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UNIVERSITY OF
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"IULIU HATIEGANU" UNIVERSITY
OF MEDICINE AND PHARMACY

DOCTORAL SCHOOL NEUROSCIENCE

PROGRAM

2018-2019 | SECTION 4

14 - 16 FEBRUARY 2019
"MULTIMEDIA" AUDITORIUM, "IULIU HATIEGANU" UMF CLUJ-NAPOCA
8 VICTOR BABES STREET | CLUJ-NAPOCA | ROMANIA
RONEURO INSTITUTE FOR NEUROLOGICAL RESEARCH AND DIAGNOSTIC
37 MIRCEA ELIADE STREET | CLUJ-NAPOCA | ROMANIA

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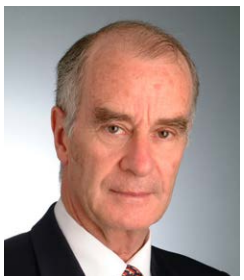

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COURSE PROGRAM

COURSE PROGRAM

THURSDAY, 14 FEBRUARY, 2019

"MULTIMEDIA" AUDITORIUM, "IULIU HATIEGANU" UMF CLUJ-NAPOCA
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09:50 – 10:00	Welcome address
10:00 – 10:45	Imaging for prediction of recovery and outcome after stroke Wolf Dieter Heiss / Germany
10:45 – 11:30	Post Stroke Pain – PSP Wolf Dieter Heiss / Germany
11:30 – 12:15	Imaging in Acute Ischemic Stroke Wolf Dieter Heiss / Germany

FRIDAY, 15 FEBRUARY, 2019

"MULTIMEDIA" AUDITORIUM, "IULIU HATIEGANU" UMF CLUJ-NAPOCA
8 VICTOR BABES STREET | CLUJ-NAPOCA | ROMANIA

10:00 – 10:45	Treatment of intracerebral haemorrhage Milija Mijajlovic / Serbia
10:45 – 11:30	Role of transcranial ultrasound in the diagnosis and treatment of carotid stenosis Milija Mijajlovic / Serbia
11:30 – 12:00	Coffee Break
12:00 – 12:45	Combined antithrombotic therapy in stroke of the posterior circulation Milija Mijajlovic / Serbia
12:45 – 13:30	Burning mouth syndrome-an update Milija Mijajlovic / Serbia
13:30 – 15:00	Session Break

COURSE PROGRAM

FRIDAY, 15 FEBRUARY, 2019

RONEURO INSTITUTE FOR NEUROLOGICAL
RESEARCH AND DIAGNOSTIC | 37 MIRCEA ELIADE STREET
CLUJ-NAPOCA | ROMANIA

15:00 – 15:45	Difficult stroke cases Milija Mijajlovic / Serbia
15:45 – 18:00	Hands on session Milija Mijajlovic / Serbia

SATURDAY, 16 FEBRUARY, 2019

RONEURO INSTITUTE FOR NEUROLOGICAL
RESEARCH AND DIAGNOSTIC | 37 MIRCEA ELIADE STREET
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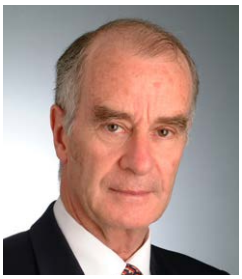
10:00 – 14:00	Hands on session • Extracranial and transcranial sonography • Temporal arteries ultrasonography and Transcranial brain parenchyma sonography Milija Mijajlovic / Serbia
14:00 – 15:00	Session Break
15:00 – 17:00	Hands on session • Optic nerves and retrobulbar circulation ultrasound • Jugular veins ultrasound • Vasomotor reactivity testing Milija Mijajlovic / Serbia

INTERNATIONAL GUEST LECTURERS



WOLF DIETER HEISS

GERMANY

Wolf-Dieter Heiss graduated in medicine from the University of Vienna, Austria, in 1965. He achieved his training in neurology, neurophysiology, psychiatry and nuclear medicine at the University hospital in Vienna and spent research fellowships at the MIT, Cambridge, USA, the Physiological Institute in Stockholm, Sweden, the Department of Physiology of SUNY, Buffalo, NY and the Department of Neurology of the University of Minnessota, Minneapolis, USA. 1976 he was appointed associate professor at the Department of Neurology of the University of Vienna. In 1978 he became director of the Center for Cerebrovascular Research of the Max Planck Institute for Brain Research and of the Department of Neurology of the City Hospital Cologne-Merheim, Germany. 1981 he was appointed as director at the Max Planck Institute for Neurological Research. 1985 – 2005 he was professor of neurology and chairman of the Department of Neurology of the University of Cologne and director of the Department of General Neurology at the MPI in Cologne. He was president of the International Stroke Society 1992-96, was on the board of directors of the Society for Cerebral Blood Flow and Metabolism, deputy editor of the Journal of Cerebral Blood Flow and Metabolism and at present is associate editor of the Journal of Nuclear Medicine and section editor of Stroke. He was chairman of the program committee of the European Federation of Neurological Societies (EFNS) 1998 - 2001 and was president of the EFNS 2001 – 2005. Since 2005 he is Visiting Professor at the Danube Univerity in Krems, Austria, since 2009 Adjunct Professor at the McGill University in Montreal, Canada, and since 2013 Associate Professor, Dept of Neurosciences, Univ. Iuliu Hatieganu, Cluj, Romania. In December 2014 he received Dr. honoris causa of Univ. Iuliu Hategianu, Cluj, Romania.

MILIJA MIJAJLOVIC
SERBIA

Dr. Milija Mijajlovic, MD, MSc, PhD is Associate Professor of Neurology at School of Medicine University of Belgrade, Serbia. He is working as Board Certified Neurology Specialist/Angiology Subspecialist at the Department for Cerebrovascular Disorders of the Neurology Clinic, Clinical Center of Serbia in Belgrade. Professor Mijajlovic is the Head of the Laboratory for Echosonographic Diagnostics of the Neurology Clinic in Belgrade, which is certified as European Reference Center in Neurosonology by the European Academy of Neurology and European Society of Neurosonology and Cerebral Hemodynamics. Dr. Mijajlovic is a Research Associate of the Ministry of Science and Education of Serbia and national expert in Neurosonology/Neuroangiology.

He received his Master's Degree in Neurology (Stroke) and PhD title in Neurology from School of Medicine University of Belgrade. Dr. Mijajlovic was trained at the Department of Neurology University of Muenster, at Neurology Clinic of the TU Dresden, at Stroke Unit of the Sackler Medical Center, Tel Aviv University, at Stroke Unit of the Vall d'Hebron Hospital in Barcelona, at the Neurology Department of the University hospital in Amines in France and at Hertie Institute for clinical brain research, University of Tuebingen, Germany.

His research is focused on stroke, neuroangiology, neurosonology, neurodegenerative diseases and headaches/pain.

Dr Mijajlovic is a member of the Executive Committee of the Neurosonology Research Group of the World Federation of Neurology as well as Neurosonology Subspecialist Panel of the European Academy of Neurology. He is also member of the Teaching course Committee of the European Academy of Neurology. Professor Mijajlovic is serving also as an external expert of the European Commission as well as Country Representative for the ESO-EAST Project.

Dr. Mijajlovic is Senior Editor of the Clinical Case Reports Journal and member of the Editorial Board of the Journal of Ultrasound in Medicine from which he received distinguished reviewer award in 2014. Dr. Mijajlovic serve as invited reviewer for more than 20 peer reviewed journals including Neurodegenerative Diseases, Journal of Neural Transmission, Journal of Neurology Neurosurgery and Psychiatry, Journal of Neurology, Journal of the Neurological Sciences, International Journal of Stroke, Journal of Neuroimaging, Psychiatry Research, etc.

Dr. Mijajlovic is author of more than 200 articles published in peer-reviewed journals, he served also as invited speaker at more than 60 national and international conferences, and coauthored more than 20 books and book chapters.

DAFIN F. MUREȘANU
ROMANIA

Professor of Neurology, Senior Neurologist, Chairman of the Neurosciences Department, Faculty of Medicine, "Iuliu Hatieganu" University of Medicine and Pharmacy Cluj-Napoca, President of the European Federation of Neurorehabilitation Societies (EFNR), Co-Chair EAN Scientific Panel Neurorehabilitation, Past President of the Romanian Society of Neurology, President of the Society for the Study of Neuroprotection and Neuroplasticity (SSNN), member of the Academy of Medical Sciences, Romania, secretary of its Cluj Branch. He is member of 17 scientific international societies (being member of the American Neurological Association (ANA) - Fellow of ANA (FANA) since 2012) and 10 national ones, being part of the executive board of most of these societies. Professor Dafin F. Muresanu is a specialist in Leadership and Management of Research and Health Care Systems (specialization in Management and Leadership, Arthur Anderson Institute, Illinois, USA, 1998 and several international courses and training stages in Neurology, research, management and leadership). Professor Dafin F. Muresanu is coordinator in international educational programs of European Master (i.e. European Master in Stroke Medicine, University of Krems), organizer and co-organizer of many educational projects: European and international schools and courses (International School of Neurology, European Stroke Organisation summer School, Danubian Neurological Society Teaching Courses, Seminars - Department of Neurosciences, European Teaching Courses on Neurorehabilitation) and scientific events: congresses, conferences, symposia (International Congresses of the Society for the Study of Neuroprotection and Neuroplasticity (SSNN), International Association of Neurorestoratology (IANR) & Global College for Neuroprotection and Neuroregeneration (GCNN) Conferences, Vascular Dementia Congresses (VaD), World Congresses on Controversies in Neurology (CONy), Danube Society Neurology Congresses, World Academy for Multidisciplinary Neurotraumatolgy (AMN) Congresses, Congresses of European Society for Clinical Neuropharmacology, European Congresses of Neurorehabilitation). His activity includes involvement in many national and international clinical studies and research projects, over 400 scientific participations as "invited speaker" in national and international scientific events, a significant portfolio of scientific articles (190 papers indexed on Web of Science-ISI, H-index: 20) as well as contributions in monographs and books published by prestigious international publishing houses. Prof. Dr. Dafin F. Muresanu has been honoured with: „Dimitrie Cantemir" Medal of the Academy of The Republic of Moldova in 2018, Ana Aslan Award 2018 - "Performance in the study of active aging and neuroscience", for the contribution to the development of Romanian medicine, National Order "Faithful Service" awarded by the President of Romania in 2017; "Iuliu Hatieganu" University of Medicine and Pharmacy Cluj-Napoca, Faculty of Medicine, the "Iuliu Hatieganu Great Award 2016" for the best educational project in the last five years; the Academy of Romanian Scientists, "Carol Davila Award for Medical Sciences / 2011", for the contribution to the Neurosurgery book "Tratat de Neurochirurgie" (vol.2), Editura Medicala, Bucuresti, 2011; the Faculty of Medicine, "Iuliu Hatieganu" University of Medicine and Pharmacy Cluj-Napoca "Octavian Fodor Award" for the best scientific activity of the year 2010 and the 2009 Romanian Academy "Gheorghe Marinescu Award" for advanced contributions in Neuroprotection and Neuroplasticity.

ABSTRACTS

IMAGING IN ACUTE ISCHEMIC STROKE

WOLF DIETER HEISS
Max Planck Institute for Neurological Research, Cologne, Germany

Imaging studies are used to exclude hemorrhage in the acute stroke patient, to assess the degree of brain injury, and to identify the vascular lesion responsible for the ischemic deficit. Some advanced CT and MRI technologies as well as PETare able to distinguish between brain tissue that is irreversibly infarcted and that which is potentially salvageable, thereby allowing better selection of patients likely to benefit from therapy.

CT has the advantage of being available 24 hours a day and is the gold standard for hemorrhage.
Hemorrhage on MR images can be quite confusing. On CT 60% of infarcts are seen within 3-6 hrs and virtually all are seen in 24 hours. The overall sensitivity of CT to diagnose stroke is 64% and the specificity is 85%. Hypoattenuation on CT is highly specific for irreversible ischemic brain damage if it is detected within first 6 hours (1). Patients who present with symptoms of stroke and who demonstrate hypodensity on CT within first six hours were proven to have larger infarct volumes, more severe symptoms, less favorable clinical courses and they even have a higher risk of hemorrhage. Obscuration of the lentiform nucleus, also called blurred basal ganglia, and hypodensity and swelling of the insular cortex are also important signs of infarction. A dense MCA sign is a result of thrombus or embolus in the MCA. 15% of MCA infarcts are initially hemorrhagic. Hemorrhage is most easily detected with CT, but it can also be visualized with gradient echo MR-sequences. With CT and MR-diffusion we can get a good impression of the area that is infarcted, but we cannot preclude a large ischemic penumbra (tissue at risk).

MRI: High signal on conventional MR-sequences is comparable to hypodensity on CT.
It is the result of irreversible injury with cell death. So hyperintensity means BAD news: dead brain. On PD/T2WI and FLAIR infarction is seen as high SI. These sequences detect 80% of infarctions before 24 hours. They may be negative up to 2-4 hours post-ictus! DWI is the most sensitive sequence for stroke imaging. DWI is sensitive to restriction of Brownian motion of extracellular water due to imbalance caused by cytotoxic edema. Perfusion with MR is comparable to perfusion CT. The area with abnormal perfusion can be dead tissue or tissue at risk. Combining the diffusion and perfusion images helps us to define the tissue at risk, i.e. the penumbra.

Positron emission tomography (PET) is still the only method allowing quantitative determination of various physiologic variables in the brain and was applied extensively for studies in patients with acute, subacute or chronic stages of ischemic stroke. The quantitative measurement of CBF, CMRO2, OEF and CBV permitted the independent assessment of perfusion and energy metabolism, and demonstrated the uncoupling of these usually closely related variables. These studies provided data on flow and metabolic variables predicting final infarction on late CTs (rCBF less than 12 ml/100g/min, CMRO2 less than 65 µmol/100g/min). Relatively preserved CMRO2 indicated maintained neuronal function in regions with severely reduced CBF; this pattern was coined “misery perfusion” and served as a definition for the penumbra, which is characterized by increased oxygen extraction fraction (up to more than 80 % from the normal 40 – 50 %). Late CT or MRI often showed these regions as morphologically intact. PET thus permits the differentiation of various tissue compartments within an ischemic territory: Irreversible damage by decreased flow and oxygen consumption below critical thresholds; misery perfusion, i.e. penumbra, by decreased flow, but preserved oxygen utilization above a critical threshold, expressed by increased OEF; luxury perfusion by flow increased above the metabolic demand; anaerobic glycolysis by a change in the ratio between glucose metabolism and oxygen utilization. However, PET has severe disadvantages limiting its routine application in patients with stroke: it is a complex methodology, requires multitracer application, and quantitative analysis necessitates arterial blood sampling. Although PET remains the imaging gold standard for identification of the penumbra in stroke patients, MR studies using diffusion and perfusion-weighted imaging might provide a differentiation between the core and the penumbra: the early diffusion weighted imaging (DWI) lesion might define the ischemic core and adjacent critically hypoperfused tissue might be identified with perfusion-weighted imaging (PWI). However, this surrogate definition of the penumbra has several uncertainties: the mismatch volume in PW / DWI as conventionally calculated does not reliably reflect misery perfusion, i.e. the penumbra as defined by PET.

IMAGING FOR PREDICTION OF RECOVERY AND OUTCOME AFTER STROKE

WOLF DIETER HEISS
Max Planck Institute for Neurological Research, Cologne, Germany

Neuroimaging modalities may help to assess functional outcome and to predict the efficacy of rehabilitation in individual patients additionally to functional assessment scales such as NIHSS and others.

CT: The most widely used imaging procedure in acute stroke is CT, especially for differentiation between hemorrhagic and ischemic stroke, for localization of the lesion and for decision making regarding administration of potentially risky stroke therapies as thrombolysis. ASPECTS (the Alberta Stroke Program Early Computed Tomography Score) is a measure to quantify ischemic changes on CT within the territory of the middle cerebral artery (MCA) and can help select patients for acute intravascular treatment.

MRI: With diffusion-weighted imaging (DWI), the size of the lesion can be outlined early and DWI lesion volume significantly increased the power of prediction models. Diffusion tensor imaging (DTI) measures may also be used to predict outcome. The connectivity in networks as assessed by DTI is more important for outcome and recovery than the extent of the primary structural lesion.

Assessment of brain blood supply and cerebral perfusion.

Inclusion of information from CT angiography contributed significantly more to outcome prediction than the ASPECTS score. Evidence of large vessel occlusion is crucial for improving outcome by early endovascular interventions. The final size of an infarct is also influenced by the extent and quality of collateral circulation to the affected brain area. The presence of robust collateral flow is best visualized by conventional angiography, but CT angiography as a non-invasive alternative has better spatial resolution than transcranial Doppler or MR angiography and can depict leptomeningeal collaterals.

The visualization of disturbed interaction in functional networks and of their reorganization in the recovery after focal brain damage is the domain of functional imaging modalities such as PET and fMRI. PET: Mapping of neuronal activity in the brain can be primarily achieved by quantitation of the regional cerebral metabolic rate for glucose (CMRGlc). Quantitative imaging of cerebral blood flow (CBF) is based on the principle of diffusible tracer exchange, using 15O-labeled water. PET detects and, if required, can quantify changes in CBF and CMRGlc accompanying different activation states of brain tissue. The regional values of CBF or CMRGlc represent the brain activity due to a specific state, task or stimulus in comparison with the resting condition, and color-coded maps can be analyzed or correlated to morphological images.

fMRI measures signals that depend on the differential magnetic properties of oxygenated and deoxygenated hemoglobin, termed the blood-oxygen-level-dependent (BOLD) signal, which gives an estimate of changes in oxygen availability. The amount of deoxyhemoglobin in small blood vessels depends on the flow of well-oxygenated arterial blood (CBF), on the outflow of O2 to the tissue (CMRO2) and on the cerebral blood volume (CBV). fMRI images map changes in brain function and can be superimposed on the anatomical image.

Motor and somatosensory deficits: In most fMRI or PET studies involving active or passive movements, a widespread network of neurons was activated in both hemispheres. During recovery from hemiparesis, a dynamic bihemispheric reorganization of motor networks takes place. Ipsilateral cortical recruitment seems to be a compensatory cortical process related to the lesion of the contralateral primary motor cortex. The unaffected hemisphere actually inhibits the generation of a voluntary movement by the paretic hand. This effect of transcallosal inhibition can be reduced by repetitive transcranial magnetic stimulation (rTMS).

Post-stroke aphasia: Studies of glucose metabolism in aphasia after stroke have shown metabolic disturbances

in the ipsilateral hemisphere caused by the lesion and contralateral hemisphere caused by functional deactivation (diaschisis). Patients with an eventual good recovery predominantly activated structures in the ipsilateral hemisphere. Combination of repetitive transcranial magnetic stimulation (rTMS) with activated imaging: Activation studies in the course of recovery of post-stroke aphasia suggest various mechanisms for the compensation of the lesion within the functional network: restoration of the original activation pattern, activation of areas around the lesion (intrahemispheric compensation) and reduction of transcallosal inhibition causing activation of contralateral homotopic areas. rTMS is a non-invasive procedure to create electric currents in discrete brain areas which, depending on frequency, intensity and duration, can lead to transient increases (with higher frequencies) and decreases (with lower frequencies) in excitability of the affected cortex. The role of activation in the right hemisphere for residual language performance can be investigated by combining rTMS with functional imaging, e.g. PET. Counteraction by rTMS of contra-lateral active areas might open a new therapeutic strategy for post-stroke aphasia.

POST STROKE PAIN

WOLF DIETER HEISS
SIBILLA ZIMMERMANN-MEINZINGEN
Max Planck Institute for Neurological Research, Cologne, Germany

Chronic pain syndromes are common after stroke and affect up to 50% of stroke patients. 70% of these patients experience pain on a daily basis. The reported prevalence of post-stroke pain (PSP) varies, reflecting differences in study design, definitions of pain types, and sampled cohorts. Still, there is a general consensus that PSP is an underreported, underrecognized and undertreated phenomenon. A rough differentiation is between acute Stroke, which is usually time limited and resolves completely and chronic pain, defined as continuous or intermittent for more than 6 weeks. It is usually associated with a chronic pathological process and recurs at intervals of months or years.

Pain is mild in 1/3 of affected subjects and moderate to severe in 2/3 of patients PSP occurs through both neuropathic and nociceptive mechanisms. Efforts to standardize descriptive terms for pain led to a publication by the International Association for the Study of Pain of pain terms and their definitions.

These are commonly used in studies of PSP to define pain subtypes
The commonest types of PSP are: central post-stroke pain (CPSP), Pain secondary to spasticity, Shoulder pain, complex regional pain syndrome (CRPS) and headache. Many patients report more than one pain subtype, with common combinations being CPSP and spasticity, or CPSP and shoulder pain.

By definition, CRPS has features of neuropathic pain, and as such, these syndromes co-occur as well. PSP is usually one sided (Shoulder, including arm, lower limbs, anterior and posterior chest, headaches). The types of pain may vary from paresthesia, spasm, tightness and increased tone.

If not treated properly, pain causes anxiety, sleep disturbances, memory problems, depression, impaired posture and reduced appetite. It interferes with daily activities like going to the bathroom, dressing, and grooming. It reduces the ability to move around, talk to other people and participate in recreational activities. The increased irritability may cause people to refuse care.

Identifying and treating PSP early is important. Treatment is complex and may be even more difficult after the pain is established.

BURNING MOUTH SYNDROME – RECENT CONCEPTS

MILIJA MIJAJLOVIC
Neurology Clinic, Clinical Center of Serbia and School of Medicine University of Belgrade, Serbia

According to International Headache Society (IHS) classification, burning mouth syndrome (BMS) is intra oral burning sensation without obvious medical and dental cause. IHS diagnostic criteria of the disorder include the presence of burning oral sensation during the most period of day without obvious changes of oral mucosa. Local and systemic causes have to be excluded by appropriate diagnostic procedures. Subjective feeling of dry mouth, paraesthesias and taste changes could be associated symptoms.
Estimated prevalence of BMS in general population varies between 1 and 15% and the disorder is seven times more common in females.

This condition is probably of multifactorial origin, often idiopathic, and its etiology remains largely obscure. BMS represents a disorder with a very poor prognosis in terms of quality of life, and the patient's lifestyle may worsen when psychological dysfunctions occur. As a result, BMS subjects continue to be high consumers of healthcare resources.
More recently, increasing attention has been given to the altered perception of sensory functions as well as to the changes in the psychological profile of many BMS patients. As a result, both disturbances should be included in the clinical spectrum of BMS.

BMS is primarily characterized by burning and/or painful sensations of the mouth with no mucosal lesions or any other clinical signs. It can occur at any site within or surrounding the oral cavity.
As in the other chronic pain conditions it has been reported that depression and anxiety are strongly associated with BMS and that they are significantly more frequent in BMS patients.

TREATMENT OF INTRACEREBRAL HAEMORRHAGE

MILIJA MIJAJLOVIC
Neurology Clinic, Clinical Center of Serbia and School of Medicine University of Belgrade, Serbia

Intracerebral hemorrhage accounts for 10%-15% of all strokes; however it has a poor prognosis with higher rates of morbidity and mortality. Neurological deterioration is often observed during the first hours after onset and determines poor prognosis. Intracerebral hemorrhage, therefore, is a neurological emergency which must be diagnosed and treated properly as soon as possible.

Therapy with hemostatic agents (e.g. factor VIIa and tranexamic acid) if started early after bleeding onset may reduce hematoma expansion, but their clinical effectiveness has not been shown. Rapid anticoagulation reversal with prothrombin concentrates (PCC) plus vitamin K is the first choice in vitamin K antagonist-related ICH. In ICH related to dabigatran, anticoagulation can be rapidly reversed with idarucizumab. PCC are recommended for ICH related to FXa inhibitors, whereas specific reversal agents are not yet approved. While awaiting ongoing trials studying minimally invasive approaches or hemicraniectomy, the role of surgery in ICH remains to be defined. Therapies targeting downstream molecular cascades in order to prevent secondary neuronal damage are promising, but the complexity and multi-phased nature of ICH pathophysiology is challenging. Finally, in addition to blood pressure control, antithrombotic prevention after ICH has to consider the risk of recurrent bleeding as well as the risk of ischemic events. Treatment of acute ICH remains challenging, and many promising interventions for acute ICH await further evidence from trials.

ROLE OF TRANSCRANIAL ULTRASOUND IN THE DIAGNOSIS AND TREATMENT OF CAROTID STENOSIS

MILIJA MIJAJLOVIC
Neurology Clinic, Clinical Center of Serbia and School of Medicine University of Belgrade, Serbia

Neurosonology is a useful diagnostic tool for vascular status study in patients with asymptomatic and symptomatic carotid stenosis. Intracranial arterial disease is an important cause of ischemic stroke and transcranial Doppler (TCD) can detect these with high sensitivity and specificity.

In hemodynamically significant extracranial internal carotid artery disease, TCD shows significant abnormalities in flow dynamics of the anterior circulation and abnormalities of cerebral vasomotor reactivity. A distinct advantage of TCD is the ability to monitor blood flow in a blood vessel over prolonged periods of time, which has shown microembolic signals in acute ischemic stroke, carotid artery disease, atrial fibrillation and during angiography or carotid revascularization. In acute ischemic stroke, TCD can be used to elucidate stroke mechanisms, plan and monitor treatment, and determine prognosis. In an era when stroke is increasingly being recognized as an emergency requiring immediate treatment, TCD may be capable of providing rapid information about the hemodynamic status of the cerebral circulation, within the time frame of the rather small 'therapeutic window'. TCD monitoring is of particular value when deviations from established surgical or anesthetic techniques in carotid revascularization may place the brain at risk for cerebral hyper- or hypo-perfusion, gaseous or particulate embolization, or their combined effects.

Neurosonology offers evident advantages compared with other diagnostic techniques: it is faster, dynamic, cheaper, harmless, and accessible, allows real-time monitoring of patients vascular status, avoids delays in acute treatments and has a therapeutic effect (sonothrombolysis).

COMBINED ANTITHROMBOTIC THERAPY IN STROKE OF THE POSTERIOR CIRCULATION

MILIJA MIJAJLOVIC
Neurology Clinic, Clinical Center of Serbia and School of Medicine University of Belgrade, Serbia

Ischemic stroke represents one of the leading causes of death and disability in both the United States and abroad, particularly for patients with prior ischemic stroke or transient ischemic attack (TIA). A quintessential aspect of secondary stroke prevention is the use of different pharmacological agents, mainly antiplatelets and anticoagulants. Antiplatelets and anticoagulants exhibit their effect by blocking the activation pathways of platelets and the coagulation cascade, respectively. Acute treatment and long-term secondary prevention of noncardioembolic ischemic stroke and TIA include initiation of antiplatelet therapy. For patients with high-risk stroke or TIA, for instance, minor stroke or high-risk TIA, or stroke of atherosclerotic origin with evidence suggesting risk of artery-to-artery embolism or with high-grade, symptomatic arterial stenosis, early initiated, short-term dual antiplatelet (e.g. aspirin and clopidogrel) is effective in reducing the risk of recurrent stroke and other vascular events which does not increase the risk of severe or fatal bleeding, as compared with mono antiplatelet therapy. However, long-term application of aggressive antiplatelet therapies after a noncardioembolic stroke or TIA increases the bleeding risks. Triple antiplatelet therapy is not appropriate for noncardioembolic stroke or TIA, in view of the high bleeding risk. In addition, emerging antiplatelets such as ticagrelor and cilostazol may work better in certain subgroups of stroke patients, which warrants further investigation.
Clinicians should carefully assess the pros and cons in each case and individualize the need for prolonged combined antiplatelet therapy.

DIFFICULT STROKE CASES

MILIJA MIJAJLOVIC
Neurology Clinic, Clinical Center of Serbia and School of Medicine University of Belgrade, Serbia

Rare and difficult to define stroke etiologies will be presented, including clinical cases with interactive discussion of treatment options, such as:

- Rare stroke etiology
- Cryptogenic stroke and embolic stroke of undetermined source (ESUS)
- Clinical cases of rare and complex stroke patients
- Clinical signs and symptoms
- Neuroimaging features of rare stroke etiologies
- Differential diagnosis of rare stroke causes
- Treatment options for rare stroke causes including multiple etiologies

NEUROSONOLOGY: HANDS-ON SESSIONS

MILIJA MIJAJLOVIC
Neurology Clinic, Clinical Center of Serbia and School of Medicine University of Belgrade, Serbia

Practical hands-on sessions will include live demonstrations of various neurosonology techniques and methodologies:

- Extracranial Doppler echosonography
- Transcranial Doppler (TCD) and Transcranial Color Coded Duplex Sonography (TCCD)
- Jugular veins sonography
- Temporal arteries ultrasonography
- Optic nerves, optic nerves sheets diameter and retrobulbar vessels sonography
- Transcranial brain parenchyma sonography
- Cerebral vasomotor reactivity testing (breath holding test)
- Cerebral microemboli detection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