are core skills for medical practitioners. The aim of this review is to discuss the pathophysiology and definition of death by neurological criteria, describing the clinical assessment, and the use of ancillary tests for the diagnosis of brainstem death.
Using CenterTBI data, agreement on the clinical evaluation (prerequisites and neurological assessment) for brain death determination (BDD) exist between centers. However, ancillary tests were required for BDD in 64% of the centers. BDD for nondonor patients was deemed mandatory in 18% of the centers before withdrawing life-sustaining measures (LSM).
Recent data showed both agreement and some regional differences regarding practices around brain death and postmortem organ donation.

Caroline DER-NIGOGHOSSIAN

NYC PRESBYTERIAN HOSPITAL / COLUMBIA UNIVERSITY, NEW YORK, USA

Biosketch

Caroline obtained her Doctor of Pharmacy degree in 2013 from the Lebanese American University School of Pharmacy. She completed a pharmacy practice residency followed by a critical care residency at NewYork-Presbyterian Hospital, Weill Cornell Medical Center and Columbia University Irving Medical Center. She has received her certification from the Board of Pharmacy Specialties in Critical Care Pharmacy. Currently Caroline practices as a critical care clinical pharmacy specialist in the neurointensive care unit of Columbia University Irving Medical Center. She is also an assistant clinical professor of pharmacy sciences at the School of Nursing of Columbia University in the City of New York. She is an active member of the Neurocritical Care Society and Society of Critical Care Medicine.

COFOUNDING FACTOR IN NEURO-PROGNOSTICATION: SEDATION, RENAL AND LIVER FAILURE

Toxic-metabolic encephalopathies are common in critically ill patients. Neurocritically ill patients often develop renal and/or liver failure and are exposed to sedatives, which may worsen their neurologic deficits making neuro-prognostication challenging. Careful examination of confounding factors is therefore essential in the setting of neuro-prognostication. Acute liver and renal failure cause diffuse cerebral dysfunction ranging from mild encephalopathy to coma, which is potentially reversible with improvement in organ function. In addition, patients with renal and liver failure are at a higher risk of seizures and are prone to accumulation of neurotoxins that are renally and/or hepatically cleared. Finally, other factors, which can lead to accumulation of sedatives, should also be considered.

FUTURE OF NEUROPROGNOSTICATION: BIG DATA AND MACHINE LEARNING

Jorge SALLUH

ACADEMIC MEDICAL CENTRE, AMSTERDAM, THE NETHERLANDS

Biosketch

Jorge Salluh is a critical care physician from Rio de Janeiro, Brasil. Currently a senior researcher at the D'OR institute for research and education (http://www.idor.org/causes/intensive-care-medicine), attached to the PostGrad program of the Federal university of Rio de Janeiro. Main research areas are on Epidemiology, delirium, risk-stratification of critically ill and sepsis. Reviewer and Associate editor of ICU journals, Jorge Salluh has +180 peer-reviewed publications in high-impact journals. Founder of epimedsolutions.com that implemented ICU analytics, predictive analysis and benchmarking in real-world scenarios for +900 ICUs in 7 countries.

USING REAL WORLD-DATA FOR RESEARCH AND OUTCOMES: AN INNOVATIVE APPROACH

The development of high-quality clinical databases is widely recognized as a necessity in the current field of critical care to evaluate outcomes and the process of care of critically ill patients. In a scenario of increasing complexity of care and rising costs in critical care delivery, such databases allow for performance evaluation of intensive care units (ICU) and are a rich source of data for clinical research as well as benchmarking. This represents an opportunity to generate relevant clinical studies to increase knowledge on the epidemiology of critical illness.

Louis PUYBASSET

PITIE-SALPETRIERE HOSPITAL / SORBONNE UNIVERSITY, PARIS, FRANCE

Biosketch

Louis Puybasset (1964) is an intensivist anesthesiologist. He is the head of the department of Anesthesia and Intensive Care from La Pitié-Salpêtrière Hospital since 2016. He runs the surgical neuro-ntensive care since 2000. His research has been mainly devoted to neuro-prognostication using quantitative MRI.

A MULTIMODAL APPROACH OF NEUROPROGNOSTICATION

The talk will be dedicated to a multimodal approach of neuroprognostication combining MRI and genetics. We will focus on the use of DTI to assess the lesional burden after cardiac arrest, traumatic brain injury and SAH. We hypothesize that the genetic and epigenetic status can influence the tertiary lesions observed after brain injury.