PROGRAM A SBORNÍK ABSTRAKT

60. SPOLEČNÝ SJEZD ČESKÉ A SLOVENSKÉ SPOLEČNOSTI PRO KLINICKOU NEUROFYZIOLOGII

1. - 2. listopadu 2013
Afi Palace, Pardubice

Záštitu nad akcí převzal:

JUDr. Martin Netolický, Ph.D.,
hejtman Pardubického kraje

PARDUBICKÝ KRAJ

Předběžný program - 60. SPOLEČNÝ SJEZD ČESKÉ A SLOVENSKÉ SPOLEČNOSTI PRO KLINICKOU NEUROFYZIOLOGII

Pořadatelé:	Česká společnost pro klinickou neurofyziologii ČLS JEP - www.neurofyziologie.cz Slovenská spoločnosť pre klinickú neurofyziológiu SLS - www.neurofyziologia.sk Společnost biomedicínského inženýrství a lékařské informatiky ČLS J. E. Purkyně - www.sbmili.cz Sekce pro mapování mozku ČSKN ČLS JEP - www.hubram.cz
Záštitu nad akcí převzal:	JUDr. Martin Netolický, Ph.D., hejtman Pardubického kraje
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Pátek 1. 11. 2013

08:00 - 16:00 Registrace účastníků a firem

09:00 - 10:00

NF škola - EMG Basic, Základy EMG - sál A

Lektoři:
Ehler E. – jehlová EMG
Vlčková E. – kondukční studie

Při registraci elektrických potenciálů pomocí jehlové EMG elektrody je možno získat klidovou aktivitu (ve zdravém svalu je „elektrické ticho“, u denervačního syndromu se nacházejí fibrilace, pozitivní vlny a repetitivní polyfazické výboje). Za patologických stavů lze detekovat další klidové potenciály (fascikulace, myokymie, myotonický či neuromyotonický výboj). Při volní kontrakci svalu se sleduje tvar MUP (amplituda, trvání, fáze, turns), nábor MUP i frekvence pálení motoneuronů. Rozlišují se myogenní (kratší, nižší) a neurogenní (delší, vyšší a polyfazické) MUP. Dalším cílem kurzu je seznámit posluchače se základy vyšetření kondukčních studií motorických a senzitivních nervů včetně jejich pozdních odpovědí (F-vlna, H-reflex) a některých navazujících technik (např. repetitivní stimulace). Vysvětleny budou technické předpoklady stimulace a registrace a možná úskalí měření vedení periferními nervy. Objasněn bude význam hodnocených parametrů (latence a amplitudy odpovědí, rychlosti vedení) a budou demonstrovány možné abnormity při demyelinizačním a axonálním postižení periferních nervů a jejich interpretace.

NF škola - EEG Basic, Základy EEG - sál B

Lektor: Petránek E.

Kurz představí základní principy registrace a hodnocení EEG záznamu. Bude vysvětlen vliv přechodových odporů, nutnost volby několika zapojení (výhody, nevýhody), vliv normální a digitální filtrace, vliv aliasingu na graf/volby frekvence digitalizace, délky časové osy na tvar grafoelementů, Fourierovu transformaci a vliv mapování na popisujícího. Na závěr budou zmíněny platné předpisy z hlediska bezpečnosti. Vše s praktickými ukázkami.

10:00 - 11:00

NF škola - EMG Advanced, Klinické aplikace EMG - sál A

Lektoři:
Josef Bednařík – Kondukční blok
Zdeněk Kadaňka – Přínos elektrofyziologie u radikulopatií

Cílem kursu je vysvětlit předpokládanou patofyziologii bloku vedení nervem (demyelinizační a jiná), přinést definici a doporučená kritéria pro stanovení kondukčního bloku (CB), praktický význam a specifika stanovení CB u jednotlivých onemocnění. Počítačová simulace ukázala, že temporální disperze může vést k maximálnímu poklesu arey či amplitudy CMAP o 50 %. Toto kritérium je doporučené dle AAEM i EFNS/PNS pro většinu nervů. Budou probrána i úskalí stanovení CB včetně vyloučení jiných příčin signifikantní redukce CMAP než je CB (pseudoblok). Předností elektrofyziologického vyšetření (především jehlové EMG) je při vysoké senzitivitě také vysoká specificita a oproti MR možnost průkazu porušené funkce vyšetřovaného kořene. Problémem identifikace poškozeného kořene je nutnost vyšetřit více svalů jehlovou elektrodou, což je pro nemocné často nepříjemné. Specifickým problémem je vyšetření paravertebrálních svalů a správné načasování EMG. Proto je možno elektrofyziologicky stanovit diagnózu radikulopatie (zániková motorická léze ve svalech inervovaných příslušným kořenem) až s latencí dvou i více týdnů.

NF škola - EEG Advanced, Interpretace EEG - sál B

Lektoři:
Marusič P. – Standardizovaný popis EEG (SCORE)
Tomášek M. – EEG u kriticky nemocných
Krijtová H. – Úloha EEG v diagnostice a léčbě nekonvulzivního státu

„Lidová tvorba“ a regionální, případně oborové zvyklosti snižují srozumitelnost popisů nejen pro neurology a ostatní lékaře, ale i mezi elektroencefalografisty navzájem. V první části kurzu bude v české verzi představena standardizovaná mezinárodní terminologie pro popis EEG, která má za cíl sjednocení termínů používaných při popisování na národní úrovni. Další část kurzu bude věnována technickým aspektům i klinickým nálezům při natáčení a hodnocení EEG nálezů u kriticky nemocných pacientů na odděleních JIP a ARO. V poslední části bude na praktických ukázkách zmíněna problematika EEG v diagnostice a léčbě nekonvulzivního statu.

11:00 - 11:15 Coffee break

11:15 - 12:00

Zahájení sjezdu

ELECTROPHYSIOLOGICAL DIAGNOSIS OF INFLAMMATORY DEMYELINATING NEUROPATHIES - Peter Van den Bergh

12:00 - 13:00

TS Elektromyografie 1 - sál A	TS NF vyšší nervové činnosti 1 - sál B
Předsedající: Ehler E., Mazanec R.	Předsedající: Brázdil M., Jech R.
STIFF PERSON SYNDROME - Ehler E., Latta J.	COGNITIVE STIMULATION CAN DIFFERENTIATE PHYSIOLOGICAL AND PATHOLOGICAL RIPPLES IN HUMAN HIPPOCAMPUS - Brázdil M.
CUTANEOUS SILENT PERIOD IN BRACHIAL PLEXUS INJURY - Štětkářová I., Vaško P., Boček V., Mencl L.	FUNCTIONAL ANATOMY OF OUTCOME EVALUATION DURING IOWA GAMBLING TASK PERFORMANCE IN PATIENTS WITH PARKINSON'S DISEASE: AN FMRI STUDY - Gescheidt T., Mareček R., Mikl M., Czekóová K.,Urbánek T., Vaníček J., Shaw D. J., Bareš M.
ELECTROPHYSIOLOGICAL FEATURES OF PERIPHERAL AND CENTRAL NERVOUS SYSTEM IN HEREDITARY NEUROPATHY CHARCOT MARIE TOOTH LINKED TO X CHROMOSOME. - Mazanec R., Haberlová J., Šafka-Brožová D., Laššutová P., Seeman P., Bojar M.	BEYOND SKELETOMOTOR FUNCTION OF HUMAN BASAL GANGLIA: OCULOMOTOR, VISUAL AND AFFECTIVE NEURONS - Jech R., Sieger T., Růžička F., Urgošík D., Bonnet C., Vostatek P., Wild J., Šťastná D., Novák D., Růžička E., Serranová T.
AMYLOIDÓZA - PŘÍČINA POSTIŽENÍ N. RADIALIS NA PAŽI. KAZUISTIKA - Matulová H., Schreiber M., Kanta M.	AN INTRA-CRANIAL EEG INVESTIGATION INTO THE ROLE OF SEMANTIC CATEGORISATION IN EMOTION PERCEPTION - Czekóová K., Shaw D. J., Urbánek T., Chládek J ., Roman R., Brázdil M.

13:00 - 14:00 Oběd a zasedání rady sekce HuBraM

14:00 - 18:15 Zkoušky pro funkční specializace - "Malý salonek"

14:00 - 15:00

TS NF u RS - sál A	NF škola - fMRI basic (sekce HuBraM) - sál B
Předsedající: Štětkářová I., Kuba M.	Lektoři: Mikl M. – Princip fMR, základní postup pro analýzu dat Bartoš R. – Praktické využití fMR v předoperačním mapování
EVOKED POTENTIALS IN DIAGNOSIS AND PROGNOSIS OF MULTIPLE SCLEROSIS - Štětkářová I.	fMR bude představena z hlediska fyziologického a fyzikálního principu, typů realizovatelných experimentů a možností využití ve výzkumu i praxi. Bude vysvětlen základní postup analýzy dat a budou zmíněny praktické informace v souvislosti s realizací fMR měření. Příspěvek také porovná specifika fMR z pohledu výzkumu a klinické aplikace. Dále bude demonstrováno praktické využití fMR coby neinvazivní metody v předoperačním hodnocení rizika operace mozkového nádoru a k posouzení plasticity kortikálních funkcí. Lokalizace některých oblastí
MULTIPLE SCLEROSIS AND PREGNANCY - Novotná A., Ehler E.	
VISUAL STIMULATION FOR LONG-TERM MONITORING OF BRAIN FUNCTIONS VIA EVOKED POTENTIALS EVALUATION - Kuba M., Kremláček J., Vít F.	

NATALIZUMAB IN PATIENTS WITH MULTIPLE SCLEROSIS. PROGRESSIVE MULTIFOCAL LEUKOENCEPHALOPATHY – A CASE REPORT. - Novotná A., Ehler E., Mareš M.

(např. primární motorická) již vykazuje poměrně vysokou spolehlivost. Příspěvek se bude zabývat limitacemi praktického využití fMR (např. díky kvalitě dat, přítomnosti kompenzatorní plasticity apod.). I když elektrická kortikální a subkortikální stimulace zůstává zlatým standardem, využití zobrazovacích metod coby doplňkových metod může zvýšit bezpečnost neurochirurgických výkonů a mělo by být prováděno standardně.

15:00 - 15:15 Přestávka

15:15 - 16:15

TS EPI - sál A

Předsedající: Doležalová I., Petránek E.

PATTERN RECOGNITION OF EPILEPTIC EEG GRAPHOELEMENTS WITH ADAPTIVE SEGMENTATION, SUPERVISED AND UNSUPERVISED LEARNING ALGORITHMS - Krajča V., Petránek E.

IS ICA OF FMRI DATA ABLE TO FIND HAEMODYNAMIC FLUCTUATIONS RELATED TO EPILEPSY WITHOUT HELP OF EEG? - Slavíček T., Lamoš M., Mareček R., Brázdil M., Mikl M., Havlíček M., Jan J.

PROGNOSTIC SIGNIFICANCE OF INTERICTAL EPILEPTIFORM DISCHARGES DURING SEMI-INVASIVE EEG MONITORING IN PATIENTS WITH HIPPOCAMPAL SCLEROSIS; EFFECTS OF PARTIAL DRUG WITHDRAWAL AND SLEEP - Doležalová I., Brázdil M., Hermanová M., Janoušová E., Kuba R.

PROCESSING AND VISUALIZATION OF HIGH RESOLUTION EEG DATA - Fousek J.

NF škola - fMRI advanced (sekce HuBraM) - sál B

Lektoři:
Mareček R. – Simultánní EEG-fMR - princip, ukázky klinické a výzkumné aplikace
Keller J.- difuzní zobrazování a traktografie

Simultánní měření modalit EEG a fMR umožňuje využít informace obsažené v obou modalitách pro získání kvalitativně lepší či úplně nové informace než při použití jedné z metod samostatně. V příspěvku bude představen princip simultánního EEG-fMR, technické problémy, s nimiž je nutné se vypořádat, a možnosti uplatnění metody ve výzkumu i klinické aplikaci (v souvislosti s neinvazivním mapováním epileptického ložiska). Dále bude představena zobrazovací metoda MR založená na detekci směrovosti difuze v mozkové tkáni, umožňující hodnotit kvantitativní parametry (např. frakční anisotropii) a provádět zobrazení mozkových drah (traktografii). V rámci příspěvku budou představeny základní principy a postupy, používané k zobrazení difuze i výpočtu traktografie s důrazem na předoperační plánování i klinickou aplikaci v diagnostice. Posluchači se dále seznámí s možnými mylnými interpretacemi výsledků a jejich příčinami.

16:15 - 16:30 Coffee break

16:30 Zasedání LOC ECCN 2015

16:30 - 17:30

Multifokální m. neuropatie - sál A — blok vyžádaných přednášek

Předsedající: Bednařík J.

MULTIFOKÁLNÍ MOTORICKÁ NEUROPATIE (MULTIFOCAL MOTOR NEUROPATHY) - Bednařík J.

AINSO REGISTRY - Suchý M., Bednařík J., Pátá M., Kovalová I.

Imunitné neuropatie - Kurča E.

TS fMRI 1 - sál B

Předsedající: Keller J., Lamoš M.

MAGNETIC RESONANCE VOLUMETRY CONFIRMS TRIGEMINAL NERVE ATROPHY IN PATIENTS SUFFERING FROM ESSENTIAL TRIGEMINAL NEURALGIA - Keller J., Švehlík V., Rulseh A., Urgošík D.

EFFECT OF REGION COORDINATES SHIFTING ON DYNAMIC CAUSAL MODELLING RESULTS - Lamoš M., Klímová J., Mikl M., Jan J.

COMPARISON OF THE METHODS FOR BRAIN PARCELLATION - Bujnošková E., Fousek J., Hladká E., Mikl M.

STATISTICAL CHARACTERISTICS OF EVENT RELATED AND BLOCK DESIGN DATASETS - Gajdoš M., Mikl M.

17:30 - 17:45

Moderní farmakoterapie bolestivé diabetické neuropatie - monoterapie nebo kombinovaná léčba ? (Sponzorovaná přednáška ELI LILLY ČR) - Mazanec R.

17:45 - 18:15

Posterová sekce

Předsedající: Ehler E., Kadaňka Z.

SENSORIMOTOR CHARACTERISTIC OF THE GESTE ANTAGONISTE - Filip P., Šumec R., Bareš M.

INCREMENTAL LEARNING IN THE TASK OF EEG DATA CLASSIFICATION - Gerla V., Murgas M., Radisavljevic V. D., Lhotska L., Krajca V.

EFFECT OF BIPOLAR ELECTROSTIMULATION ON FOCAL NEUROPATHY OF ULNAR NERVE IN ELBOW AREA – PILOT STUDY. - Husárová I., Pochmonová J., Minks E., Konečný L., Doležalová I., Bareš M.

BOTULOTOXIN IN THE TREATMENT OF SPASTICITY - OUR EXPERIENCE - Kubik J., Bodnárová P., Michánková R., Klepiš P., Neumann J.

MODULATION OF CEREBRAL SENSORIMOTOR CIRCUITS DURING BOTULINUM TOXIN TREATMENT OF CERVICAL DYSTONIA. - Nevrlý M., Hluštík P., Otruba P., Opavský R., Hok P., Kaňovský P.

CHANGES IN BRAIN ACTIVATION AFTER THERAPEUTIC STIMULATION USING VOJTA THERAPY: CONTROLLED STUDY - Hok P., Hluštík P., Kutín M., Opavský J., Grambal A., Tüdös Z., Opavský R., Kaňovský P.

18:15 - 18:45	Schůze ČSKN, následuje schůze výboru ČSKN
19:30 - 00:00	Společenský večer v historických prostorách pardubického zámku s rautem a poslechem Vaňhalova kvarteta. (Od 21:00 - 22:00 můžete na zámku zdarma navštívit expozice "České sklo" a "Zbraně")

Sobota 2. 11. 2013

08:00 - 10:00 Registrace účastníků

08:00 - 09:00

TS fMRI 2 - sál A Předsedající: Mareček R., Mikl M.	TS ION - sál B Předsedající: Němec M., Tomáš R.
MAPPING OF MOVEMENT ARTIFACTS IN fMRI - Nováková M., Mikl M., Jan J.	INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING IN SCOLIOSIS SURGERY AT UNIVERSITY HOSPITAL BRNO - Němec M., Praksová P., Repko M., Leznar M., Tichý V., Horálková H., Mokrá M., Bednařík J.
SIMULATIONS OF FMRI DATA WITH USAGE OF ESTIMATED PHYSIOLOGICAL ARTIFACTS - Mikl M., Bartoň M., Mareček R.	MONITORING OF MOTOR EVOKED POTENTIALS DURING THORACOABDOMINAL AORTIC ANEURYSM REPAIR - Tomáš R., Štádler P., Horváth V., Křivánek P.
SPATIO-TEMPORO-SPECTRAL PATTERNS OF EEG AND BRAIN HEMODYNAMICS USING BAYESIAN APPROACH.- Mareček R., Mikl M., Rektor I., Brázdil M.	INTRAOPERATIVE ELECTROCORTICOGRAPHY IN DETECTION OF FOCAL CORTICAL DYSPLASIA ASSOCIATED WITH HIPPOCAMPAL SCLEROSIS - Elišák M., Krysl D., Janca R., Ježdík P., Zamecnik J., Mohapl M., Jiruška P., Tomášek M., Tomek A., Marusič P.
DEALING WITH NOISE IN PSYCHOPHYSIOLOGICAL INTERACTIONS - FMRI ANALYSES - Barton M., Mikl M., Marecek R.	TRANSCRANIAL FACIAL MOTOR EVOKED POTENTIALS: A CONTINUOUS MONITORING OF THE FACIAL MOTOR FUNCTION DURING VESTIBULAR SCHWANNOMA SURGERY - Tomáš R., Klener J., Šetlík M.

09:00 - 09:15 Přestávka

09:15 - 10:15

TS Neurorehabilitace - sál A

Předsedající: Hluštík P., Kremláček J.

MODULATION OF CORTICAL ACTIVITY BY BOTULINUM TOXIN TYPE A IN PATIENTS WITH POST-STROKE ARM SPASTICITY - Hluštík P., Veverka T., Hok P., Tüdös Z., Otruba P., Krobot A., Kaňovský P.

ELECTROPHYSIOLOGICAL MONITORING OF VISUAL FUNCTION AFTER MIRROR TELESCOPE IMPLANTATION - Kremláček J., Jirásková N., Nokolová J.

SURFACE POLYELECTROMYOGRAPHY – PRINCIPLE OF THE METHOD AND POSSIBLE USE IN DYSPHAGIA - Bednar M., Vanaskova E., Vareka I.

PRINCIPLE AND CONDITIONS OF INCLUSION THE HIPPOTHERAPY IN THE TREATMENT OF NEUROMUSCULAR DISORDERS - Smíšková Š.

Intraoperační NF - EP - sál B

Předsedající: Ostrý S.

SUBCORTICAL MAPPING AND INTRAOPERATIVE DTT 3.0T OF THE CORTICOSPINAL TRACT IN SUPRATENTORIAL INTRINSIC TUMOR SURGERY. WHAT SHOULD WE RELY ON? - Ostrý S., Belšan T., Otáhal J., Beneš V., Netuka D.

WORKSHOP FO-ION

10:15 - 10:30 Coffee break

10:30 - 11:30

TS NF zraku - sál A

Předsedající: Kubová Z., David I.

DIFFICULTIES OF MOTION-ONSET VEP EXAMINATION IN CHILDREN - Kubová Z.

ANALYSIS OF DISORDERS OF THE EYE MOVEMENT CONTROL IN ALCOHOL DEPENDENT MEN - David I., Kozelka P., Fabian V., Dobiáš M., Doležal J.

ELECTROPHYSIOLOGICAL DIAGNOSIS OF EARLY CNS INVOLVEMENT IN HIV-1 INFECTION – PILOT STUDY - Szanyi J., Kremláček J., Kubová Z., Langrová J., Kuba M., Kapla J., Gebouský P., Plíšek S

OPTICAL COHERENCE TOMOGRAPHY AND VISUAL EVOKED POTENTIALS IN HEALTHY PERSONS - Langrová J., Kremláček J., Vališ M., Kuba M.

TS Elektromyografie 2 - sál B

Předsedající: Latta J., Minks E.

MYASTHENIA GRAVIS – IDENTIFYING RISK FACTORS LEADING TO A MORE SEVERE COURSE OF THE DISEASE IN A COHORT OF 45 PATIENTS - Latta J., Ehler E.

REPETITIVE STIMULATION AND LAMBERT-EATON MYASTHENIC SYNDROME - Minks E., Čechová I., Streitová H., BAREŠ M.

REPRESENTATION OF JOINT PATTERNS IN SURFACE EMG - Novotná I., Křemen V., Čeřovský Z., Hrach K., Jelínek M., Tichý M., Lhotská L.

CUTANEOUS SILENT PERIOD IN IDIOPATIC SCOLIOSIS: A PILOT STUDY - Boček V., Štětkářová I., Vaško P., Zámečník J., Krbec M.

11:30 - 11:45 Přestávka

11:45 - 13:15 TS NF vyšší nervové činnosti 2 - sál A

Předsedající: Bareš M., Roman R.

KOGNITIVNÍ MODULACE BIOELEKTRICKÉ AKTIVITY NCL. SUBTHALAMICUS - Rektor I.

SLOW NEGATIVE ERP RECORDED IN HUMAN HIPPOCAMPI DURING A SIMPLE SENSORIMOTOR TASK OCCURS INDEPENDENTLY OF MOTOR EXECUTION - Roman R.1,2*, Brázdil M., Chládek J., Rektor I., Jurák P., Světlák M., Damborská A., Shaw D. J., Kukleta M.

DETECTION OF EMOTIONAL STATES BASED ON SCALP AND SOURCE MAPS OF EEG - Vavrečka M., Štěpánová K., Lhotská L.

DELINEATING THE ROLE OF MEDIAL AND MEDIO-LATERAL TEMPORAL NETWORKS IN DÉJÁ VU USING STRUCTURAL COVARIANCE MAPPING. - Shaw, D. J., Mareček, R., Brázdil, M.

THE CEREBELLUM, BASAL GANGLIA AND MOTOR TIMING IN MOVEMENT DISORDERS. BEHAVIORAL AND FMRI STUDY. - Bareš M., Husárová I., Filip P., Mareček R., Mikl M., Lungu O. V.

MODULATING CORTICAL CONNECTIVITY IN SCHIZOPHRENIC PATIENTS WITH AUDITORY HALLUCINATIONS BY RTMS ASSESSED WITH EXACT LOW-RESOLUTION BRAIN TOMOGRAPHY (ELORETA). - Brunovský M., Horáček J., Novák T., Klírová M., Kohútová B., Krajča V., Höschl C.

13:15 - 14:15 Oběd

14:15 - 15:15 fMRI - kvíz/case studie (sekce HuBraM) - sál A

15:15 - 15:30 Zakončení sjezdu

SBORNÍK ABSTRAKT

Pátek 1. 11. 2013

ELECTROPHYSIOLOGY IN THE DIAGNOSIS OF INFLAMMATORY DEMYELINATING NEUROPATHIES

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Inflammatory demyelinating neuropathies constitute a significant proportion of the acquired peripheral neuropathies. They include Guillain-Barré syndrome (GBS), chronic inflammatory demyelinating polyradiculoneuropathy (CIDP), multifocal motor neuropathy (MMN), multifocal demyelinating neuropathy with persistent conduction block (Lewis-Sumner syndrome), and paraproteinemic neuropathies. Inflammatory demyelinating neuropathies are receiving increasing attention because they are treatable. A proper diagnosis as early as possible is very important because timely immune treatment can largely reduce morbidity and disability. The diagnosis is based on a constellation of clinical and laboratory features, the latter including electrodiagnostic (nerve conduction) studies, spinal fluid examination, and in selected cases serological studies and peripheral nerve biopsy. Electrodiagnostic studies play a key role in the early detection and characterization of inflammatory demyelinating neuropathies.

Making the diagnosis of inflammatory demyelinating neuropathy, in particular when the disease course is chronic, is often difficult. Diagnostic criteria are very important but given the lack of a definitive diagnostic marker and the limitations of laboratory studies, it appears impossible to reach a definitive diagnosis in all patients. By definition, electrophysiological criteria for primary demyelination are designed to exclude abnormalities that can be explained by axonal degeneration. Therefore, lesser degrees of demyelination can not be defined with complete certainty electrophysiologically. Optimised electrophysiological criteria are capable, however, to support the diagnosis with different levels of probability (possible, probable, definite) in the very large majority of cases.

TS Elektromyografie

STIFF PERSON SYNDROME

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Background: Stiff person syndrome (SPS) is a rare, insidiously progressive disease of central nervous system characterized by axial and limb rigidity with superimposed stimulus-sensitive spasms. SPS can be divided to classical generalized form, stiff limb syndrome, jerking SPS and progressive encephalomyelitis with rigidity and myoclonus (PERM). The incidence of SPS and its variant is about 1 per million in European population.

Methods: In this study of retrospective design we have evaluated all patients with muscle overactivity syndromes investigated in our EMG laboratory in last 6 years. Patient with SPS were further described and demographic data, EMG findings, laboratory results, auxiliary methods, therapy and improvement/progression were analyzed.

Results: During 6-year period (2007-2013) 5 patients with SPS were diagnosed and treated in Department of Neurology, PKN. There were 3 women and 2 men, 22-65 yrs. In 3 patients we were able to find a provoking factor (2 infectious diseases – tick-born encephalitis, herpes zoster; one patient was exposed to solvents during longer work in a garage). In all patients EMG was characterized by continuous muscle activity (normal motor unit potential), 3 with higher voltage of F-waves, in a woman constant retroflexion reaction. In 2 patients we found very high titers of anti-GAD in serum, in 1 in cerebrospinal fluid, and in another women increased titer of anti-amphiphysin. All patients were treated with

immunosupression (steroids and later azathioprine or cyclosporin A), 3 patients treated with plasma exchange, 2 with high doses of intravenous immunoglobulins, and all by baclofen. Paraneoplastic SPS were in 2 (thymoma, multiple myeloma) and autoimmune type of SPS were in 3 patients.

Conclusion: SPS is one of the orphan diseases, which diagnosis and treatment demand experienced staff in EMG lab, broad spectrum of immunological laboratory methods, and neurologic intensive care unit for monitoring and treatment.

CUTANEOUS SILENT PERIOD IN IDIOPATIC SCOLIOSIS: A PILOT STUDY

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Objective: The pathogenesis of idiopathic scoliosis (IS) remains poorly understood. One of the hypothesis of the development of IS could be an abnormal sensorimotor integration. Cutaneous silent period (CSP) is a plurisegmental spinal inhibitory reflex, which occurs after painful stimulation of small diameter A-delta fibers. To date, CSPs have not been extensively studied in patients with idiopathic scoliosis.

Materials and Methods: We recorded CSPs induced by noxious digit II stimulation in both thenar muscles while the subject maintains a moderately strong voluntary muscle contraction in 6 patients with idiopatic scoliosis before surgery (1 male; age 14 –28 years) and in 9 healthy volunteers (4 males; age 20-34 years). The beginning, duration and end of the CSP have been measured in individual traces.

Results: CSP onset, duration and end latencies in IS did not significantly differ between concavity and covexity of the scoliotic curve. Moreover, there was not any significant difference in CSP onset, duration and end latencies in IS as compaired to controls.

Conclusion: We conclude that plurisegmental spinal inhibitory reflex is well preserved in idiopatic scolioisis. These findings did not support the hypothesis of disturbances in sensorimotor integration at the spinal level.

Supported by Research Projects of Charles University PRVOUK P34, Grant Project of Czech Ministry of Health NT12282, NT13693.

ELECTROPHYSIOLOGICAL FEATURES OF PERIPHERAL AND CENTRAL NERVOUS SYSTEM IN HEREDITARY NEUROPATHY CHARCOT MARIE TOOTH LINKED TO X CHROMOSOME.

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Background: Hereditary neuropathy Charcot Marie Tooth linked to X chromosome (CMTX) is the second most frequent hereditary neuropathy (about 10% of all Charcot-Marie-Tooth neuropathies-CMT). CMTX is caused by mutations of gab junction b-1 (GJB1) gene coding connexin 32 protein. This protein is expressed by myelinating Schwann cells in the peripheral nerves and by oligodendrocytes in the central nervous system. We were interested in clinical features of GJB1 gene mutations in the peripheral nerves and central nervous system (acoustic, visual or vestibular pathways), which could be affected subclinically. We were also interested in differencies of electrophysiological results between CMTX males and females.

Methods: We report an electrophysiological study of 39 CMTX patients (18 M+21 F) from 10 unrelated families with genetically proven diagnosis. We performed nerve

conduction studies (NCS), evoked potentials (BAEP, VEP) and electronystagmography (ENG) to determine whether PNS, CNS or boths pathways were affected.

Results: The NCS were severly affected in CMTX males than in females. The conduction abnormalities in males fullfiled demyelinating pattern (MCV 32-33 m/s) in majority of them compare to females with intermediate slowing or normal (MCV 41-44 m/s) conduction velocity.The sensory fibers were more severe affected than motor fibers. Brainstem auditory evoked potentials (BAEP) were abnormal in 24 (13M+11F) out of 29 patients (13M+16F). BAEP were severly affected males than females. Visual evoked potentials (VEP) were abnormal in 5 (4M+1F) out of 18 patients (10M+8F), mainly prolonged latency and low amplitude of P100 wave. Electronystagmography (ENG) of 15 patients (7M +8F) detected central abnormalities in 9 patients (4M +5F).

Conclusions: Electrophysiological testing of peripheral nerves showed severe lesions in males compare to females and sensory fibers were more affected than motor fibers. The majority of CMTX males developed demyelinating type of conduction abnormity compare to normal results or mild axonopathy in CMTX females. BAEP are most sensitive method to detected subclinical lesion of CNS in CMTX patients. BAEP were abnormal in 82%, ENG in 43.7% and VEP in 25% of CMTX patients, mainly in males. The combination of the different modalities of evoked potentialsincrease the sensitivity of detection of central lesions in CMTX patients.

Supported by MZ ČR-RVO, FN Motol 00064203 and by IGA grant NT/14348

AMYLOIDÓZA - PŘÍČINA POSTIŽENÍ N. RADIALIS NA PAŽI. KAZUISTIKA

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Úvod: Amyloidová polyneuropatie (symetrická distální senzitivně motorická s častými bolestmi) je v literatuře uváděna jako jedna z možností systémového postižení amyloidózou, v praxi se s ní však neurolog setká relativně zřídka. O to vzácnější je lokální postižení periferního nervu popisované v naší kazuistice.

V tomto sdělení je referováno o 55-leté nemocné se 7 let plíživě progredující senzitivní a motorickou symptomatikou z postižení n. radialis na pravé paži. EMG (2/2010) verifikovalo chronický částečný denervační syndrom m. extensor digit. comm. a m. brachioradialis vpravo, nevýbavnost SNAP r. superficialis n. radialis a blok vedení motorickými vlákny n. radialis na pravé paži. Magnetická rezonance odhalila vřetenitou expanzi (neurofibrom?) v délce 6 cm na n. radialis na paži. Neurochirurg (5/2010) při první operaci odstranil útvar z nervu a při druhé operaci provedl náhradu nervu štěpem z n. suralis. Histologicky byla potvrzena amyloidóza. Komplexní interní vyšetření se zaměřením na systémovou amyloidózu včetně biopsie z rekta , jater, kostní dřeně, bukální sliznice vyzněla negativně. Pacientka dlouhodobě rehabilituje s postupným zlepšováním stavu. Je sledována internistou, neurologem, neurochirurgem, elektromyografistou. Neobjevily se známky polyneuropatie ani systémové amyloidózy. EMG nález plynule mírně regreduje.

Závěr: Postižení n. radialis na paži je většinou způsobeno úrazem, tlakem na nerv zvenčí či zevnitř, iatrogenně či vzácněji benigním nádorem. Lokální postižení amyloidózou je velmi vzácné.

TS NF u RS

EVOKED POTENTIALS IN DIAGNOSIS AND PROGNOSIS OF MULTIPLE SCLEROSIS

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Objective: Evoked potentials (EP) are functional neurophysiological methods that have been used in multiple sclerosis (MS) especially in its early diagnosis. Recently, multimodal EPs appears to be a prognostic factor for disease progression.

Methods: The review is based on a literature search in PubMed and the author´s long experience of neurophysiological diagnostics.

Results: Visual evoked potential (VEP) are preferentially used in early diagnosis of MS. They are highly sensitive to detect subclinical optic neuritis more than magnetic resonance. Somatosensory (SEP) and motor (MEP) evoked potentials can reveal subclinical lesions in the central nervous system and could be a supplementary diagnostic tests for sensory and motor system disturbances. MEP abnormalities correlate with the degree of motor impairment and disability assessed by EDSS. Abnormal multimodal EPs ("positive EP score") at the first session are worse prognostic factor. Low and stable EP scores along with stable EDSS identify a "benign" form of RS. The assessment of the disease progression and/or monitoring of the therapeutic effects have some limitations, e.g. abnormal response persists even in relative inactivity of the disease and it´s localization is non-specific. The sensitivity of EPs increases with the length of the tested neural pathways and with used EP modalities.

Conclusion: Evoked potentials are highly sensitive in revealing "silent lesions" especially at the beginning of MS and/or when no obvious neurological symptoms occur. Multimodal evoked potentials have indisputable benefit of prognostic value to determine non-responders, "benign" course of the disease and patients with significant disease progression.

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MULTIPLE SCLEROSIS AND PREGNANCY

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Background: Many women with multiple sclerosis do become pregnant, though there are some controversies about fertility, immunomodulating therapy, conceptions, or decision making to become pregnant. During pregnancy the number of MS relapses is reduced, but after delivery the curve of disease activity risessteeply There are some therapeutic schedules recommended for the post-delivery period and couple of advice for breastfeeding.

Method: In a retrospective study we registered and analyzed a subgroup of pregnant women in a MS Centre in Pardubice. We were searching for course of pregnancy, abortions, complications of pregnancy, relapses of MS, therapy during pregnancy and lactation periods.

Results: In a 5-year period (2008-2012) we treated49 pregnant women from 950 patients in MS Centre (690 women). There were only 4 abortions, and no occurrence of newborn malformations. During pregnancy only 4 relapses were treated by high doses of intravenous methylprednisolone (3-5 g during 8-10 days). One relaps was severe and 3 moderate (on?) clinical grade. After delivery only 3 relapses were found, one of them was severe and 2 of mild severity. All 49 women were given 10 g of intravenous immunoglobuline within first 48 hours after delivery.

Conclusion: Pregnancy should no longer be looked at as a factor provoking relapses and worsening MS. In our subgroup of pregnant MS patient we encountered only few attacks and more than 90% of pregnant women gave birth of a healthy newborn.

VISUAL STIMULATION FOR LONG-TERM MONITORING OF BRAIN FUNCTIONS VIA EVOKED POTENTIALS EVALUATION

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Introduction: At present, predominantly stationary visual stimulators are used for diagnostic examination of visual evoked potentials (VEPs). They cover significantly the central visual field of the tested subject and such examination does not allow any other parallel activity during the stimulation. Therefore, it cannot be used e.g. for a long-term monitoring and evaluation of functional changes of CNS functions - for continual assessment of visual perception.

Methods: We have introduced a visual stimulator (Czech Republic patent No. 303192 pending), the principle of which is that the source of light stimuli is in periphery of the visual field - a row of light emitting diodes (LEDs) is placed on the head of a stimulated subject on a standard peak (a part of a baseball cap). A control unit switches individual LEDs (flash or motion stimuli are generated) and synchronizes VEPs evaluation. The set of LEDs is located about 20° from the center of the stimulus field. There are several variants of stimulation available because of significant inter-individual differences in reactivity of subjects to particular stimuli. The motion stimuli have similar parameters as stimulations used for clinical diagnostic purposes (see Kuba, M., Kubová, Z., Kremláček, J., et al. Motion-onset VEPs: Characteristics, methods, and diagnostic use. Vision Res**.,** 2007, vol. 47, p. 189-202 - http://dx.doi.org/10.1016/j.visres.2006.09.020). Recording of VEPs (with the use of built-in amplifiers) and on-line evaluation of their parameter changes can be done via "blue-tooth" transmission to a standard computer or in a built-in microprocessor (in preparation).

Results: Since using of this kind of VEPs examination does not interfere with common human activities, it is possible to use it not only for standard diagnostic purposes in neuro-ophthalmological diseases but also for monitoring of CNS function changes or level of vigilance/fatigue, e.g. in drivers or some other professions.

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NATALIZUMAB IN PATIENTS WITH MULTIPLE SCLEROSIS. PROGRESSIVE MULTIFOCAL LEUKOENCEPHALOPATHY – A CASE REPORT.

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Background: Multiple sclerosis still remains a severe neurologic problem, though in last years a tremendous progress in diagnostics and therapy was achieved. On the evidence of randomized controlled studies it was documented, that only early beginning of immune modulating therapy with subsequent further escalation therapy can slow down and even stop the activity of the disease. The decreased activity can postpone or stop the development of disability and conversion to a chronic progressive form of multiple sclerosis. The immune modulating therapy is most effective in the first five years of multiple sclerosis.
Natalizumab (Tysabri) is humanized monoclonal antibody approved for the therapy of remitting-relapsing form of multiple sclerosis. Therapy with natalizumab is effective in patients with high disease activity and is able to reduce the number of relapses by 68 % in comparison with placebo. This therapy is associated with a couple of adverse effects, the most important is progressive multifocal leukencephalopathy.

Methods: In a retrospective study we evaluated patients treated with natalizumab in our MS Centre.

Results: In MS Centre of Department of neurology in Pardubice we register and treat 950 patients with MS, 470 of them are on disease modulating therapy. There are 94 patients on natalizumab, 68 females and 26 males, 18-60 years old, median 31 years, the length of treatment with natalizum till 48 months. We analyzed the effects of treatment, proper indication of such treatment escalation, and adverse events. We presented a case report of 45-year old woman, in whom subclinical MRI changes disclosed progressive multifocal leukoencephalopathy and subsequent development of severe clinical course of this disease, including immune reconstitution inflammatory syndrome (IRIS).

Conclusion: Therapy with natalizumab is very effective in patients with remitting relapsing multiple sclerosis. This therapy is expensive, the indications are restricted, and is associated with severe adverse events.

TS EPI

PATTERN RECOGNITION OF EPILEPTIC EEG GRAPHOELEMENTS WITH ADAPTIVE SEGMENTATION, SUPERVISED AND UNSUPERVISED LEARNING ALGORITHMS

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IS ICA OF FMRI DATA ABLE TO FIND HAEMODYNAMIC FLUCTUATIONS RELATED TO EPILEPSY WITHOUT HELP OF EEG?

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Traditional approach to epilepsy localization using functional magnetic resonance imaging (fMRI) technique utilizes timings of spike EEG events in so called spike-informed general linear model. Simultaneous fMRI-EEG examination represents a challenging problem in terms of both technical equipment and signal processing. Main goals of our work were to show that haemodynamic changes related to epilepsy can be detected in the blood oxygen level dependent (BOLD) signal without using EEG, and to find optimal settings for the used independent component analysis (ICA) decomposition.

In our retrospective study, we compared spatial maps of independent components (IC) derived from preoperative BOLD recordings (24 sessions) with a spatial masks of surgically removed tissue from patients with focal epilepsy. At each patient, there was one component selected as epilepsy-related (ER-) candidate based on spatial similarity criteria. Each ER-candidate IC was visually inspected by a neurologist and either classified as being epilepsy-related or marked as artifact. A dataset of 17 healthy controls was used to evaluate ER-candidate selection process (for each resection mask we tested belonging patient's data against healthy controls using Wilcoxon test).

In the patient group, we found a significantly better fit with the respective resection masks than the healthy control group, in 15 of 24 cases. The cases, where ER-candidate IC was classified as artifact (related to motion or large blood vessel), corresponds with cases of statistically insignificant results, which indicates validity of our approach. Several data decomposition/reduction methods were tested. Best fit between the ER-candidate IC and resection mask was obtained when performing ICA decomposition based on 98% of variability contained in the original data.

After indentifying possible typical properties of the ER-candidate component, ICA of fMRI data may become a suitable method for improving epilepsy localization, thus becoming a potentially valuable tool with future application in clinics.

PROGNOSTIC SIGNIFICANCE OF INTERICTAL EPILEPTIFORM DISCHARGES DURING SEMI-INVASIVE EEG MONITORING IN PATIENTS WITH HIPPOCAMPAL SCLEROSIS; EFFECTS OF PARTIAL DRUG WITHDRAWAL AND SLEEP

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Objective: To assess changes in the relative distribution of interictal epileptiform discharges (IEDs) and interictal EEG prognostic value in terms of surgical outcome between periods with full medication (FMP) and reduced medication (RMP) in patients with temporal lobe epilepsy (TLE) associated with hippocampal sclerosis (HS).

Methods: Interictal scalp EEGs of 43 patients were evaluated for the presence of IEDs separately in a waking state (WS) and sleeping state (SS) during FMP and RMP. In each period, patients were categorized as having unitemporal or bitemporal IEDs. Surgical outcome was classified as Engel I or Engel II-IV; and alternatively as completely seizure-free (CSF) or not seizure-free (NSF).

Results: There were significant changes in relative IED distribution between FMP and RMP during SS. The representation of patients with unitemporal IEDs declined from 37 (86%) in FMP during SS to 25 (58%) in RMP during SS (p=0.003). The relative IED distribution is a predictive factor for surgical outcome defined as Engel I or Engel II-IV in FMP during SS (p=0.020). The relative IED distribution could be a predictor for surgical outcome defined as CSF or NSF in both FMP during WS (p=0.043) and FMP during SS (p=0.015). When stepwise logistic analysis was applied, only FMP during SS was found to be an independent predictor for surgical outcome defined as Engel I or Engel II-IV (p=0.017), as CSF or NSF (p=0.018).

Conclusion: The predictive value of relative IED distribution with respect to surgical outcome in interictal EEG is present only during FMP; the predictive value decreases with the reduction of AEDs caused by the change of relative IED distribution.

PROCESSING AND VISUALIZATION OF HIGH RESOLUTION EEG DATA

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Continuous improvement of the acquisition of the EEG signals presents the scientists with new challenges arising from the sheer volume of the recorded data. Tasks, which were simple so far, fall out of the capabilities of the classical tools. Here, I'd like to give a glimpse of the computational issues linked to the processing of high resolution intracranial EEG recordings and present the approaches taken to address them.

The acquisition system on the St. Anne's Hospital in Brno currently records from the intracranial needle electrodes with 190 channels on the sampling frequency of 25 kHz. The raw data are downsampled for further processing to 5 kHz.

Processing of such data needs to turn to parallelization due to prohibitive memory or computational time requirements. Methods applied to particular channels independently (e.g. frequency band filtering) can be easily run concurrently, however methods applied on tuples of channels (e.g. correlation) need to be rewritten to efficiently scale with the number of employed processing cores. To address this, we have written a tool performing windowed pair-wise analysis in parallel both on one machine, or on a cluster.

Another essential task is the visualization of the raw and processed data. While the visual inspection is irreplaceable, displaying several gigabytes of data at once fails due to memory limits of a workstation. Therefore we have created a tool using hierarchical resolution for zooming, which allows to dynamically load downsampled data according to the resolution of the display.

As a last point, I'd like to advocate for a usage of pipeline systems for formalization and automation of the data analysis. It allows for encapsulation and replaceability of the tools used to perform particular processing steps.

Multifokální m. neuropatie

MULTIFOCAL MOTOR NEUROPATHY

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Multifocal motor neuropathy (MMN) is a rare inflammatory neuropathy with supposed prevalence of 1/100 000 individuals characterized by slowly progressive, asymmetric distal limb weakness without sensory loss. MMN can mimic amyotrophic lateral sclerosis or other variants of motor neuron disease, and asymmetric form of chronic inflammatory demyelinating neuropathy (Lewis-Sumner syndrome).

The underlying pathological mechanisms of MMN are not completely understood, but IgM autoantibodies against the ganglioside GM1 may be the cause of changes in nodal and perinodal structures that compromise nerve conduction.

The electrophysiological finding of conduction block in the absence of abnormalities in sensory nerves is the hallmark of MMN, but can be difficult to detect.

Intravenous humane immunoglobulin (IVIG) is currently the only standard therapy of MMN. IVIG efficacious in most patients, but long-term maintenance therapy does not prevent slowly progressive axonal degeneration.
Aim of the presentation will be a summary of current diagnostic criteria and current therapeutic strategy in MMN with stress laid on pitfalls in electrodiagnostic detection of partial motor conduction block. Difficulties in diagnostics and therapy of this orphan disease together with high cost of immunoglobulin therapy justify implementation of a national MMN registry.

AINSO REGISTRY

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The AINSO registry is designed for patients with AutoImmune NeuromuScular disOrders treated with intravenous humane immunoglobulin (IVIG) or therapeutic plasma exchange (TPE). These therapeutic approaches are regulated by key recommendations of the AINSO guideline supported by the IGA MZ ČR grant (IGA, No. 10650-3) „Research of the methods of health care standardization focused on development of the national set of guidelines of health services".

In contrast to other similar registries in this clinical area, AINSO registry is process-oriented, i.e. – every step of a process of care, sc., „performance", is documented according to key recommendations of the guideline. The registry navigates a doctor through the process of care and signals expected next step. The registry could be used for implementation of the AINSO guideline into clinical practice and to control its compliance. The AINSO registry was launched in 2012. It is used primarily for neuromuscular centres, but is open for other health care facilities offering relevant treatment modalities. Nowadays, 9 centres participate in the registry.

Among the main aims of the AINSO registry are:
1. To guarantee treatment of patients with autoimmune neuromuscular disorders in compliance with the AINSO guideline;
2. To analyze acquired data with respect to the incidence of particular diseases, to factors modifying clinical manifestations (demographics, triggered factors etc.), to the efficacy of treatment modalities, and to the validity of methods used to monitor progression and prognosis of the disorders.

The AINSO registry started with collection of data from patients with Guillain-Barre syndrome. By August 19th 2013, the registry contains data from 102 cases (45 women, 56 men, with mean age of 52.1 years). In April 2013, the registry expanded to collect data from patients with multifocal motor neuropathy (MMN). By August 19th 2013, the registry contains data from 11 cases (6 women, 5 men, with mean age of 47.4 years). The sample is, however, still too small to derive any conclusion. The presentation will be focused on the description of individual steps during the process of care, evaluation of the degree of neurological deficit and methods of statistical assessment.

IMUNITNÉ NEUROPATIE

Kurča E.

TS NF vyšší nervové činnosti

COGNITIVE STIMULATION CAN DIFFERENTIATE PHYSIOLOGICAL AND PATHOLOGICAL RIPPLES IN HUMAN HIPPOCAMPUS

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Until now there has been no way of distinguishing between physiological and epileptic ripples in intracranial recordings. In the present study we addressed this by investigating the effect of cognitive stimulation on interictal high frequency oscillations in ripple range (80-250 Hz) within epileptic and non-epileptic hippocampus. We analyzed depth EEG recordings in 10 patients with intractable epilepsy, in whom hippocampal activity was recorded during quiet wakefulness and subsequently during a simple cognitive task. Using automated detection of ripples based on amplitude of power envelope, we analyzed ripple rate (RR) in the cognitive and resting period, within epileptic (EH) and non-epileptic hippocampi (NH). Compared to quiet wakefulness we observed a significant reduction of RR during cognitive stimulation in EH, but not in NH. Further, we investigated the direct impact of cognitive stimuli on ripples (i.e. immediately post-stimulus), which showed a transient statistically significant suppression of ripples in the first second after the stimuli onset in NH only. Our results thus point to differential reactivity of ripples within EH and NH to cognitive stimulation.

FUNCTIONAL ANATOMY OF OUTCOME EVALUATION DURING IOWA GAMBLING TASK PERFORMANCE IN PATIENTS WITH PARKINSON'S DISEASE: AN fMRI STUDY

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Introduction: The aim of this study was to investigate the functional anatomy of decision-making during the Iowa Gambling Task in patients with Parkinson's disease (PD).

Method: We used event-related functional magnetic resonance imaging (fMRI) during a computerized version of IGT to compare 18 PD patients on dopaminergic medication in the ON state and 18 healthy control subjects. Our analyses focused on outcome evaluation following card selection, because we expected this aspect of decision making to be impaired in PD patients.

Results: The PD patients exhibited lower activation of the left putamen than the control group as a reaction to penalty. Using psychophysiological interaction analysis, we identified decreased functional connectivity between the right globus pallidus internus and the left anterior cingulate gyrus in the PD group. In contrast, increased connectivity between these structures was observed after penalty in the control group.

Conclusions: Our results suggest altered functioning of the basal ganglia and their connections with the cortical structures involved in the limbic loop (e.g. the limbic fronto-striatal circuit of the basal ganglia) during decision making in PD patients. Differences in the response to loss could be associated with insufficient negative reinforcement following a loss in PD patients in the ON state in comparison to a healthy population.

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BEYOND SKELETOMOTOR FUNCTION OF HUMAN BASAL GANGLIA: OCULOMOTOR, VISUAL AND AFFECTIVE NEURONS

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Deep brain stimulation (DBS) of targets in basal ganglia is an effective treatment of motor dysfunction in Parkinson's disease and primary dystonia. However this treatment may be accompanied by unwanted non-motor side effects. To confirm their neurophysiological nature we searched for any neurons in the subthalamic nucleus (STN), substantia nigra pars reticulata (SNr) and globus pallidus (GP) involved in processing of visually presented emotional scenes.

Nineteen Parkinson´s disease patients, which underwent implantation of DBS electrodes to STN or GP, were investigated with simultaneous intraoperative microelectrode recordings and single channel electrooculography during a visual emotional task containing a series of photographs varying in emotional valence and arousal. Recordings were analyzed by the WaveClus program which allowed for detection and sorting of individual neurons.
Out of 183 neurons that were detected, 130 were found in the STN, 30 in the SNr and 23 in the GP. Twenty percent of the neurons in each of these structures showed eye movement-related activity. In the STN, we observed 35 neurons whose firing rate changed significantly within first 500 ms after presentation of a photograph suggesting their participation in visual or attentional mechanisms. Activity of 14 STN neurons showed significant changes during 500-1500 ms interval in alpha band of the instantaneous firing rate related to the emotional content of presented photographs. Activity of 8 of neurons was related to the

arousal while activity of another 6 neurons was changing in relation to the emotional valence.

Our results showed that basal ganglia contain relatively high share of oculomotor neurons suggesting their critical role in eye-movement control. In addition, the STN neurons involved in visual processing and in transmission of emotional information provide evidence of separate management of the affective dimensions of valence and arousal. Therefore, it is not surprising that DBS may have various non-motor consequences.

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AN INTRA-CRANIAL EEG INVESTIGATION INTO THE ROLE OF SEMANTIC CATEGORISATION IN EMOTION PERCEPTION

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Introduction and objectives: Achieving an understanding of the principles underlying categorisation is important for a wide range of psychological phenomena, and especially for emotion processing. In a previous study with a large non-clinical sample, we observed spontaneous categorisation of IAPS images according to their semantic content. In the present study, we explored whether this principle of categorisation is reflected at the neurophysiological level.

Methods: Eighteen patients suffering from pharmacologically intractable focal epilepsy (10 males) observed the same set of 120 IAPS images, and were asked subsequently to rate them on valence and arousal. The following semantic categories were contrasted on the basis of our previous results: Death, violence and suffering for negative valence; objects, erotica and portraits for neutral valence; and food, nature and social content for positive valence.

Results: Event-related potentials (ERPs) were modulated according to semantic content, as indexed by the latency (*lat*), length, and the magnitude of the peak amplitude difference. Importantly, this occurred independently of perceived valence and arousal. Such categorisation emerged throughout many brain structures.

Conclusions: Our findings provide strong evidence that semantic content is an important factor in the categorisation of non-verbal emotional stimuli, and pictures grouped together implicitly evoke distinct neurophysiological responses. This implies that an emotional response does indeed involve the extraction of meaning.

TS fMRI 1

MAGNETIC RESONANCE VOLUMETRY CONFIRMS TRIGEMINAL NERVE ATROPHY IN PATIENTS SUFFERING FROM ESSENTIAL TRIGEMINAL NEURALGIA

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Object. The aim of this study was to assess trigeminal

nerve (TN) atrophy in trigeminal neuralgia (TNr) using magnetic resonance imaging (MRI) in patients that subsequently underwent gamma knife surgery (GKS) and to evaluate correlation between anatomic findings and clinical data.

Methods. We measured TN volumes along their course through the pontocerebellar cistern in 55 subjects. MRI was performed on a 1.5 T Siemens Avanto scanner using a CISS sequence (T2 ci3d, slice thickness 0.9 mm, inplane resolution 0.45x0.45 mm, TE 2.47 ms, TR 5.54 ms, NEX=2). Volumometry was performed in a consistent grayscale using an auto-level mode in Leksell GammaPlan v.10.1 by manually tracing the contours. Two independent investigators carried out the measurements. Statistical analyses (paired Wilcoxon test, descriptive statistics and Spearman non-parametric correlation) was calculated in GraphPad Prism 5.01.

Results. The volume of the TN on the affected side was significantly smaller (32.6±13 (SD) – observer DU and 31.6±12 mm^3 – observer VS) than the volume of the unaffected side (41.2±18 mm^3, and 36.53±14; $p<0.0001$ and $p<0.001$). In 71% of subjects the affected nerve was smaller. No significant differences were found between subjects with and without pain relief after gamma knife surgery, post-treatment sensory deficit or pain recurrence. Neither correlation between TNr duration and affected nerve volume, nor significant differences between groups of subjects with pain duration under 60 months (n=28) and equal or longer than 60 months (n=22); mean 32.6 vs. 33.2 (observer DU) and 31.9 vs. 30.9 mm^3(observer VS)) were detected.

Conclusion. TN volumes significantly differ among affected and unaffected TN in TNr patients. Statistically significant correlation between the duration of pain and TN volume was not found and atrophy was not observed to progress throughout the course of the disease, suggesting that volume changes may be a predisposing factor for TNr.

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EFFECT OF REGION COORDINATES SHIFTING ON DYNAMIC CAUSAL MODELLING RESULTS

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Dynamic Causal Modelling (DCM), as one of methods for effective brain connectivity analysis allows us making inferences about neural processes that underlie measured functional magnetic resonance imaging (fMRI) data. The main goal is to estimate parameters of the neuronal system model, whose outputs correspond most precisely to observed blood oxygenation level dependent (BOLD) response. As DCM is not exploratory technique, we have to define a hypothesis, which contains information about inputs, connections and brain regions. This contribution deals with the effect of region coordinates selection on the DCM results.

For exact evaluation of the shifting effect we designed and implemented a data simulator based on the DCM model. Simulated BOLD signals from different regions of interest are generated with selectable fine time step and then down-sampled to the specific repetition time (TR). The idea of the shifting simulation on hemodynamic level is that decreasing the signal to noise ratio corresponds to a greater shift, which means that the signal extracted from the region of correct coordinates consists of 100% useful BOLD signal, while the signal from a region, not included in the analysis, is formed only by noise. The noise means low frequency fluctuations, realistic physiological phenomena, signal closely correlated to the useful BOLD signal or their combinations. Thereafter the connectivity is estimated by the same model, which is used for the simulation but with sparser sampling. We are interested in the amount of correctly estimated connections between selected regions of the specific model. Monte Carlo simulations are used for investigation of the model behavior.

Based on the simulation results, we can say that the shifting affects the number of correctly estimated connections. However, DCM shows some uncertainty

because, also in case of no shift, there exist results with one falsely estimated connection.

COMPARISON OF THE METHODS FOR BRAIN PARCELLATION

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In recent studies many scientists tend to examine functional connectivity with the help of graph theory algorithms, especially when studying resting-state fMRI data. The graph theory approach is based on the cortex parcellation – dividing it to disjoint areas and analyzing the relations between these areas. This work tries to compare results of parcellation by 3 types of anatomical atlases – AAL atlas, atlas of Brodmann areas and parcellation to gyri and sulci. We also use different approaches to compute representative signal for each area and compare how the representative explains data. We used mean signal, first, second and third principal component as the typical signal and we computed significances of each representative type by percentage of area variability explained by this signal.

We found that the representative explains less than 50 % of the variability in the area no matter which type of representative we chose. This could have been caused by present noise or the area size. The representative created from mean signal is almost the same as the first principal component signal regarding the percentage of explained variability. However, 1st PCA component can capture the inhomogeneity of the area and therefore can suggest possible dividing of the area which would result in smaller areas better explained by their separate representatives.

Our comparison of anatomical atlases brought one compex conclusion – areas created according to Brodmann and AAL atlases have lower mean variance and higher mean explained variabillity than areas specified by atlas of gyri and sulci.

To conclude we propose to use the AAL atlas above the other two types of atlases. In future the comparison of parcellation by anatomical atlases and data driven analysis would be interesting.

STATISTICAL CHARACTERISTICS OF EVENT RELATED AND BLOCK DESIGN DATASETS

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Introduction: In this work we characterize functional magnetic resonance imaging (fMRI) data from event related and block design studies with typical values of several parameters. We use signal to noise ratio (SNR), percent signal change (PSC) and statistical parametric maps, estimated by SPM8 toolbox (beta, con and t-statistic maps). The aim of this work is to describe typical values appearing in datasets and to enhance knowledge about typical distributions of dataset's parameters which could be used for estimation of data quality.

Methods: We used data from four studies. Datasets were acquired using 1.5T MR scanner Siemens Symphony. First dataset is event-related visual oddball experiment (VOB) with 4 sessions, other datasets are block design studies: visual memory task (VMT), verbal fluency task (VFT) and semantic decision task (SDT). Parameters were calculated for three types of previously selected brain regions – regions related to the task (activations and deactivations), regions related to physiological artifacts and one cortical area not related to the task.

Results: In the event related study, typical PSC in task activated voxels was about 0.1%, in the block design studies was PSC higher, with mean values between 0.4 to 1%. Greater variance of SNR was observed in regions designated as sources of physiological noise in event related than in block design studies. We also observed significant correlation between t-values and PSC in VOB study (Pearson p=0.8517) and stronger correlations in

block design studies (Pearson p={0.9902; 0.9299; 0.9697}).

Conclusion: Lower correlation of PSC and t-values in VOB study could be caused due to separation of experiment in 4 sessions. More robust explanation could be made after including more event related studies into this comparison. These dataset characterizations will provide useful basis for fMRI data simulations, for calculation of statistical power, and possibly for evaluation of fMRI data quality.

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Posterová sekce

SENSORIMOTOR CHARACTERISTIC OF THE GESTE ANTAGONISTE

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Keywords: cervical dystonia, geste antagoniste

The sensory trick (geste antagoniste) – a slight touch in the area of face or head – is a bizarre clinical feature in cervical dystonia patients leading to attenuation of the disease symptoms. Even if well known, the pathophysiology and clinical significance of it still remain shrouded.

In a semiquantitative, questionnaire based research, we have so far examined 81 patients (58 women, 23 men, mean age 57.9 years) with idiopathic cervical dystonia. While 77 % of subjects were able to correct the abnormal posture with force – pushing the head to the normal position; only about 41 % of subjects showed the classic geste antagoniste where just a slight touch sufficed – with slight difference between men and women – 30 %, resp. 44 %, however, statistically not significant (p = 0.24). Out of these patients, 76 % were able to use both hands and 42 % both sides of the head (at a patient-specific area) to provoke the trick. However, when another person (the researcher) touched the very head area, only in 27 % of patients it lead to partial or full alleviation of symptoms, showing there is a distinct motor pattern that needs to be maintained to induce the gesta antagoniste. Only 33 % of the patients were able to provoke the trick using a foreign object (e.g. a pen), so the geste antagoniste seems to be not only a simple sensory feature requiring just touching of the area, no matter the object providing the touch. Surprisingly, about 21 % of patients showed at least a partial disease symptoms improvement when imagining doing the trick themselves and about 82 % of patients were not able to fully provoke the trick when busy with some cognitively demanding activity (e.g. counting), allowing us to hypothesize that there is also a psychological dimension of the geste antagoniste requiring the subject to focus on it.

These data show that geste antagoniste is a complex feature requiring distinctive motor, sensory and cognitive input combination. It definitely deserves more attention as there is a promise of possibly effective therapeutic use of sensorimotor stimulation in cervical dystonia patients leading to at least partial symptoms alleviation of this painful and stigmatizing disease.

INCREMENTAL LEARNING IN THE TASK OF EEG DATA CLASSIFICATION

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In this paper, we present incremental approach used for classification of long-term sleep EEG recordings. Incremental learning implies that we can add new EEG signal segments to training set without training the classifier again.

Firstly, it was important to choose a method for evaluating the number of attributes necessary for proper classification. Then we could start the main experiments. There were two approaches chosen to simulate two real cases: the first was to take segments of signal sequentially from the beginning, and the second was to choose segments randomly. If we take segments for training set gradually from the beginning, we simulate case when a neurologist is classifying data from the beginning. With random selection of segments for training data set, we simulate case when a doctor classifies only preselected data that he wants. To make the classification to speed up the classification process, we try to find the most accurate classifier, which is able to classify sleep data by learning on as little as possible number of segments, i.e. the shortest part of available data set. This should save time, which neurologists spend with classifying EEG signal manually.

The most efficient approach was, for our dataset, incremental Support Vector Machine learning. We can summarize that we get better results, if segments were chosen for incremental learning randomly. In this case, for achieving classification accuracy of 70% (compared to the physician's evaluation) it was sufficient to evaluate about 10% of a recording.

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EFFECT OF BIPOLAR ELECTROSTIMULATION ON FOCAL NEUROPATHY OF ULNAR NERVE IN ELBOW AREA – PILOT STUDY.

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The focal neuropathy in the elbow area is the second most common mononeuropathy. The goal of our pilot study was to analyze the effectiveness of the bipolar electrostimulation of the ulnar nerve lesion in the elbow, using clinical examination, electromyography, questionnaires, motor tests, and Hoorweg-Weiss I/t curves. Study included 10 patients, 49 ± 14.2 years old, with clinical noninjury, mild paresis of ulnar nerve. Nerve conduction studies revealed mild slowing of MCV, SCV and focal nerve lesion in ulnar nerve sulcus with subacute axonal neuropathy in needle EMG in m.IDI and FCU. Participants received bipolar electrostimulation (oblique pulse at subtreshold motor level, pulse duration 500ms) twice a week for six weeks. A paired t-test was used to compare the input and output EMG values, questionnaires (DASH, UNEQ),and motor tests ($p < 0.05$). The results showed nonsignificant improvement of functional tests and in questionnaires. EMG results showed an increase in amplitude of CMAP from IDI (6.8 ± 3.5 mV vs. 9.9 ± 5 mV, *0.037), increase in amplitude of SNAP from V.finger (13.5 ± 8.2μV versus 17,1 ± 9μV, *0.039). No significant differences were found in amplitude of CMAP recorded from ADM, no changes were found in MCV across the elbow from ADM (38.6 ± 10.8 m/s versus 38.7 ± 9.1m/s, *0.94) and IDI (39.6 ± 13.0 m/s versus 39.1 ± 9.9 m/s, *0.92). I/t curves revealed a nonsignificant increase in accomodative quotient (2.7 ± 0.4 versus 3.3 ± 0.7 *0.12). While the present study shows nonsignificant impact of the bipolar electrostimulation on focal neuropaty in functional test, the subjective improvement and

increase in amplitude of CMAP from IDI and SNAP from V. finger are indicative of its positive effect.

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BOTULOTOXIN IN THE TREATMENT OF SPASTICITY - OUR EXPERIENCE

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Introduction: Botulotoxin (Btx) is our department currently treated 66 patients. Of these, 14 patients with cervical dystonia (21 %) , 17 patients with blepharospasm or hemifacial spasm (26 %) , 5 patients with chronic headache (8 %) and 31 patients with spasticity of the extremities (47 %) . In the group with spasticity limbs predominate patients after stroke , 27 patients (41 %). We analyzed a group of patients treated with Btx for limb spasticity . The indication is moderate to marked spasticity of the upper and / or lower extremities , evaluation, notably the modified Ashworth scale (MAS) .. Exclusion criteria are fixed contractures , neuromuscular disease , pregnancy and INR above 2.5.

Results: During I/2012-VIII/2013 a total of 31 patients with spasticity of limbs, 23 men (74 %) and 8 women (26%) aged 19-73 years. For spasticity of the upper limb Btx was administered in 28 patients (90 %) with lower limbs in 14 patients (45 %) and both limbs of 11 patients (35%). Application Btx was administered under EMG control at intervals of 3-4 months, the control test after three weeks of application. Median MAS score decreased spasticity in the elbow of the input 3 to 1 + after application. Median spasticity in the wrist and fingers from 3 to 2 and lower limbs decreased from 2.5 to 1 + . Improvements were seen in 30 patients (97%). The most common complication was pain at the injection site 12 (8 % of applications) , hematoma 9 (6%) , edema 3 (2%) and weakness of the limbs 2 (1.5 %)

Conclusion: Btx is an effective and safe treatment . An integral part of the treatment program for patients with spasticity must be rehabilitation, stretching, splinting , physical processes . The prerequisite is the motivation and cooperation of patients.

MODULATION OF CEREBRAL SENSORIMOTOR CIRCUITS DURING BOTULINUM TOXIN TREATMENT OF CERVICAL DYSTONIA

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Objective: Neurophysiological and lately also functional brain imaging studies in cervical dystonia (CD) patients indicate a disorder of sensorimotor integration within extensive cortico-subcortical brain networks. Intramuscular botulinum toxin type A (BoNT-A) application has a proven clinical effect on pathological muscle activation in CD but recently has also been shown to modulate sensorimotor networks. To clarify cervical dystonia pathophysiology through functional magnetic resonance imaging of sensorimotor network changes associated with first-time botulinum toxin treatment.

Methods: We have studied 12 BoNT-A naïve CD patients using functional MRI during specific hand motor task performance. Clinical and imaging examinations were performed before the first BoNT-A application and subsequently 4 weeks after application, at the time of maximal clinical effect of BoNT-A. Clinical treatment response was evaluated with the Tsui score, functional MRI data were analyzed with a general linear model implemented in FSL software, treatment effects were tested in pair-wise linear contrasts.

Results: First BoNT-A injection, although it had a good clinical effect, did not lead to any significant changes in activation of cortex or basal ganglia in our group of CD patients.

Discussions: Within the context of previously described sensorimotor network hypoactivation during motor

task performance in CD, our observed effect of no significant change in sensorimotor cortex activation would suggest the hypothesis that robust central changes develop after long-term regular BoNT-A treatment, although even the first BoNT-A application is clinically effective.

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CHANGES IN BRAIN ACTIVATION AFTER THERAPEUTIC STIMULATION USING VOJTA THERAPY: CONTROLLED STUDY

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Introduction: The aim of this study was to assess the changes in brain activation patterns in healthy volunteers after therapeutic stimulation using *Vojta therapy*. Although the efficacy of this treatment has been supported by clinical studies, the underlying physiological processes at the central nervous system level remain largely unknown. We suggest that the stimulation effects include changes in *resting-state functional connectivity* and in task-related cortex activation.

Methods: Twenty-three healthy volunteers were enrolled and divided into two groups based on the treatment received: either stimulation in the Vojta right heel zone (Group A, n = 14, 3 males, mean age 25.57) or sham stimulation of the right ankle (Group B, n = 9, no males, mean age 25). All subjects underwent a single magnetic resonance imaging (MRI) examination using our Siemens Avanto or Symphony 1.5T scanners, including 6 functional imaging experimental runs: two pairs of 6-minute resting and finger tapping runs separated by two consecutive 10-minute runs during intermittent pressure stimulation which was applied in 30-second blocks alternating with rest. The BOLD signal acquisition covered the whole brain in 30 axial slices using *gradient-echo EPI* sequence with TR 2500 ms. Statistical analysis of the imaging data was carried out using FEAT (General Linear Model, GLM), MELODIC (Independent Component Analysis, ICA), and Dual Regression tools, parts of FSL 5.0 developed by FMRIB. Group post-hoc contrasts yielded Z-statistical maps thresholded using cluster significance threshold at $p < 0.05$.

Results: The finger tapping data showed significant interaction in the right (ipsilateral to the active extremity) middle and superior frontal gyrus, whereas the GLM analysis of the stimulation data showed stronger activation in predominantly right frontal perisylvian and insular cortex, bilateral basal ganglia, thalami, cerebellum, and brain stem in Group A, while there was stronger activation in bilateral precentral and postcentral gyri, left frontal cortex, and bilateral occipital cortices in Group B. The group ICA of both stimulation and resting data did not reveal any significant relationship between the tested variables.

Conclusion: Our findings during the stimulation and the voluntary motor task performance prior and after the treatment provide the evidence, that the reflex locomotion elicited by Vojta therapy is associated with specific changes in cortical and subcortical brain activation when compared to the sham treatment.

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TS fMRI 2

MAPPING OF MOVEMENT ARTIFACTS IN fMRI

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Introduction: Movement artifacts can cause serious changes in fMRI time series and therefore induce false positive or false negative results. In this work we calculated maps of movement artifacts using various approaches and compared maps across three different datasets to assess the variability between different populations and acquisition parameters.

Methods: Three different data sets (each under different experimental task, TR and number of scans, each consisted of 50 subjects), were included into the evaluation. The data was processed using SPM8. 6 parameters obtained during realignment were extended by adding their first differences and their squares to get up to 24 parameters included in the design matrix. Subsequently these movement parameters were tested for their statistical significance on explanation of variability in the data. Probability maps were created by calculating relative frequency of occurrence of "movement-based activation" within each dataset. Power maps were calculated from the ratio of movement-based signal energy to the energy of the total measured signal.

Results: In this work, we demonstrated that using all of 24 parameters will explain more variability in the data related to movement artifacts. We found out that probability maps show the similar location of artifacts across datasets nevertheless maps differ in frequency of occurrence. Power maps indicate similar places as probability maps but the amount of the movement-based variability is different across datasets.

Conclusion: We can conclude, that movement artifacts influence the signal at similar areas within subjects and datasets. Movement artifacts are mainly localized at the edges of the brain and brain ventricles. However, consistency of artifact occurrence and power of movement-based signal is different between studies.

SIMULATIONS OF FMRI DATA WITH USAGE OF ESTIMATED PHYSIOLOGICAL ARTIFACTS

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Introduction: Simulation of fMRI data is a useful tool to verify or to compare different processing methods. Typically simulated data are created using combination of modeled signals and regions of interest with addition of some noise (Gaussian, sometimes low-frequency noise, autocorrelation or polynomial drift). Our previous experiences indicated that such simplification is not enough to simulate 4D data suitable for independent component analysis (ICA). In this work, we introduced new approach which uses estimates of physiological artifacts from real data to create more realistic structure of simulated fMRI data.

Methods: Synthetic fMRI datasets were created using in-house fMRI simulator. We combined three regions of interest sharing the same signal fluctuation according to block stimulation, three other regions with low-frequency fluctuations and random events uncorrelated to stimulation, EPI template, Gaussian and low-frequency noise, and polynomial drift. RETROICOR algorithm was used to estimate spatial maps and temporal characteristics of cardiac and breathing processes from resting-state fMRI data. These estimates of physiological artifacts were combined with synthetic data in multiplicative manner to form the final 4D datasets. ICA was used to process both 1) pure synthetic datasets, and 2) datasets with physiological noise to compare the suitability of our process.

Results: Typically 4 components were estimated using ICA on pure synthetic data showing all modeled regions. Using more realistic datasets, typically 7 additional components related to physiological noise were estimated.

Conclusion: Using more realistic simulated data will enable us, for instance, to test classification algorithm and to make ICA calculation more realistic because using ICA with resting-state data results typically in 20 components (and more than half are probably related to artifacts). We proved that using spatiotemporal characteristics of physiological processes estimated from real data, it is possible to create more realistic simulations of fMRI data.

SPATIO-TEMPORO-SPECTRAL PATTERNS OF EEG AND BRAIN HEMODYNAMICS USING BAYESIAN APPROACH.

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Introduction Bro et al. [1] introduced a Paralell factor analysis method (Parafac) which could blindly separate 3D data into components. This method could be applied to 3D spectrogram of EEG data to get natural spatio-temporo-spectral patterns of EEG spectrum (STSp) without any apriori spectral or spatial constrains. Temporal features of STSp could be then used to find brain regions with correlated brain hemodynamics in simultaneously acquired fMRI data. In this work we show the comparison between two methods for Parafac estimation, so far used Alternating least square (ALS) and our proposed method based on Variational Bayesian statistic (VB). The VB method is then applied to real EEG data from healthy controls to get natural STSp and brain regions with correlated hemodynamics.

Methods: We used a large set of simulated 3D data which were subjected to the Parafac estimation using either ALS or VB. The similarity between true and estimated components was computed for each dataset and both methods were compared. The simultaneous EEG-fMRI data were acquired from 52 healthy subjects. The Parafac was then applied using VB method to 3D spectrogram of EEG data concatenated along time dimension to get group-specific STSp. The temporal features of resulting STSp were then used to get brain regions with correlated brain hemodynamics.

Results: The similarity between true and estimated components was significantly higher for VB than for ALS. Using the real data from healthy subjects we found several STSp in all frequency bands and corresponding brain regions with significantly correlated hemodynamics.

Conclusion: The VB based Parafac is a powerful blind decomposition method which could draw natural STSp from EEG data with better performance than ALS. It could add valuable contribution to the studying of physiological relationship between EEG and hemodynamics.

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DEALING WITH NOISE IN PSYCHOPHYSIOLOGICAL INTERACTIONS - fMRI ANALYSES

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Introduction: Psychophysiological interactions (PPI) method [1] is a valuable method for assessing the effective connectivity in fMRI. The published studies examined the impact of different noise filtration strategies on the functional connectivity analyses, but there were no attempts to observe the influence of the noise filtration on PPIs.

Methods: Thirty subjects (13 women, 17 men, 25.6 ± 4.2 y/o) underwent fMRI scanning with visually cued semantic decision block-design task. Three regions of interest were chosen and PPI terms were computed in SPM8. There were 18 versions of preprocessing and analysis settings with different degrees of signals

filtrations (concerning the usage of RETROICOR [2], covariates and/or filtration of signals from white matter, liquor, movement estimates and global signal). The group statistic maps were compared in the terms of voxel counts above threshold and positions of corresponding clusters.

Results: We observed significant differences in results due to different noise filtration approaches – especially increase in sensitivity with usage of RETROICOR or by adding covariates to the design matrix. Global signal filtration/adding to design matrix led, in general, to lowering the statistical values and hence increasing in negative localizations. Combinations of particular filtration approaches had complex effects which cannot be described in simple way.

Conclusion: We proved different effects of various filtration strategies on PPIs analyses. Suggestions about the most suitable approaches for PPIs are matter of future research.

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TS Neurorehabilitace

MODULATION OF CORTICAL ACTIVITY BY BOTULINUM TOXIN TYPE A IN PATIENTS WITH POST-STROKE ARM SPASTICITY

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Introduction: There is growing evidence of remote effects of botulinum toxin. We aimed to use functional MRI (fMRI) to localize brain activation changes in stroke patients treated by botulinum toxin A (BoNT) for arm spasticity.

Methods: 14 ischemic stroke patients with hand weakness and spasticity were studied. Spasticity was scored by modified Ashworth scale (MAS). FMRI was performed 3 times: before (W0) and 4 (W4) and 11 weeks (W11) after BoNT. Group A: 7 patients with hand plegia, who imagined moving fingers. Group B: 7 age-matched patients able to perform sequential finger movement. Difficulty was scored with visual analog scale. Statistic analysis (FSL) yielded group session-wise statistic maps and paired between-session contrasts.

Results: BoNT-A transiently lowered MAS in W4 in both groups. Performance difficulty did not change. In group A, activation of frontal premotor cortex dominated (as in healthy). At W4, ipsilateral cerebellum engaged as well, and persisted at W11. Paired contrasts showed activation decrease in bilateral occipital cortex W0 > W4 and left-sided occipitoparietal increase W4 < W11. These can be attributed to occipital deactivation (also precuneus and medial orbitofrontal cortex) at W4.
Group B additionally activated contralateral motor and parietal cortex and bilateral cerebellum. From W0 to W4, activation was markedly reduced, which persisted at W11. Paired contrasts confirmed differences W0>W4 (extensive ipsilateral parietal, occipital and premotor) and W0>W11 (occipitoparietal). The effect of deactivation at was limited.
Conclusion: Study of 2 age-matched groups with mild and severe weakness demonstrated different effect of BoNT-lowered spasticity on motor system engagement. Group A during movement imagery at maximum BoNT effect manifested deactivation of visual and default mode system, perhaps a change from visual to kinesthetic imagery, with cerebellum participating. Group B during movement also manifested motor pattern normalization, especially reduced activation extent. *Supported by IGA MZ CR NT13575.*

ELECTROPHYSIOLOGICAL MONITORING OF VISUAL FUNCTION AFTER MIRROR TELESCOPE IMPLANTATION

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Objective: Implantation of an intraocular telescope increases life quality of patients with end-stage age related macular degeneration (AMD) (Singer et al., 2012), which is the most common cause of blindness and its prevalence in adults can be up 8 % (Lim et al., 2012). The implantation of such telescope brings unique opportunity to study brain plasticity in old age as the retinal image is displaced. The aim presented study was to monitor changes of electrophysiological markers of visual processing after implantation of a novel telescope based on mirror lenses, and to contribute to discussion about brain plasticity in elderly.

Methods: Visual evoked potentials (VEPs) were recorded to high contrast pattern-reversal, low contrast motion-onset and to target detection in odd-ball visual paradigm. The responses were collected before mirror lens implantation and then for seven months in two patients (OV- male 90y, MZ - female 70y) with a final-stage form of the AMD.

Results: The mirror lens offers resolution boost by zoom of 2.4, it, however, concurrently decreases contrast of the retinal image and its luminance at least by factor 5.8. In both patients we find reliable responses to low contrast paramacular motion-onset stimuli. The post-implantation luminance and contrast drop was reflected in the dominant VEP peak latency prolongation, the expected gain for higher spatial frequencies was not visible in VEPs partially because of their high variability even during one session. The VEPs amplitude degraded for about one month after surgery and then it started to stabilize. Psychophysically measured contrast sensitivity and visual acuity has been improving consistently for seven months after the post-implantation drop. While after half a year the visual acuity overcame the pre-implantation state the contrast sensitivity was still about twice worse that before implantation.

Conclusion: The electrophysiological responses to paramacular stimuli and psychophysical measurements demonstrate changes in visual processing even half year after transplantation. A trend of the electrophysiological changes does not follow the psychophysical observations. This pilot study demonstrates strong plasticity of the visual processing in elderly and the dissociation between psychophysical and electrophysiological recordings, which reflects complexity of visual processing and visual awareness.

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SURFACE POLYELECTROMYOGRAPHY – PRINCIPLE OF THE METHOD AND POSSIBLE USE IN DYSPHAGIA

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Objective: Surface polyelectromyography (PEMG) represents a specific application of electromyography (EMG) in the functional analysis of movement ("kinesiological EMG") with the aid of simultaneous recordings of electrical activity from multiple muscles using specialised equipment (typically 16 channels). Swallowing is a very complex function that involves 26 muscles in head and neck.

Patients and methods: The authors present their experience with PEMG in 12 patients with dysphagia, particularly after a cerebrovascular accident. They used subsurface layer muscle groups (orbicularis oris, masseter muscle, submental and laryngeal muscles) and simple standardised tests (dry swallowing, swallowing 20 ml of water and drinking 100 ml of water without interruption) for a PEMG examination at the beginning and end of an intensive physiotherapy and speech therapy.

Results: PEMG findings are presented in practical illustrations of specific cases including software processed EMG signals. Conclusion: PEMG (unlike "classic EMG") does not provide information to identify the clinical diagnostic units that cause a disorder. However, it facilitates, in terms of muscle activity, the characterisation of a functional disturbance (acknowledging limitations of the elusive definition for a normal movement pattern) and to monitor the evolution of functional parameters over time including its reaction to various influences (e.g. therapy).

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PRINCIPLE AND CONDITIONS OF INCLUSION THE HIPPOTHERAPY IN THE TREATMENT OF NEUROMUSCULAR DISORDERS

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Hippotherapy is a treatment method, which we can with a significant positive effect include in the comprehensive physiotherapy care of neuromuscular disorders. It is a therapy by horses. Gait motion generated pulses, which due to its size and capacity can be transmitted to the patient through contact with the horse's back. These pulses show a correlation with the motion stereotype of human bipedal locomotion, their essence is cross pattern. The patient is in balance area, which is formed by a moving horse's back, reflexively adapts on the external motion stimulus and activates all the means and the level of the central nervous system to activate the executive apparatus in order to maintain control over the center of gravity. As the external stimuli have physiological origins, adaptation takes place on the physiological substrate. There is a setting of desirable muscle tone and muscle chains involvement in physiological pattern. Cyclical effects of the initiative with good physiological response in time, we are trying to create or restore the neuromuscular junction in the body and save the interplay of motion in the form of engrams in order to repeat the connection has been made for the inclusion of this specific link to the spontaneous activity of the organism. The result is a new one, respectively rehabilitated motorized link, usable in the active patient movement. This process is very much influenced by the quality of the input parameters for dynamic stimulation (quality of movement of the horse) and no less then the default position (support base) of a patient, which adapts to the movement. If one of the starting points of error can not be assumed that the outcome of the therapy will be responsible physiology. If gait (speed and space) is not adapted to the needs and possibilities of the patient, does not adapt to the movement, but only the activation of defense mechanisms, when the muscle tension increases and primarily activate postural muscles, instead of stabilizing systems. Can not reach tone adjustment, neither synergy antagonists . In the case of a wrongly selected base supporting the patient and when improper setting root joints leads to a similar result. The patient used to stabilize of the centre of gravity pathological replacement patterns and therefore we can not talk about therapy, but only the fixation of pathological muscle interplays and isolated muscle strengthening on these samples are involved . The horse provides a unique opportunity to cyclic dynamic stimulation of precise parameters within the required time, when the patient's body has the ability to recall and fix the links, leading to the rehabilitation of its global possibly bipedal locomotor pattern. In practice I proved interconnection The Reflexology by V. Vojta (and other methods) with hippotherapy, which is able to offer controlled realization of the movement in space and time.

TS NF zraku

DIFFICULTIES OF MOTION-ONSET VEP EXAMINATION IN CHILDREN

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Introduction: In our previous papers (for review see Kuba et al., Vision Res., 2007, 47, 189-202) we have shown that in adults the motion-onset visual evoked potentials (M-VEPs) represent a useful diagnostic tool in neuro-opthalmology because they enable to test quite selectively the magnocellular system/dorsal stream function. In adults robust M-VEPs with low variability and typical shape with dominant negative N160 peak can be acquired easily, however, it is difficult to record and evaluate this type of VEPs in children. The M-VEPs go through very long maturation (up to 18 years of age) accompanied by gradual shortening of main negative peak latencies and also by age dependent shape development (Langrova et al., Vision Res., 2006, 46, 536-544). Moreover, they are unidentifiable to standard moving stimuli in some children. To understand better this problem, we tested 30 normal children aged 7 - 12 years.

Methods: We performed the set of standard stimuli used in our lab (https://www.lfhk.cuni.cz/elf) for examination of adults – low contrast translation motion (TM) and expansion/contraction motion (EXCOM).

Results: Reliable VEPs were detected in 77% of children to TM and in 83% of children to EXCOM. The dominant peak of the VEPs was negative in all TM VEPs and in 80 % of EXCOM VEPs (positive in 20%). In both VEP types there was large inter-individual latency variability (in the range of 176 - 268 ms in TM and 176 – 290 ms in EXCOM). When a high contrast TM stimulus (non-optimal "magno" stimulus) was used, the M-VEP latencies shortened and amplitudes increased in majority of subjects. In contrast to adults, M-VEPs to peripheral stimulation (outside central 20°) were detectable only in 43 % of children.

Conclusions: Our findings show that maturation of motion perception in children is rather inter-individually variable, which makes a diagnostic use of M-VEPs in children quite complicated.

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ANALYSIS OF DISORDERS OF THE EYE MOVEMENT CONTROL IN ALCOHOL DEPENDENT MEN

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Some disorders of various types of the eye movements are a very sensitive correlate of the various organic mental disorders. The study examined 34 men addicted to alcohol aged 28 - 47 years who were 2 - 7 weeks included in the scheduled institutional treatment. By means of the questionnaire methods there were in them found the indications of alcohol dependence. There were used a set of the psychological tests for organic mental disorders such as Benton's test, Rey-Osterrieth complex figure, WAIS-III subtests, ect. The examination was performed by the I4Tracking® system in a darkened chamber. The examined person watched a set of images on a monitor. Parameters of movements during fixation, saccadic movements, smooth pursuit eye movements (SPEM) and viewing of images was detected. I4Tracking ® system is device using the video-oculographic method. The basis of the device is a small camera attached to the head supporting part and through a semitransparent mirror records in the immediate proximity the user's eye movements. It is a monocular system. The obtained video signal is carried through the USB interface to a PC where it is then processed. Near-infrared spectrum is used. The reliability of the eye movements detection is 98% with an accuracy of 0.5 ° (at a distance of 60 cm from the monitor and with the fixed head). The recording rate is up to 200 frames per second. By the correlation analysis of the dependency parameters, results of psychological tests and eye movements parameters was determined a statistically significant correlation of saccadic, SPEM and some parameters of viewing images with the total

amount of the consumed alcohol, the age and duration of the alcohol career and with the Benton's test parameters.

ELECTROPHYSIOLOGICAL DIAGNOSIS OF EARLY CNS INVOLVEMENT IN HIV-1 INFECTION – PILOT STUDY

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Introduction: The aim of our study was to verify the possibility of early identification of HIV-related neural injury using visual evoked potentials (VEPs) in neurologically asymptomatic HIV seropositives. In the CART (combination antiretroviral therapy) era, the prevalence of neurocognitive impairment remains high, up to 50%, and HIV-associated neurocognitive disorder (HAND) has shifted towards a milder clinical presentation. Such a mild clinical presentation can escape detection [1].

Methods: The examination consisted of the Montreal Cognitive Assessment (MoCA) [2], and VEPs to pattern-reversal, motion-onset stimulation (radial movement), and of visual ERPs recorded during an odd-ball test (http://www.lfhk.cuni.cz/elf). Subjects: 9 homosexual men and 3 heterosexually infected women were examined in this study. All patients had ≥ 350 x 10^6 CD4 cells/l blood at inclusion. The duration of the HIV infection was 0.5 – 7 years, and mean age of the patients was 35 (24 – 50) years. Results: P100 potential was recorded with no alteration in the VEP amplitude or latency. However, in 5 patients with CD4 counts 350 – 750 x 10^6cells/l, there was prolonged latency of the N160 peak compared to the reference values obtained in our laboratory, which suggests a dysfunction of the motion-processing (magnocellular system or the dorsal cortical stream) [3]. P300 latencies and MoCA results were within the normal range in all HIV patients.

Conclusions: Our data suggest that motion-onset VEPs may be a sensitive measure of subclinical visual pathway dysfunction in early HIV-1 infection, however, we did not reveal any cognitive decline in this pilot group. Subsequently, the patients will be investigated using VEPs and visual ERPs at six-month intervals to evaluate the long-term development of the visual pathway involvement in HIV patients.

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OPTICAL COHERENCE TOMOGRAPHY AND VISUAL EVOKED POTENTIALS IN HEALTHY PERSONS

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Purpose: Optical coherence tomography (OCT) and Visual evoked potentials (VEPs) represent non-invasive objective examination of the visual system. While the OCT measures a morphological property of the retina (thickness of the retinal nerve fibre layer – RNFL), the VEP allows assessment a function of the visual system. There are numerous studies describing a mutual involvement of both mentioned aspects in diseases like multiple sclerosis, optic neuritis or glaucoma, however, normative studies of these relationship are missing. In our study we address this issue with an expectation to

translate the findings into interpretation of pathological findings.

Methods: We examined a group of 20 healthy volunteers (14 females, 6 males) aged 19-23 years. For VEPs were used the following stimuli: standard checkerboard reversal stimulation with 60′ and 15′ check size and radial expansion/contraction motion of concentric rings. RNFL thickness was measured for superior, temporal, inferior and nasal retinal sectors in peripapilar circular scan using FD-OCT (Spectralis Heidelberg Engineering, Germany). The RNFL in each sector was compared with latency and amplitude of VEP dominant peaks (MedelecSynergy, Viasys Healthcare, USA).

Results: We found highly significant positive correlation between inferior sector of the RNFL thickness with P100-N145 interpeak amplitude for reversal R15′ ($r = 0.728$; $p < 0.001$) and reversal R60′ ($r = 0.424$; $p = 0.006$) and negative relationship to N160 interpeak amplitude ($r = -0.498$; $p = 0.01$). The only correlation for the RNFL within the papilo-macular bundle was demonstrated for reversal 60′ N75-P100 interpeak amplitude ($r = 0.496$; $p = 0.001$). This correlation was also seen for RNFL in temporal sector ($r = 0.412$; $p = 0.006$).

Conclusion: In our study we demonstrated the relationship of some anatomic and function factors of visual system in healthy subjects. However, the interpretation of the relationship between inferior RNFL sector and VEPs amplitudes is not straightforward, as for VEPs recorded above the sulcus calcarinus just the upper hemiretina is dominant and so this topic is opened for further research.

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TS NF vyšší nervové činnosti 2

KOGNITIVNÍ MODULACE BIOELEKTRICKÉ AKTIVITY NCL. SUBTHALAMICUS

Rektor I.

SLOW NEGATIVE ERP RECORDED IN HUMAN HIPPOCAMPI DURING A SIMPLE SENSORIMOTOR TASK OCCURS INDEPENDENTLY OF MOTOR EXECUTION

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Introduction: A hippocampal-prominent slow negativity with a peak latency at around 450 ms is consistently observed as a correlate of hippocampal activity during various cognitive tasks. Some intracranial EEG studies demonstrated that hippocampal evoked activity is related to movement execution as well as stimulus evaluation and associated memory processes. The aim of the present study was to investigate the temporal relationship between the latency of the hippocampal slow negative potential and motor responses.

Methods: We analyzed ERPs recorded with 22 depth electrodes implanted into the hippocampi of 11 epileptic patients. Subjects were instructed to press a button after the presentation of a tone. In each subject, the artifact-free EEG segments were 1) sorted according to the respective RT from the fastest to the slowest responses, 2) divided into five subgroups and averaged separately (sorted averages). Finally, the ERP latency

and relative latency, obtained from all five sorted averages, were correlated with the median RT for each subgroup.

Results: All investigated hippocampi generated a prominent negative ERP peaking at approximately 420 ms. In 16 from 22 cases we found that the ERP latency did not correlate with the reaction time; in different subjects, this potential could either precede or follow the motor response.

Conclusion: Our results indicate that the hippocampal negative ERP occurs independently of motor execution. We suggest that hippocampal slow negativity, recorded in a simple sensorimotor task, is related to the evaluation of stimulus meaning within the context of situation.

DETECTION OF EMOTIONAL STATES BASED ON SCALP AND SOURCE MAPS OF EEG

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Recent methods of emotional states detection are mostly based on low-density EEG recording and analysis of the scalp activity. This disadvantage should result in the low classification accuracy of emotions. We extend the research in this area to high-density EEG recordings (118 electrodes) and source localization methods.

Our experiment consisted of 100 affective pictures (mostly IAPS dataset) standing for 3 different emotional categories (positive, neutral and negative). They were presented to 30 participants and the EEG signal was recorded. The spectral bands were calculated for scalp projection and further ICA decomposition and dipole fitting was applied for source localization. We analyzed classification errors for specific emotional categories. The goal of our study was to identify differences between low-density and high-density density EEG recordings. We were interested in the difference between scalp maps and the localized sources of the EEG signal. These differences should clarify possible sources of classification errors. We also analyzed whether differences in the spectral activity of specific emotions on the scalp correlates with the source signals. The advantages and disadvantages of specific methods are discussed.

DELINEATING THE ROLE OF MEDIAL AND MEDIO-LATERAL TEMPORAL NETWORKS IN DÉJÁ VU USING STRUCTURAL COVARIANCE MAPPING

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Objective: In a previous study (Brázdil et al., 2012), we revealed that the frequency of non-pathological déjà vu (DV) experience is related inversely to grey-matter (GM) volume throughout a diffuse set of cortical and subcortical brain structures. In this study, we set out to develop this finding by examining if patterns of GM decline occur in a co-ordinated fashion among these brain structures, and how patterns of GM *co-variance* relate to DV frequency.

Method: We compared GM covariance among 16 regions of interest emerging from our previous analyses, between three groups defined according to self-reported DV experience. To do so we employed partial least-squares (PLS). In contrast to voxel-based morphometry, this is a multivariate technique for structural co-variance mapping. To assess whether the emerging patterns of structural co-variance indexed functional networks, we compared our results to functional connectivity data supplied under the Human Connectome Project (HCP) database (http://www.humanconnectomeproject.org).

Results: Our PLS analyses revealed two patterns of GM co-variance associated with non-pathological DV frequency. The first revealed that grey-matter

alterations co-varied *increasingly* with higher DV frequency among limbic structures and the caudate; the second identified *decreasing* co-variance in GM alterations with higher DV frequency among medial and lateral temporal structures. Assessing functional connectivity among the same set of brain structures comprising each structural covariance pattern indicated that they reflect two distinct brain networks.

Conclusions: We suggest non-pathological DV emerges as a result of specific alterations in patterns of neural connectivity within and between medial and lateral temporal cortical networks, leading to these distinct patterns of coordinated structural alterations. This goes some way towards reconciling the discrepant findings concerning the role of lateral temporal cortex in pathological DV.

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THE CEREBELLUM, BASAL GANGLIA AND MOTOR TIMING IN MOVEMENT DISORDERS. BEHAVIORAL AND FMRI STUDY.

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Introduction: Published studies demonstrated that the cerebellum and basal ganglia participate in various motor and non-motor task related to prediction. In a series of behavioural and functional imaging studies we studied different populations of patients with movements disorders to clarify the role of the cerebellum and basal ganglia with respect to the motor timing.

Methods: Specifically, we investigated four different groups: i) patients with early Parkinson's disease (PD); ii) patients with sporadic spinocerebellar ataxia (SCA); iii) patients with essential tremor (ET); IV) patients with focal dystonia - cervical dystonia (CD) and v) matched healthy controls. We used a predictive motor timing task that involved mediated interception of a moving target, and we assessed the effect of movement type (acceleration, deceleration, constant), speed (slow, medium, fast), and angle (0°, 15°, 30°) on performance (hit, early error, late error). Using functional magnetic resonance imaging (fMRI) we evaluated the effect of hits, early errors, late errors - and their contrasts.

Results: Behavioral: The main results showed that the PD group did not significantly differ from the control group. However, the SCA, ET and CD subjects (severe and mild cerebellar damage, respectively) were significantly worse at interception than the other two

groups. We found that the PD patients failed to postpone their action until the right moment and to adapt from one trial to the next more often than the controls.
Imaging: The lobule VI of the right cerebellum was more activated in the healthy controls relative to the PD patients during successful trials. Also, successful trial-by-trial adjustments were associated with more pronounced activation in the right putamen and lobule VI for the healthy controls relative to the PD patients. PD subjects and healthy controls used identical functional circuits to maintain the successful outcome in predictive motor timing behavior, however the strength of effective connectivity differed between these two groups.

Conclusions: The cerebellum plays an essential role in integrating incoming visual information with motor output when making predictions about upcoming actions. Both the cerebellum and the basal ganglia are necessary for the predictive motor timing in general, with the cerebellum being associated with the postponement of the action until the right moment, and with both the cerebellum and the basal ganglia needed for successful adaptation in the task from one trial to the next. Future studies of the exact roles of subcortical structures in movement disorders is the challenge for the researchers.

MODULATING CORTICAL CONNECTIVITY IN SCHIZOPHRENIC PATIENTS WITH AUDITORY HALLUCINATIONS BY RTMS ASSESSED WITH EXACT LOW-RESOLUTION BRAIN TOMOGRAPHY (ELORETA)

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Background: Low-frequency repetitive transcranial magnetic stimulation (LF-rTMS) directed to the left temporo-parietal region is a promising effective treatment for auditory hallucinations (AHs) in patients who do not respond to antipsychotic medication. However, little is known about the electrophysiological effect on regional functional activity and its functional connectivity subsequent to the rTMS treatment. The aims of our study were a) to assess the therapeutic efficacy of LF-rTMS applied to the left temporo-parietal cortex (TPC) in a randomized, parallel-group, sham-controlled study, b) to identify the regional eletrophysiological correlates of AH and their changes accompanying the LF-rTMS intervention, and c) to identify the influence of LF-rTMS on cortical connectivity.

Methods: Nineteen schizophrenia patients with antipsychotic-resistant AHs were randomized to either active (n=10) or sham (n=9) rTMS. LF-rTMS (0,9Hz, 100% MT, 1200 stimuli per session) was administered over the left temporo-parietal region for ten days. In case of sham rTMS a coil was tilted at 90°. EEG data were recorded within tree days before and after rTMS treatment. The clinical effect was assessed by the Auditory Hallucination Rating Scale (AHRS) and the Positive and Negative Syndrome Scale (PANSS) by a rater blind to the treatment condition. The localization of the differences in electrical activity (current density) was assessed by the low resolution brain electromagnetic tomography (sLORETA) and functional connectivity was measured by lagged phase synchronization (eLORETA).

Results: After two weeks of treatment, AHRS scores were significantly improved for patients receiving active rTMS compared to the sham group (median reduction: 40% vs. 12%; p=0.01). LORETA analysis revealed a decrease of current densities in alpha2 (10.5-12 Hz), beta1 (12.5-18 Hz) and beta2 (18.5-21 Hz) bands in the left frontal, temporal and parietal lobes in case of active group. Active rTMS was followed by decrease of lagged phase synchronization in beta1 and beta2 bands and majority of affected connections originated in areas close to the site of rTMS stimulation. More complicated pattern of connectivity modulation by rTMS was observed in alpha2 band. The active treatment led to an increase of inter- and intrahemispheric connections and this effect was more pronounced on the side of stimulation. The decrease of alpha2 intra-hemispheric connections was found only in left hemisphere for long pathway connecting subgenual cingulate with posterior

cortices. No significant differences in electrical activity or functional connectivity were observed in sham group.

Conclusions: Active rTMS but not sham stimulation attenuated auditory hallucinations and was associated with a decrease activity in alpha2, beta1 and beta2 frequency bands on the left hemisphere. The functional connectivity changes support the assumption that the mechanism of LF-rTMS is linked to the modulation of cortico-cortical coupling.

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TS ION

INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING IN SCOLIOSIS SURGERY AT UNIVERSITY HOSPITAL BRNO

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Aim: The aim of our study was the evaluation of sensitivity and specificity of intraoperative neurophysiological monitoring (IONM) in scoliosis and developmental spinal deformities Sumery in our hospital after 10 years of practice.

Materials and methods: we evaluated retrospectively all intraoperative monitoring of motor (MEP) and somatosensory evoked potentials (SEP) during surgery of scoliosis and spinal deformities at Orthopedic clinic of University Hospital Brno between January 2003 and September 2013.

Results: Altogether 529 IONM using MEP and SEP were performed in 431 female and 98 male patients (mean age 15,1, range 2 – 48). No evoked responses were recorded during four surgeries due to technical reasons.

Retrospectively, with respect to postoperative neurological status we identified 510 true negative monitoring, 1 false negative monitoring, 12 true positive monitoring (significant EP changes which disappeared during surgery after targeted intervention were observed or these changes remained and correlated with postoperative neurological deficit), and 2 false positive monitoring. Significant permanent deficit was observed in 2 patients (0,38%).

Conclusion: Combined MEP and SEP IONM showed sensitivity 92,3 % and specificity 99,6 % in prediction of postoperative neurological status. Permanent neurological deficit was observed in 0,38% of surgeries. These findings correspond to those referred by other authors.

MONITORING OF MOTOR EVOKED POTENTIALS DURING THORACOABDOMINAL AORTIC ANEURYSM REPAIR

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Spinal cord ischemia is one of the most serious complications of thoracoabdominal aortic aneurysm surgery. Hypotermia, cerebrospinal fluid drainage and pressure monitoring, reimplantation of segmental arteries and staged clamping are usual methods of spinal cord protection. We use electrophysiological monitoring of motor evoked potentials (MEPs) to measure a functional status of the thoracolumbar spinal cord during thoracoabdominal aortic surgery. Between

May 2011 and May 2013, MEPs monitoring-assisted thoracoabdominal repair was performed in 14 patients.

Stable MEPs were reproducible in 10 of 14 patients (71%). Nine of them displayed no neurological deficit after postoperative awakening. One patient suffered light hemiparesis due to brain ischemia.
Bilateral MEPs loss occurred in 4 of 14 patients. Two of them recovered after spinal-cord protecting interventions with no neurological deficit. One patient died early after surgical intervention in the ICU and it was not possible to assess neurological functions in this patient. The remaining patient suffered left-sided hemiparesis, which improved to a very light deficit within several days after the procedure. There was no case with paraparesis or paraplegia in our group.

Neurophysiological monitoring of spinal cord function is necessary to detect spinal cord ischemia. An advantage of MEPs comparing to the somatosensory evoked potentials (SSEPs) is rapid response to spinal malperfusion and corrective steps to prevent or reduce the extent of paraplegia and paraparesis can be taken with little delay. False positive results, detected in 2 patients of our group, are well known and described in literature and were not detrimental for the patients.

INTRAOPERATIVE LECTROCORTICOGRAPHY IN DETECTION OF FOCAL CORTICAL DYSPLASIA ASSOCIATED WITH HIPPOCAMPAL SCLEROSIS

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Purpouse: Patients with hippocampal sclerosis associated with focal cortical dysplasia can have a higher risk of seizure recurrence if both of these pathologies are not removed. The aim of our study was to determine the role of intraoperative electrocorticography in detection of this dual pathology.

Methods: Intraoperative electrocorticography recordings were obtained in patients who underwent anteromedial temporal lobe resection. Patients with histopathologically proven hippocampal sclerosis and temporal pole available for analysis were included and were divided into two groups according to histopathology: isolated hippocampal sclerosis (n=23) and hippocampal sclerosis associated with focal cortical dysplasia – FCD IIIa (n=23).Cortical activity was measured prior to the resection using two six-contact strips (sampling from latero-basal and temporo-polar regions respectively) and one four contact strip sampling from mesio-basal temporal cortex. Occurrence of isolated mesial and independent neocortical (basal or lateral) spike activity was evaluated. Data analysis was performed by raters blinded to histopathology.

Results: Independent neocortical spikes were identified more frequently in patients with dual pathology (sixteen patients with FCD IIIa vs. four patients with isolated hippocampal sclerosis; p=0.01). On the contrary, isolated mesial spikes occurred more often in patients with isolated hippocampal sclerosis (19 patients vs. 6 patients with FCD IIIa). In one patient with FCD IIIa no spikes were recorded.

Conclusion: Independent latero-basal temporal spikes recorded during intraoperative electrocorticography in patients with hippocampal sclerosis suggest associated dysplastic tissue in neocortex, i.e. dual pathology.

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TRANSCRANIAL FACIAL MOTOR EVOKED POTENTIALS: A CONTINUOUS MONITORING OF THE FACIAL MOTOR FUNCTION DURING VESTIBULAR SCHWANNOMA SURGERY

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Monitoring of facial nerve during vestibular schwannoma surgery is usually performed by using free-running EMG and by direct stimulation of the facial nerve. The main limit of free-running EMG is that a quantitative analysis is possible only after the surgery. On the other hand, the direct electrical stimulation of facial nerve can only be used intermittently and after the identification of the nerve. Facial motor evoked potentials of the orbicularis oris muscle turned out to be a very useful tool allowing continuous information about the actual functional state of facial nerve during the resection of the tumor.

Forty eight (n=48) consecutive neurosurgical procedures for vestibular schwannoma were performed between July 2009 and June 2013 at the Department of Neurosurgery, Na Homolce Hospital, Prague. Free-running EMG and direct electrical stimulation were used to monitor function of the facial nerve in all the cases. Facial motor evoked potentials (FMEP) monitoring was performed in 42 cases. Stable FMEPs were reproducible in 39 of 42 patients (93%). All cases were divided into 3 groups according to the decrease of amplitude FMEPs at the end of the tumor resection. The first group (A) – 70-100% of the initial FMEP amplitude, the second group (B) – 30-70% of the initial FMEP amplitude and the third group (C) 0-30% of the initial FMEP amplitude. Functional result at the end of follow up was consider to be favorable when there was no or mild paresis of facial nerve (grade 1-3 according to House- Brackmann scale). The unfavorable results meant severe paresis (grade 4-6 according to House-Brackmann scale). A mean follow-up was 15, 4 months.

Group A consisted of 18 cases with 17 (94%) favorable and 1 (6%) unfavorable results. Group B consisted of 10 cases with 9 (90%) favorable and 1 (10%) unfavorable results. Group C consisted of 10 cases with 2 (20%) favorable and 8 (80%) unfavorable results.

Our study showed that the decrease of FMEP amplitude to 30% and lower at the end of tumor resection meant unfavorable prognosis for function of facial nerve.

Intraoperační NF - EP

SUBCORTICAL MAPPING AND INTRAOPERATIVE DTT 3.0T OF THE CORTICOSPINAL TRACT IN SUPRATENTORIAL INTRINSIC TUMOR SURGERY. WHAT SHOULD WE RELY ON?

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Introduction: The course of the corticospinal tract (CST) can be identified using subcortical mapping (sc-MEP). The threshold technique (MEP-trsh) is considered to be reliable in setting the safe zone. Intraoperative DTT and sc-MEP correlation is thought to be more precise because of brainshift elimination.

Goal of the study: Evaluate intraoperative DTT 3.0T reliability comparing to CST mapping in nonselected patient series.

Methods: 25 patients were enrolled consecutively and prospectively from 7/2010 to 7/2012. Inclusion criteria: solitary supratentorial intracerebral lesion compressing

or infiltrating the CST. Sc-MEP was performed by monopolar (cathodal) stimulation (500Hz, 400μs, 5 pulses) with navigated probe. CST DTT was made both at preoperative and intraoperative 3.0T MRI. MEP-trsh current and probe-CST distance were recorded at 155 points before iMRI (preoperative scans), and at 103 points after iMRI (intraoperative scans). Current-distance correlations were performed both for pre-iMRI and for post-iMRI data separately.

Results: The correlation coefficient pre-iMRI was R = 0.470 ($p < 0.001$), post-iMRI was R = 0.338 ($p < 0.001$). MRI radical resection was achieved in 17 (68%), subtotal in 5 (24%) and partial in 3 (12%). Postoperative paresis developed in 8 (32%), permanent remained in one case (4%). Intraoperative DTT was unreliable because of image distortion in 9 (36%).

Conclusion: The linear current-distance correlation was found both in pre-iMRI and in post-iMRI data. Correlation of post-iMRI data was weaker. Intraoperative DTT was unreliable in 36%. Sc-MEPs remains superior, because of direct mapping of neural fibers and lack of technical failure.

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TS Elektormyografie 2

MYASTHENIA GRAVIS – IDENTIFYING RISK FACTORS LEADING TO A MORE SEVERE COURSE OF THE DISEASE IN A COHORT OF 45 PATIENTS

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Introduction: Myasthenia gravis is an autoimmune disease that causes neuromuscular transmission disorder manifested by muscle weakness and fatigue, in particular predilection muscle groups. Most cases are mediated by T lymphocyte-dependent polyclonal antibody directed against acetylcholine receptors. Approximately 10-15% of cases are etiological associated with thymoma. AChR antibodies in serum are detectable in 80-90% of patients. Of the remaining seronegative MG forms are most commonly detected antibodies to MuSK (30-70%) and especially in thymoma antistriatal, antititin and antiryanodin antibodies. Some cases are associated with low affinity antibodies against AChR. Diagnostic and therapeutic procedures in medicine has recently developed in a fast rate. The goal of our observations was to assess how the reflected developments in the area of the approach to patients with this diagnosis affected our department and to try identifying risk factors leading to a more severe course of the disease.

Patients and Methods: The study included 45 patients (27 men, 18 women) followed in our department from 2009 to the present. The diagnosis was established on the basis of history, clinical examination and EMG findings. In this retrospective study was used material available in our archives.

Results: We present a cohort of patients with myasthenia gravis diagnosed and treated in our department. In our patients the EMG findings correspond with the severity of the disorder. We found that the higher titers of the antibodies against AChR led to a more severe course of the disease.

Conclusion: Despite advances in diagnosis and treatment of myasthenia, this still represents a challenge for physicians due to the relatively variable course and clinical findings. The aim of our study was to refer to this variability and point out not full understanding the pathogenesis of myasthenia. We determined risk factors leading to a more serious course of the disease in our patients.

REPETITIVE STIMULATION AND LAMBERT-EATON MYASTHENIC SYNDROME

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Introduction: Lambert-Eaton myasthenic syndrome (LEMS) is a rare autoimmune disease with antibodies against voltage-controlled calcium channels (antiVGCC). The etiology can be paraneoplastic or idiopathic. Clinically, the patients have paresis of proximal muscle in the limbs, hyporeflexia, ptosis, fatigue, and autonomic symptoms. Electromyography is essential for diagnosis. The initial amplitude of the compound muscle action potential (CMAP) is strikingly low and is increased after facilitation. Low frequency repetitive nerve stimulation (LFS) 2-5Hz shows decrement of amplitude and high frequency repetitive nerve stimulation (HFS) 20-50 Hz shows increment (increment over 100% is diagnostic for LEMS). The aim of the presentation is to share the electrophysiological findings in our 3 patients.

Patients: Age of patients (females) were 30-57 years, the development of their disease was 0.2 to 4 years, all of them had positive antiVGCC type P/Q. One patient had a paraneoplastic form. Results: If we stimulated abductor digiti minimi muscle (ADM), we found that the initial amplitude of CMAP was low in only one patient. LFS 3Hz showed a decrement of at least 10% just in one patient and HFS 30Hz showed increment 40%, 67% and 600% in these patients. If we stimulated abductor hallucis muscle (AH), the initial amplitude of CMAP was low only in one patient, LFS 3Hz showed decrement of more than 10% in two patients and the HFS 30Hz showed increment 117%, 136% and 200% in these patients.

Conclusion: We consider that AH should be always investigated by HFS 30Hz, where we constantly recorded increment over 100% in contrast to the stimulation of ADM.

REPRESENTATION OF JOINT PATTERNS IN SURFACE EMG

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Introduction: The purpose of the study was to develop and test an experiment that will enable us to evaluate by surface EMG a conduction of flexion and extension chains triggered by reflex heel pad.

Methods: Electrodes were placed on two heads of the muscle Quadriceps femoris – Vastus lateralis (VL) and Vastus medialis (VM). Surface bipolar EMG signal on VM and VL and force values in the ankle were measured. EMG was measured during submaximal 60% of maximal voluntary contraction (MVC) upon knee extension in 70 degrees. Three configurations were used to measure EMG VL and VM muscle activity: without reflex heel pad, with flexion and extension heel pad respectively. Raw EMG signal at 60% MVC was filtered and used to find 19 different types of EMG parameters (several calculation in spike shape analysis and spectral analysis were performed). Parameters were compared to test if there is statistically significant difference in between three used configurations of measurements. Volunteers: 19 healthy humans (15 women (23.5±4.0 years) and 4 men (32.8±11.8 years)) were used for measurement. The ANOVA method followed by post hoc analysis (Tukey method) was chosen for statistical analysis.

Results: The results were statistically significant ($p<0.05$). Effect of changes in heel pad median parameter for the VM and first spectral moment parameter for the VL. It shows that there are statistically significant differences in muscle activity in measurements without heel pad vs. supine heel pad

(parameter Median EMG, absolute value of the difference between the average values: 1.07 μV, $p<0.05$) and without heel pad vs. pronation heel pad (parameter 1st spectral moment of EMG, absolute value of the difference between the average value: 1.15 Hz, $p<0.05$).

Conclusion: The study shows that there are statistically significant changes in surface EMG patterns in situations where human subject is exposed to artificially triggered flexion or extension reflex chains. This basic setup of experiment reveals changes in EMG patterns and we speculate that this could be proved further by using HD surface EMG mapping techniques.

CUTANEOUS SILENT PERIOD IN BRACHIAL PLEXUS INJURY

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Objectives: The cutaneous silent period (CSP) is a spinal inhibitory reflex mediated primarily by small-diameter A-delta fibers, which enter the spinal dorsal horn and suppress activity in spinal motor nuclei in neighboring myotomes. The aim of the study was to define if CSP testing may be particularly useful in evaluation of brachial plexus injury, especially contributing to diagnosis of root avulsion.

Methods: In 11 patients with traumatic brachial plexus injury (8 males, age 18 – 62 years) we performed clinical examination, myelo CT and neurophysiological testing. Needle EMG was obtained from the main root muscles of C5-C8 myotomes. CSP was recorded by painful stimuli while the subject maintains a moderately strong voluntary muscle contraction and impulses were delivered to thumb (C6 dermatome), middle (C7) and little (C8) fingers.

Results: Clinical and EMG examination proved motor root damage of C5 in 3 subjects, C5 and C6 in 3 subjects, C5-C7 in 3 subjects, C5-C8 in 2 subjects. The CSP was partially absent in 3 subjects, however, well preserved in 8 subjects.

Conclusion: in theory, CSP can be used to quickly monitor afferent impulses travelling through damaged cervical roots, however, in brachial plexus avulsion CSP abnormalities were found only in a few cases. CSP is a robust protective plurisegmental spinal reflex, which is maintained even with a preservation of minimal functional afferent fibers and/or because the afferent signal is amplified within the spinal cord.

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