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Abstracts
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Eingeladene Referenten – Abstracts

Les états végétatifs et la dignité de la personne

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La notion de «dignité» joue un rôle fondamental pour la conception de l'éthique qui prévaut dans nos sociétés libérales: tant la Déclaration universelle des droits de l'homme dans son article premier que la Constitution suisse s'y appuient: tous les êtres humains possèdent une égale dignité par le fait même qu'ils sont humains. Les patients en état végétatif (PVS) la possèdent donc, puisqu'ils ne sont pas morts. Cela paraît clair, mais quand on y regarde de plus près, un problème apparaît: le même article premier de la Déclaration stipule que les êtres humains possèdent la même dignité en tant qu'ils sont doués de conscience; or, manifestement, les patients en état végétatif n'en sont plus doués. Ce problème manifeste une tension entre différentes conceptions de la dignité, de l'être humain et de la mort qui passe souvent inaperçue. Je me propose d'en mettre les aspects en lumière et conclurai en indiquant quelques impacts de cette tension sur la question du prélèvement d'organes.

Cerebral sinus and venous thrombosis

J. M. Ferro

Lisboa (P)

In this review lecture on "Thrombosis of the Cerebral Veins and Dural Sinus" (CVT) we will provide the audience with an updated review of the epidemiology, chronobiology, clinical features, diagnosis, associated conditions and risk factors, outcome and treatment of CVT. This will be illustrated with data from the VENOPORT and ISCVT studies. New information concerning particular aspects of CVT in the elderly, interobserver agreement in the diagnosis, mechanisms of early death, validity of prognostic models, safety of future pregnancies, risk of seizures, therapeutical role of steroids, thrombolysis and decompressive surgery will be emphasised. Ongoing clinical trials and cooperative studies will be briefly presented.

Neurorehabilitation in locked-in syndrome

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Locked-in syndrome is caused by lesions in the basis pontis where efferent motor activities caudal to the eye and some facial movements are damaged while all afferent pathways remain intact. This leaves the person with all perceptive capabilities (except proprioception from muscle actions). Lesions most often are due to cerebrovascular (brainstem stroke, basilar artery thrombosis, cerebral hypoxia), traumatic, degenerative (motor neuron disease), metabolic (central pontine myelinolysis) disorders or very rarely brainstem tumours or localised infections. Clinical differential diagnosis of coma or persistent vegetative state may be very difficult, though of utmost importance. Depending on the cause and the extent of the lesions and on neuroplastic capacities, the syndrome may be transient. The primary aim of neurorehabilitation in this condition is to restore motor expression via technical aids governed by any muscle remaining functional, to provide adequate and appropriate sensory stimulation, to train muscle activity and preserve the full range of movement of all joints (standing upright and lying prone), to prevent complications, e.g. contractions and infections, and to support relatives and carers. Neurorehabilitation in locked-in syndrome is a great challenge because it is difficult to be sure that all such measures are performed according to the presumed will of the person concerned.

Neuromyopathies des soins intensifs: physiopathologie et pronostic

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La survenue d'un déficit neurologique périphérique chez des patients séjournant en réanimation s'explique par le développement d'une polyneuropathie, d'une myopathie, parfois par la persistance d'un bloc neuromusculaire, souvent par des lésions combinées du nerf et du muscle («critical illness neuromyopathies»). L'atteinte s'exprime par une faiblesse, avec ou sans troubles sensitifs, et une difficulté au sevrage de la ventilation mécanique.

La *polyneuropathie de réanimation* survient habituellement après plusieurs semaines en réanimation, chez des patients présentant une défaillance multiorganique avec sepsis. L'atteinte consiste en une polyneuropathie axonale, sensitive et motrice. L'infection et le syndrome de réponse inflammatoire systémique (SIRS) joueraient un rôle physiopathologique central. La défaillance multiorganique s'accompagne d'une mortalité élevée. Chez les survivants, la récupération neurologique nécessite habituellement plusieurs mois et n'est pas toujours complète.

La *myopathie de réanimation* survient après dix jours en moyenne, chez des patients admis le plus souvent pour un trouble respiratoire aigu. Le déficit est purement moteur. La myopathie est attestée par l'électromyographie, une élévation des CK et par la biopsie musculaire. Dans les atteintes accusées il existe peut-être une lésion axonale distale surajoutée. L'affection suit l'utilisation de curares; les corticostéroïdes aggravent la condition, prolongent l'hospitalisation et retardent la récupération. Le pronostic est cependant bon habituellement, avec une récupération en quelques semaines.

Malgré une évolution neurologique souvent satisfaisante, le retour à une existence normale aux plans psycho-social, familial et professionnelle, n'est pas toujours possible pour tous les patients.

SAMW-Richtlinien zur Feststellung des Todes im Hinblick auf Organtransplantationen

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Gemäss den aktuell gültigen, 1996 verabschiedeten Richtlinien der Schweizerischen Akademie der Medizinischen Wissenschaften (SAMW) erfolgt die Feststellung des Todes im Hinblick auf Organtransplantationen mit Hilfe der Anamnese, den klinischen Befunden und Ergebnissen der Hilfsuntersuchungen.

Die Diagnose beruht auf dem klinischen Nachweis der Funktionslosigkeit des Gehirns und dem Nachweis der Irreversibilität derselben nach einer Wartezeit. Die Wartezeit dauert, je nach Ursache des Funktionsausfalls des Gehirns, bei intaktem Kreislauf zwischen 6 und 48 Stunden und bei Herz-Kreislaufstillstand 30 Minuten. Legal ist der Patient zu Beginn der Wartezeit tot, und damit sind ab jenem Zeitpunkt eine Transplantation vorbereitende Handlungen erlaubt. Gemäss neuem Richtlinienentwurf kann die Irreversibilität der Funktionslosigkeit des Gehirns weiterhin durch eine Wartezeit und neu auch mit Hilfe von Zusatzuntersuchungen bewiesen werden.

Welche Zusatzuntersuchungen einsetzbar sind, wird derzeit in einer Subkommission noch erarbeitet. Hauptproblem des neuen Richtlinienentwurfs ist der legale Todeszeitpunkt. Die Juristen vertreten die Ansicht, dass der Sterbende erst am Ende der Wartezeit oder nach Durchführung der Zusatzuntersuchungen tot ist, und erst dann dürfen eine Transplantation vorbereitende Handlungen begonnen werden.

Therapie des Deliriums

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Die Therapie des Deliriums richtet sich nach der Ätiologie, doch sind die Möglichkeiten der Diagnostik im akuten Verwirrtheitszustand oft eingeschränkt und die Ursachen nicht kausal therapierbar. Bei der Erstmanifestation eines Deliriums sind deshalb Fragen des Patientenmanagements und der Sicherheit im Vordergrund. Oft ist eine pharmakologische Therapie unabdingbar. In diesem Teil des Workshops werden das Management und die Möglichkeiten der Therapie praxisnahe besprochen.

Myasthenia gravis: new discoveries and implications for management

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It has been known for more than 30 years that IgG antibodies to muscle acetylcholine receptors (AChRs) are responsible for muscle weakness in many patients with myasthenia gravis (MG), that these antibodies are specific for the disease, and that the thymus plays a role in the disease process. However, serum AChR antibodies are only detected in about 85% of those with generalised MG. In the remainder, antibodies are implicated in the disease process because such seronegative patients respond to plasma exchange and immunosuppressive treatment, and can even give birth to babies with transient neonatal MG. Antibodies to Muscle Specific Kinase (MuSK) have now been detected in about half of these seronegative patients. During development MuSK plays a key role in the aggregation of AChRs at the neuromuscular junction. MuSK antibody positive patients appear to have a distinctive phenotype in which bulbar weakness is often dominant and thymic changes usually absent. Thymoma in MG patients occurs only in those who are AChR antibody positive. Recently an antibody to voltage-gated potassium channels (VGKCs) has been detected in association with thymoma, MG, neuromyotonia and sometimes also limbic encephalitis (that resembles Maladie de Morvan).

These new discoveries concerning the immunopathogenesis of MG and its associated disorders have implications for diagnosis and for management. Many of the treatments in use in MG, including thymectomy, have yet to be fully validated by randomised clinical trials.

Illicit drugs and the nervous system

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Illicit drugs belong to substances that are ingested by consumers with the goal of a subjectively pleasant psychic and/or physical experience. However, repeated or even the first administration of these drugs leads to psychic and/or physical dependence which is followed by symptoms of withdrawal when the drug is not sufficiently provided or its delivery has been stopped. Every illicit drug displays its positive or negative effects through interaction with receptors and structures physiologically present in the brain. Interaction of illicit drugs with receptors then launches a cascade of intracellular events that may alter transmitter release. The most important transmitter systems include dopamine, glutamate, γ-amino butyric acid, acetylcholine and endocannabinoids. Acute or chronic cerebral mechanisms of adaptation (i.e. synaptic plasticity, [de-]sensitisation, conformational changes of receptors, etc.) or drug toxicity may result in transient or permanent alterations and may almost irreversibly damage the brain of the drug user. Most likely, similar mechanisms of brain plasticity contribute to the symptoms of tolerance, reinforcing, craving, and withdrawal.

While the current legislation allows the use of some "conventional" drugs (i.e. alcohol, nicotine, caffeine, tranquilisers) within some limitations, illicit drugs are substances whose possession, trade, and, partly, consumption are prohibited by law. Prominent classes of these substances include opioids, stimulants (amphetamines), hallucinogens, and cannabinoids.

Inhalation ("sniffing") of organic solvents (like toluene) has no greater impact in industrialised countries; however, these substances are an area of serious concern in, especially, children and adolescents of developing countries.

Medications, doping, toxins, and illicit drugs share some overlapping features: the same substance may switch from one status into another when, for example, its dosage is altered or depending on the situation of use.

It is important to note that drug abuse may cause several neurological disorders beyond the neurobehavioural entities. They include toxic encephalopathies, seizures, movement disorders, strokes, headaches, and spinal (myelitis / ischaemic infarcts) as well as neuromuscular disorders (plexus neuritis, toxic polyneuropathies, and myopathies, incl. rhabdomyolysis).

Eventually, the clinical picture of overdose and withdrawal of illicit drugs can mimick other similar neuropsychiatric conditions like delirium, non-convulsive status epilepticus, psychosis, etc. Awareness of these differential diagnoses may support medical professionals caring for drug users in their own practice, emergency rooms, intensive care units, and clinics specialised in the treatment of drug dependence.

Untersuchung und Differentialdiagnose des Deliriums

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Der akute Verwirrtheitszustand, auch Delirium genannt, zeichnet sich aus durch eine stark fluktuierende Aufmerksamkeit, Desorientiertheit und gestörten Schlaf-Wach-Rhythmus, oft mit nächtlicher Agitiertheit und Halluzinationen. Er muss gegen eine Demenz abgegrenzt werden, die eine konstantere Symptomatik aufweist. Gelegentlich kann auch eine sensorische Aphasie den Eindruck eines Verwirrtheitszustandes erwecken. In diesem Referat werden die typischen Manifestationen, die klinische Untersuchung sowie die Differentialdiagnose des akuten Verwirrtheitszustandes besprochen.

Endovaskuläre Therapie beim akuten Hirninfarkt

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Im Verlauf der vergangenen Jahre wurden in der Berner Stroke Unit mehr als 350 Patienten endovaskulär behandelt, davon 37 mit Zentralarterienverschluss, 39 mit Basilaristhrombose und 80 mit Verschluss der A. carotis und/oder T-Verschluss. Die überwiegende Mehrzahl waren endovaskuläre Rekanalisationen von Verschlüssen des Hauptstammes oder Ästen der A. cerebri media.

Bis auf Ausnahmefälle, vor allem bei Infarkten im Basilaris-Stromgebiet, wurde ein Zeitfenster von 6 Stunden eingehalten. Bei technisch unkomplizierten Fällen erfolgte die Behandlung in Form von bildgesteuerter, lokaler Applikation von bis zu einer Million Einheiten Urokinase vor oder in den Thrombus über 60 bis 90 Minuten oder bis zur Wiedereröffnung des Gefässes. Bei komplexen Verschlüssen kamen zusätzlich mechanische Rekanalisationstechniken zum Einsatz.

Als Prädiktoren für gute klinische Besserung fanden wir

1. einen niedrigen NIHSS-Score bei Beginn der Behandlung,
2. gute Kollateralversorgung des Infarktes, vor allem über piale Anastomosen, die in allen Fällen nach Protokoll systematisch angiographisch dargestellt wurden
3. und eine erfolgreiche Rekanalisation des Gefässverschlusses, der in etwa 75% (TIMI 2 und 3) unserer akuten Schlaganfälle möglich war.

Negative signifikante Prädiktoren sind in unserem Patientenkollektiv

1. Diabetes mellitus und
2. symptomatische Blutungen, die in 4,8% unserer Patienten auftraten (14 von 298 Patienten; i.a. Lyse der Zentralarterienverschlüsse – bei denen keine Blutung auftrat – wurden nicht in die Analyse eingeschlossen).

Unsere Rekanalisationsrate von etwa 75%, die im Vergleich sehr hoch ist (Spontanverlauf: ca. 25%, i.v. Lyse ca. 46%; PROACT Studie: 66%), lässt sich damit erklären, dass in unserem Zentrum auf der Basis einer 7 Tage/24 Stunden Präsenz von Stroke MRI und interventioneller Neuroradiologie Patienten für die endovaskuläre Behandlung sorgfältig ausgewählt werden und im Bedarfsfall alle Techniken einer Gefässrevaskularisation zur Verfügung stehen. Diese neuen Möglichkeiten einer endovasalen Behandlung von Gefässverschlüssen – einschliesslich Angioplastie und Stenteinlage beim akuten Verschluss extra- und intrakranieller Gefässe, Thrombaspiration und mechanischer Thrombus-Extraktionsverfahren – werden vorgestellt und ihre Vorteile, Risiken und Ergebnisse diskutiert.

Management of severe MCA infarction

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Large hemispheric infarcts must be recognised in the emergency department as a life-threatening condition that requires prompt and massive intervention. After stabilisation of the airway, breathing and circulation, the initial diagnostic work-up and transfer to a neurointensive care unit should not be delayed. Today several new therapeutic options can be offered. Surgical decompression seems to be effective in lowering increased ICP, preventing transtentorial herniation and reducing mortality in patients with malignant MCA infarction. Another option may be therapeutic hypothermia, which has been found to be neuroprotective in animal models, as well as in clinical studies after cardiac arrest. Experience in stroke patients suggests that hypothermia may offer a new approach for the treatment of acute cerebral ischaemia.

Neurodegenerative Erkrankungen – intensivmedizinische Massnahmen gerechtfertigt?

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Einführend wird die Bedeutung kultureller Kontexte in bezug auf Entscheidungen am Lebensende angesprochen: Ergebnisse der ETHICUS-, MELS- und EURONIC-Studien belegen ein europäisches Nord-Süd-Gefälle, das sich mit Quality of Life- versus Sanctity of Life-Ansichten überschreiben lässt. Dieses zeigt, wie weitgehend «end of life-decisions» auf europäischen Intensivstationen und insbesondere die Frage nach Abbruch der Beatmung de facto von nationalstaatlichen und teils auch religiösen Kontexten geprägt sind.

Ausgangspunkt der ethischen Überlegungen bildet ein Fallbericht, welcher den Umgang mit der Beatmung bei ALS-Patienten thematisiert. Der Fallbericht wird in drei Schritten aus ethischer Sicht bearbeitet:

Erstens werden die ethisch relevanten Herausforderungen benannt: Informed Consent, Mitteilung von Bad news und rechtzeitige ärztliche Beratung, Bedeutung des (mutmasslichen) Patientenwillens und Relevanz von Patientenverfügungen, Einbezug der (pflegenden) Angehörigen, Entscheidungen zum Verzicht oder Abbruch auf eine invasive/nicht-invasive Beatmung und damit die «passive» Sterbehilfe, End of life-care mit dem angemessenen Einsatz von Schmerzmitteln und Sedativa und die Bedeutung der Handlungsabsicht («indirekte» Sterbehilfe, Prinzip der Handlung mit doppelter Wirkung), Bitte um Suizidbeihilfe oder Lebensbeendigung auf Verlangen bei ALS-Patienten («aktive» Sterbehilfe) und nicht zuletzt die palliative Betreuung bis zur Begleitung der Angehörigen nach dem Tod des Patienten.

In einem Zwischenschritt werden *zweitens* drei Kriteriengruppen unterschieden, die im Bereich der klinischen Ethik relevant sind: (a) Die Person/Persönlichkeit der Beteiligten (ärztliche und pflegerische Tugenden/Haltungen), (b) prozedurale Regeln (formale Vorgehensregeln zur Entscheidfindung) und (c) normative Kriterien (wie Menschenwürde/ärztliches Tötungsverbot, Selbstbestimmungs-, Nicht-Schadens-, Fürsorge- und Gerechtigkeitsprinzip).

Drittens werden ausgewählte Fragen anhand normativer Kriterien diskutiert, wobei insbesondere die SAMW-Richtlinien zur Intensivmedizin und der Betreuung von Patientinnen und Patienten am Lebensende berücksichtigt werden: (a) Die Bedeutung des Patientenwillens und bes. von Patientenverfügungen bei Entscheidungen zu intensivmedizinischen Massnahmen wie der Beatmung; (b) die ethische Einschätzung der indirekten Sterbehilfe und die Abgrenzung zur Tötung auf Verlangen und zu LAWER-Fällen; (c) mögliche Konsequenzen einer angemessenen palliativen Betreuung für den Einsatz intensivmedizinischer Massnahmen bei ALS-Patienten.

Im Schlussplädoyer wird die Wichtigkeit der palliativen Betreuung und einer entsprechenden Aus- und Weiterbildung der Mitglieder von Behandlungsteams hervorgehoben.

SNG – Freie Mitteilungen und Poster

Vertebral artery dissection: clinical and radiological findings and outcome in 92 patients

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Background: Few data exist on clinical and radiological baseline data and predictors of clinical outcome of patients with vertebral artery dissection.

Patients and methods: We studied clinical features, radiological findings, clinical outcome and predictors of outcome in 92 patients with 97 spontaneous vertebral artery dissections who had been examined at two tertiary care stroke centres.

Results: The mean age was 43 years. 61 patients (66.3%) were male, 31 (33.7%) female ($p = 0.002$). Posterior headache and/or neck pain had occurred in 76 patients (82.6%). The main clinical symptom was stroke in 75 patients (81.5%), TIA in 10 (10.9%), subarachnoidal haemorrhage in 1 (1.1%) and isolated headache and/or neck pain in 2 (2.2%). In 2 patients VAD was asymptomatic. The most frequent location of stroke was the territory of the posterior inferior cerebellar artery (55%). At follow-up 78.6% of the patients had a favourable clinical outcome (modified Rankin Scale score 0 or 1).

Mortality was 2.4%. Younger age (p = 0.012) and low NIHSS (p >0.0001) score on admission were independent predictors of a favourable clinical outcome.

Conclusion: Spontaneous dissections of the vertebral artery are mostly associated with a good prognosis. Younger age and low NIHSS score were independently associated with a favourable outcome.

Intra-arterial thrombolysis of iatrogenic acute intracranial vessel occlusion due to neuroendovascular procedures or coronary arteriography

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Background: For selected stroke patients local intra-arterial thrombolysis (LIT) is an effective treatment option. However, little is known about the safety and efficacy of LIT in patients with stroke due to neuroendovascular and cardiologic catheter interventions.

Methods: We analysed clinical and radiological findings and functional outcome 3 months after LIT in patients with periprocedural strokes because of arterial catheter interventions.

Results: Four women and 6 men were treated with LIT. Stroke followed a neuroendovascular intervention in 6 and coronary angiography in 4 patients. The average time from symptom onset to treatment was 88 minutes. Recanalisation was complete (thrombolysis in myocardial infarction [TIMI] grade 3) in 5 and partial (TIMI grade 2) in 5 patients. Six patients had an excellent outcome (mRS 0 to 1), one a good (mRS 2), and 3 a poor outcome (mRS 3 or 4). All patients with complete recanalisation had an excellent outcome. Follow-up brain imaging was normal in 2 and showed new ischaemic lesions in 8 patients. One patient suffered a symptomatic cerebral haemorrhage.

Conclusion: LIT in acute stroke due to arterial catheter interventions is feasible and may have the potential to improve outcome in these patients. A high recanalisation rate could be achieved.

CSF Lipocalin-type prostaglandin D synthase: a marker for hypersomnia?

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Background: The prostaglandin D system is involved in rodent, primate and human sleep regulation. Lipocalin-type prostaglandin D synthase (L-PGDS, also known as β-trace) catalyses the production of sleep-promoting prostaglandin D2. L-PGDS is produced by the choroid plexus, leptomeninges, and oligodendrocytes, and is secreted into cerebrospinal fluid (CSF). In humans, normal circadian L-PGDS serum concentration changes in serum are suppressed by total sleep deprivation.

Aim: The aim of the study was to test whether CSF L-PGDS concentrations may be a marker of hypersomnia.

Methods: In 14 patients with narcolepsy-cataplexy, and in 20 patients with other documented forms of hypersomnia, CSF L-PGDS and hypocretin-1 (a hypothalamic neuropeptide which is decreased in narcolepsy) were determined. CSF L-PGDS levels were compared to those of 22 age- and gender-matched controls without sleep, neurological or vascular disorders. Determinations were performed using one single immunonephelometric assay kit with an interassay variability of ≤5%. CSF was obtained between 10 am and 2 pm in all patients.

Results: We observed significantly decreased CSF L-PGDS levels in patients with hypersomnia disorders (narcolepsy-cataplexy: mean 14.7 mg/l, median 14.2, SD 3.7, range 7.0–19.0, other hypersomnias: mean 16.1 mg/l, median 15.5, SD 3.6, range 11.0–24.8) compared to controls (mean 21.3 mg/l, median 19.6, SD 6.8, range 11.7–36.8; p <0.001). Mean levels did not differ significantly between narcolepsy-cataplexy and other hypersomnia patients (p = 0.74).

Conclusions: Our data suggest an involvement of L-PGDS not only in the regulation of sleep but also in hypersomnia (downregulation?).

Stroke as an uncommon complication of Biermer disease (pernicious anaemia)

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Stroke in a young adult justifies an extensive aetiologic workup. We present a 44-year-old woman who presented with frontal ischaemic stroke. Extensive evaluation is normal, only anomaly evidence is a very high plasma level of homocysteine. Hyperhomocystinaemia is a known risk factor for stroke, particularly fostering intimate fibrosis of vessels. It can be found among individuals suffering from homocystinuria, in individuals homozygous for the MTHFR T allele but also when there is deficiency of vitamin B_{12} or folic acid. Further investigations in our patient revealed a deficient level of vitamin B_{12} in the context of Biermer disease with positive anti-intrinsic factor and anti-parietal gastric cells antibodies. Although it is very seldom described, pernicious anaemia would be a cause of stroke, possibly acting through hyperhomocystinaemia.

Limbic encephalitis of non-paraneoplastic origin

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A 37-year-old man was hospitalised following a first time generalised tonic clonic seizure. On admission the patient presented with mood and behavioural changes, as well as cognitive dysfunction including short-term memory problems. Otherwise, clinical neurological examination was normal. Previous history was unrevealing apart from earlier drug abuse.

MRI showed bilateral abnormalities in the limbic system consistent with limbic encephalitis. Paraneoplastic aetiology could be excluded by intensive investigations.

The cerebrospinal fluid (CSF) showed a slight protein elevation, other parameters were within normal limits. We found no evidence for viral or bacterial encephalitis. The patient's neuropsychological symptomatology as well as MRI findings improved markedly on treatment with steroids and immunoglobulines.

Limbic encephalitis of non-paraneoplastic origin is a very rare disorder. It may also be caused by immunological mechanisms as in our patient. Prognosis is dependent on diagnosis early in the course of disease and immediate initiation of steroid and immunoglobuline therapy.

Assessment in neurorehabilitation in multiple sclerosis (MS)

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Different scales are used to measure the effect of neurorehabilition in multiple sclerosis (MS). There is a continuing debate about the most appropriate and sensitive assessment system in this respect.

Methods: We analysed data sets from 107 MS patients after 3–4 weeks of rehabilitation. Patients with medical complications or maximal Extended Barthel Index (EBI) score at entry (ceiling effect) were excluded. We assessed disability with EBI; mobility with Rivermead Mobility Index (RMI), walking speed, 2-minute walking distance and balance with one leg stance and functional reach. For upper limb function we used the Purdue pegboard test and grip strength. To compare the sensitivity of the different outcome measures, we compared the effect size (ES) according to Kazis.

Results: We found significant ES for RMI (0.39), balance (1.47), walking speed (0.64), walking distance (2.3) and functional reach (0.68). Global impairment/disability scales (EDSS, EBI) and tests for upper limb functions showed a minimal change, but even this small change may be relevant in a progressing disease.

Conclusion: These preliminary data show that a 3–4-week inpatient neurorehabilitation

program results in a significant improvement in goal-orientated assessments for mobility and balance scores, whereas only small ES were found in global assessment scales and upper limb tests. This may partly be due to the low sensitivity of these tests assessing outcome of rehabilitation treatment in MS patients.

Quality of life in stroke survivors after local intraarterial thrombolysis

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Background: To assess quality of life (QOL) and its predictors in stroke survivors after local intraarterial thrombolysis (IAT).

Methods: We analysed clinical and radiological findings in 175 consecutive stroke patients after IAT. 132 of 135 survivors were contacted by phone, and QOL was assessed subsequently using postal questionnaires with general (EuroQol) and disease-specific tools (SSQOL). Mean follow-up was 923 days (± 431). Residential status, profession, family background, modified Rankin Scale (mRS) and Barthel Index (BI) at follow-up were evaluated. EuroQol was completed in 91% (n = 123) of survivors, SSQOL in 90% (n = 122). Functional disability and QOL were compared. Predictors of QOL were identified using logistic regression analysis.

Results: Low mRS and high BI were associated with better QOL ($p < 0.001$). Measured with EuroQol, 63% of patients reported a good QOL, measured with SSQOL 62%. Nevertheless, 20% of patients with minimal disabilities (mRS 0–1) indicated a decreased QOL (SSQOL <3). Low National Institute of Health Stroke Scale score on admission was a predictor of an impaired QOL ($p < 0.001$).

Conclusion: Almost two thirds of stroke survivors after IAT reported a good QOL, mostly survivors with mild disabilities. Nevertheless, some survivors with mild disabilities experienced poor QOL. Therefore, QOL should be added to stroke outcome research.

NIHSS score and arteriographic findings in acute ischaemic stroke

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Background and purpose: To test the association of NIHSS and arteriographic findings in acute stroke.

Methods: We analysed NIHSS scores on hospital admission and clinical and arteriographic findings of 226 consecutive patients (94 women, 132 men; mean age 62 years) who underwent arteriography within 6 hours of symptom onset in carotid and 12 hours in vertebrobasilar strokes.

Results: From stroke onset to hospital admission 155 (± 97) minutes and from stroke onset to arteriography 245 (± 100) minutes elapsed. Median NIHSS was 14, and scores differed depending on the arteriographic findings ($p < 0.001$). NIHSS scores in basilar, internal carotid, and middle cerebral artery M1 and M2 segment occlusions (central occlusions) were higher than in more peripherally located or absent occlusions. Patients with NIHSS scores ≥ 10 had positive predictive values (PPV) to show arterial occlusions in 97% of carotid and 96% of vertebrobasilar strokes. With an NIHSS score of ≥ 12 PPV to find a central occlusion was 91%.

Conclusions: There is a significant association of NIHSS scores and the presence and location of a vessel occlusion. An NIHSS score ≥ 10 strongly predicts that a vessel occlusion will be seen on arteriography, and a score ≥ 12 that its location will be central.

Isolated thrombosis of ascending cerebral cortical veins – pathognomonic signs in cerebral MR-imaging. Case series and literature review

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Isolated cortical vein thrombosis (CVT) seems to be rare but may be missed. We present 4 patients demonstrating a heterogeneous clinical picture but typical signs on cerebral imaging allowing for definite diagnosis. Focal seizures, headache and further signs of increased intracranial pressure were the main clinical features. Aetiology or possible promoting factors were: lumbar puncture (1), dehydration (3) and hyperhomocysteinaemia (1). High-quality CT scans and MR imaging revealed a characteristic anatomical 3-dimensional arrangement of gyral swelling, focal sulcal subarachnoid haemorrhage and thrombosed cortical vein (cord sign). Although MRI has the advantage of coronal and sagittal plane imaging as well as higher resolution venography, all signs necessary for CVT recognition can be gathered from a high-quality CT scan. The reviewed literature confirms the stereotyped clinical picture with headache, transient focal neurologic deficits TIA-like or recurrent, suggesting seizures. The ascending bridging veins seem to be most frequently involved and the central sulcus the predominant site, but more frontal or parietal bridging veins or temporal veins may go unrecognised when not causing focal neurologic signs.

Myélopathie dans le cadre d'une fistule artério-veineuse durale multiple

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La fistule artério-veineuse durale est une cause rare de myélopathie. Nous décrivons le cas d'un patient de 72 ans qui présente des troubles de la marche depuis 2 ans avec atteinte pyramidale et sphinctérienne dans le cadre d'une myélopathie sur fistule artério-veineuse durale L1. Après clippage de cette dernière, une amélioration de la symptomatologie de courte durée est observée. En effet, on note par la suite une nouvelle péjoration clinique avec une parésie proximale sévère et fluctuante, 1 à 2 mois en post-opératoire. En l'absence d'une autre cause pouvant expliquer ce tableau, une nouvelle artériographie d'exploration médullaire est pratiquée et révèle la présence d'une seconde fistule artério-veineuse en D6, qui sera réséquée avec amélioration subséquente de la paraparésie.

Par conséquent, devant la persistance d'une symptomatologie inexpliquée chez un patient connu pour une fistule artério-veineuse traitée, il convient de rechercher la présence d'une autre malformation vasculaire.

Neurosarcoidosis and panhypopituitarism

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We report the case of a 23-year-old woman with a recent medical history of rhino-pharyngeal, pulmonary and abdominal sarcoidosis who presented with polyuria, polydipsia and secondary amenorrhoea. Paraclinical work-up revealed both panhypopituitarism and diabetes insipidus of central origin that were explained by an extra-axial, parasellar mass. Goldmann perimetry was normal. The radiological presentation, a slight pleocytosis and elevation of converting enzyme in the CSF were compatible with a CNS manifestation of sarcoidosis. The clinical features, a minor variant of the optico-hypothalamic syndrome from the older literature, its course and treatment are discussed.

Significance of vertebral artery hypoplasia in posterior circulation ischaemic stroke

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Background: Variations of the caliber of the vertebral arteries and even marked hypoplasia are quite common. Ischaemic strokes in the posterior circulation represent about one third of all strokes. Our objective was to determine whether vertebral artery hypoplasia (VAH) was more frequent in patients with acute posterior circulation territory infarction than in patients with strokes in other territories.

Methods: Sequentially admitted patients suffering from a first ischaemic stroke underwent ultrasound examination. Vertebral arteries were examined with colour-coded duplex flow imaging using the 7.5 MHz linear array transducer (Acuson, Sequoia, USA). Hypoplasia of VA in the V2 segment was defined by a diameter of less than 2.5 mm and a difference to the contralateral side of more than 1:1.7.

Results: 395 patients with acute cerebral ischaemic infarction were studied. 140 (35%) patients suffered from a posterior circulation stroke. VAH was diagnosed in 48 (34%) posterior circulation strokes and in 33 (13%) other territory infarctions. Statistical analysis (Chi-square = 25.2; p <0.001) was highly significant.

Discussion: This study demonstrates a higher frequency of posterior circulation strokes in patients with vertebral artery hypoplasia than in other strokes. These findings raise the question whether vertebral artery hypoplasia represents a predisposing factor for stroke in the posterior circulation.

High-dose rituximab[1] and anti-MAG-associated polyneuropathy

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Objective: To show whether high-dose rituximab is a safe and effective treatment of anti-MAG-associated polyneuropathy.

Background: Rituximab is a mouse-human chimaeric antibody, directed against the CD20 antigen and specifically eliminates normal and malignant B-cells and B-cell precursors. Rituximab in a dose of 375 mg/m^2 has been shown to be a promising new drug that effectively and safely eliminates B-cells and lowers IgM levels in patients with anti-MAG-associated polyneuropathy and leads to clinical improvement in some patients. Since not all patients had improved clinically and the anti-MAG antibodies had not been completely removed, we designed a pilot study with the double dose of rituximab 750 mg/m^2 to see whether it has a better effect on this paraproteinaemic polyneuropathy.

Design and methods: 8 patients with an anti-MAG-associated polyneuropathy were treated intravenously with 750 mg/m^2 rituximab once a week for 4 weeks. All of them had received rituximab 375 mg/m^2 in the two previous years. None of the patients had received immunosuppressive treatment during the previous three months. Clinical follow-up consisted in neurological examination with the Neurological Disability Score (NDS) and Neurological Symptoms Score (NSS) at baseline, month 1, 3, 6, 9 and 12. Electroneurography was done at baseline, month 6 and month 12. In addition, regular white and red blood cell counts, blood chemistry and measurement of IgM and IgG levels and anti-MAG antibodies were performed.

Results: The higher dose of rituximab was also well tolerated. The only side effect was hypotension during infusion in one patient. One patient died after month 6 from a cause unrelated to rituximab treatment. Four out of the remaining 7 patients had an improvement of at least 2 points on the NDS. Two of them had not responded to the lower dosage. One progressed on the NDS by 2 points while remaining stable with neurography, and 2 remained stable. The nerve conduction velocity improved in 2 patients by at least 10%. One patient did not consent to control neurography at month 12 and the remaining 4 patients had stable motor nerve conduction velocities. Anti-MAG antibody titres were reduced to a median of 59% compared to baseline (start of high-dose treatment).

Conclusion: Increase of rituximab from 375 mg/m^2 to a dose of 750 mg/m^2 was well tolerated and led in half of the patients to clinical improvement, in 2 of them for the first time, along with improvement of nerve conduction velocities and a reduction of anti-MAG antibody titres. However, it is unclear whether the observed effect is due to the longer period of observation or to the higher dose of rituximab.

1 Rituximab was provided free of charge by Roche, Switzerland.

Feasibility and safety of combined intravenous and intra-arterial tPA thrombolytic therapy of acute middle cerebral artery occlusion. Comparison with IV therapy. A pilot study

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Background: We sought to assess the efficacy and safety of a combination of intravenous and intra-arterial (IV-IA) tissue plasminogen activator (tPA), compared to IV thrombolysis alone.

Patients and methods: Patients with middle cerebral artery occlusion underwent systemic IV thrombolysis within 3 hours of onset of symptoms. In the absence of clinical improvement and/or signs of recanalisation on ultrasound after 30 minutes, angiography was performed with IA thrombolysis. For the remaining patients, we continued the IV lysis. Clinical scores (National Institutes of Health Stroke Scale-NIHSS and modified Rankin Scale) were assessed at baseline, at 24 hours and at 3 months. Outcome measures included the proportion of patients with no or minimal neurological disability at 3 months, recanalisation rate, incidence of symptomatic intracranial haemorrhage and mortality rate.

Results: We included a total of 26 patients, 7 of whom underwent combined therapy (IV-IA) and 19 underwent IV treatment. The mean age was 72.9 years vs 67 years for the groups with combined IV-IA and IV treatment alone. The mean NIHSS at admission was 12 (IV-IA) vs 14 (IV) and 5 (IV-IA) vs 10 (IV) at 24 hours respectively. Three (IV-IA) vs 4 (IV) patients had a modified Rankin scale between 0 and 1 at 3 months (no or minimal disability). Recanalisation was achieved in 5 (IV-IA: 71%) and vs 12 (IV: 0.63%) patients. Symptomatic haemorrhagic transformation occurred in 0 (IV-IA) vs 2 (IV) patients. Mortality rate was 0 (IV-IA) and 3 (IV).

Conclusions: Combined IV and IA thrombolytic therapy, guided by ultrasound is feasible and safe. In our pilot study there was no statistical difference in recanalisation rate, symptomatic intracranial haemorrhage and mortality rate between the two groups. However, larger numbers of patients are needed in order to draw more definite conclusions.

Clinical evaluation in a cohort of patients with primary dystonia

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In recent years, several mutations have been identified in primary familial dystonia but the correlation between phenotype and genotype is still unclear. In this study, our goal was to investigate whether the clinical presentation would differ between patients with a positive family history, related to a probable hereditary cause of dystonia, and patients without. A total of 175 adult patients (85 men and 90 women) with primary dystonia were evaluated. Data on sex, presence and frequency of pain and tremor, and the distribution of affected body parts were compared between patients with positive and negative family history. The family history of dystonia was positive in 23% of all cases of primary dystonia. Dystonia patients with a positive family history of dystonia had an earlier age of onset than those without. In subgroup analysis, age of onset in women but not in men with positive family history of dystonia was significantly earlier than in women with negative family history of dystonia. Further, dystonia patients with a positive family history of tremor more frequently exhibited an associated tremor than those with a negative family history. The finding of an earlier age of onset in familial cases suggests that genetic factors are linked with an earlier manifestation of the disease. The presence of a positive family history influences apparently more strongly the age of onset of female patients than of male patients, indicating that sex influences the manifestation of familial dystonia.

Blood pressure after acute ischaemic stroke in patients with and without sleep apnoea

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Background: Sleep apnoea (SA) is an independent risk factor for arterial hypertension and is present in 50–70% of patients with acute ischaemic stroke. The effect of SA on blood pressure (BP) and stroke outcome in the acute phase of stroke is poorly known.

Methods: We studied 41 consecutive patients admitted within 96 hours after stroke onset. Stroke severity was determined by the NIH Stroke scale (NIHSS). Sleep breathing was assessed by an ambulatory device the first night after admission. SA was defined by an apnoea-hypopnoea-index (AHI) >10, and moderate-severe SA (MSSA) by an AHI >30. Blood pressure (BP) was monitored by a portable device during the first 36 hours after admission. A non-dipping status was defined by a ratio >0.9 of ([systolic BP during night 1 + 2]/2) / systolic BP during day 2. Stroke outcome was estimated by the modified Rankin Disability Scale (mRS) at hospital discharge.

Results: SA was found in 28 (68%), and MSSA in 11 (27%) of 41 patients. Patients with MSSA had higher systolic and diastolic BP values during night 1 ($p = 0.001$), day 2 ($p = 0.002$) and night 2 ($p = 0.020$) than patients without SA. There were no significant differences between MSSA and non-SA patients in stroke severity and outcome. A non-dipping status was found in 26 (63%) of 41 patients. Non-dippers had a similar AHI but higher NIHSS ($p = 0.004$) and mRS ($p = 0.008$) than dippers.

Conclusions: MSSA is associated with higher 24h BP values but not with stroke severity or stroke outcome. Conversely, a non-dipping status is linked with a more severe stroke and a worse stroke outcome but not with MSSA. These data suggest different pathophysiological and clinical implications of circadian and nocturnal BP values in the acute phase of stroke.

Hyperammonaemia and neurological worsening in brain-damaged subjects

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Hyperammonaemia is widely accepted to play a key role in the pathogenesis of hepatic encephalopathy. We present four patients with pre-existent brain lesions in whom neurological status worsened. Mild to moderate hyperammonaemia was the only convincing abnormal finding. One patient had loss of equilibrium, increased hemiparesis and subtle personality changes many years after hemispheric stroke. Three patients had increased confusion; two of them also decreased consciousness (these two had valproate in normal therapeutic range). All improved after lowering their blood ammonia level. We suggest that brain-damaged subjects may be more sensitive to hyperammonaemia and may have worsening of their pre-existing neurological impairment in response to increased blood ammonia. We therefore propose to include ammonia measurement when a brain-damaged subject has otherwise unexplained worsening of his or her neurological status.

Nerve excitability studies in patients with critical illness polyneuropathy

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Patients in intensive care units frequently suffer muscle weakness and atrophy due to critical illness polyneuropathy (CIP), an axonal neuropathy associated with systemic inflammatory response syndrome and multiple organ failure. CIP is a frequent and serious complication of intensive care, which delays weaning from mechanical ventilation and increases mortality. The pathogenesis of CIP is not well understood and no specific therapy is available. The aim of this project was to use nerve excitability testing to investigate the changes in axonal membrane properties occurring in CIP. Ten patients were studied with electrophysiologically proven CIP. The median nerve was stimulated at the wrist and compound action potentials recorded from abductor pollicis brevis muscle. Strength-duration time constant, threshold electrotonus, current-threshold relationship and recovery cycle (refractoriness, superexcitability and late subexcitability) were recorded using a recently described protocol. In eight patients a follow-up investigation was performed. All patients underwent clinical examination and laboratory investigations. Compared with aged-matched normal controls, CIP patients exhibited reduced superexcitability and increased accommodation to depolarising and hyperpolarising currents, indicating membrane depolarisation. Superexcitability was reduced both in patients with renal failure (high creatinine) and without. In the former, late subexcitability was also reduced (as also occurs due to hyperkalaemia in patients with chronic renal failure). In patients without renal failure, late subexcitability was normal, and the signs of membrane depolarisation correlated with serum bicarbonate and base excess, consistent with intracellular acidification due to ischaemia. Nerve excitability tests thus provide evidence that in CIP patients two distinct mechanisms can cause membrane depolarisation, which may be responsible for the neuropathy.

SGI – Freie Mitteilungen und Poster

Detection of heart-specific autoantibodies after myocardial infarction using a novel porcine alpha-myosin based ELISA

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Background: Experimental data suggest that heart-specific autoimmunity following cardiac injury affects clinical outcome.

Methods: We developed an ELISA using porcine alpha-myosin as antigen to measure crossreactive IgG anti-cardiac alpha-myosin-antibodies (AMYA) in patients with acute transmural myocardial infarction on ICU admission and after 30 days of follow-up. The diagnosis of acute myocardial infarction based on clinical assessment, ECG findings, and increased levels of troponin I, CK-MB, and CK.

Results: In a preliminary test run 10 patients (age range 58–83) with acute transmural myocardial infarction were prospectively assessed. Average troponin-I levels on admission, 6 hours and 24 hours were 7.4 ng/ml (range 0.3–42), 78 ng/ml (range 13–334) and 150 ng/ml (range 6–604), respectively. Average CK-MB levels on admission, 6 hours and 24 hours were 163 U/l (range 76–361), 538 U/l (range 145–2272) and 572 U/l (140–1872). All patients with acute myocardial infarction showed a significant increase in relative AMYA levels from admission to day 30. There was no significant correlation between troponin I/CK-MB levels and the increase in relative AMYA levels, but a significant and inverse relation between cardiac ejection fraction and the increase in relative AMYA levels between admission and day 30 ($p < 0.05$).

Conclusion: In conclusion, we successfully monitored the development of a heart-specific humoral autoimmune response after transmural myocardial infarction using a sensitive ELISA based on porcine alpha-myosin. Our preliminary data suggest an inverse correlation between the increase in relative anti-myosin IgG titres and cardiac function. Given the small sample size, further studies are needed to assess the clinical significance of increasing AMYA titres in patients after acute myocardial infarction.

Propofol infusion syndrome (PRIS): two episodes with two different manifestations in one patient with severe traumatic brain injury

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Introduction: PRIS is a syndrome with high mortality in the critically ill undergoing propofol infusion. The main features are: arrhythmia, ECG alterations, haemodynamic failure, rhabdomyolysis, metabolic acidosis, hyperlactataemia, renal failure.

Case: A 20-year-old man suffered a severe traumatic brain injury. Sedation was maintained with midazolam, propofol (maximal 320 mg/h [4.5 mg/kg/h]) and fentanyl. On day 6, we entertained a first suspicion for PRIS (escalating doses of catecholamines). Propofol was stopped. A catecholamine-resistant shock with broad complex arrhythmia was controlled only after starting low-dose vasopressine. 6 days later, we again used propofol for 5 hours (100 mg/h). The patient was haemodynamically stable, experienced no ECG alterations and there was no metabolic acidosis. The creatine kinase values were impressive: same day 3399 U/l, peak level next day 16249 U/l. Renal function remained normal.

Discussion: Our case is unique in several aspects that have not been described yet. (1) This is the first case of two episodes of suspected PRIS in one patient with to different manifestations (both typical). There is no indication in the literature about the risks of re-exposure to propofol after an episode of PRIS. (2) This is the first case of vasopressine use in PRIS-induced haemodynamic failure with rapid haemodynamic normalisation. (3) Although a dose of less than 5 mg/kg/h is said to be safe, PRIS occurred in this case at a rather small dose of 4.5 mg/kg/h. (4) We found no metabolic acidosis and no hyperlactataemia in our case.

Conclusions:

- a short re-exposure to propofol can induce a new episode of PRIS,
- different manifestations of PRIS can occur in the same patient,
- PRIS can occur at smaller doses than 5 mg/kg/h,
- metabolic acidosis and hyperlactataemia are not obligatory early markers of PRIS,
- vasopressine should be considered as a therapeutic option in case of catecholamine-resistant PRIS-associated shock.

Comparison of standard and new preload indices in patients following aortocoronary bypass surgery and volume loading in the surgical intensive care unit

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Introduction: A reliable assessment of ventricular preload as a basis for fluid management remains a challenging task of the perioperative period. The aim of our study was to compare the standard preload indices with those derived from pulmonary artery and transpulmonary thermodilution techniques (VoLEF and PiCCO, Pulsion Medical Systems AG).

Method: After approval by the Faculty Ethical Committee and written informed consent, 17 patients (age 65 ± 10, LVEF >50%) were studied in the ICU immediately after isolated CABG surgery. All patients had a thermistor-tipped femoral artery catheter (Pulsiocath 5 F), pulmonary artery catheter (7.5 F VoLEF Catheter), multiplane transoesophageal echocardiography probe (4–7 MHz Phillips Sonos 5500) and were ventilated with a Vt of 8 ml/kg. The measurements were obtained at baseline and after 7 ml/kg of 6% HAES/20 min. The response of the preload variables to volume loading was assessed by paired t-test and the association between variables by linear regression analysis.

Results: The volume loading resulted in increases in mean arterial pressure, stroke volume (SV) and cardiac output (CO). There was a close correlation between CO and SV measured by thermodilution and PiCCO. The improvement in haemodynamic function was associated with increase in indices of LV preload (PCWP, enddiastolic area [EDA]), of RV preload (CVP, RV enddiastolic volume [RVEDV], right heart enddiastolic volume [RHEDV]) as well as with increases in intrathoracic blood volume (ITBV) and global enddiastolic volume (GEDV). In contrast, left heart enddiastolic volume (LHEDV) and the dynamic parameters (SV variation [SVV%] and pulse pressure variation [PPV%]) did not change significantly. The changes in SV induced by volume loading correlated with the changes in EDA, ITBV, GEDV, RHEDV and RVEDV but not with changes in LHEDV, SVV% and PPV%. The ITBV correlated with EDA, whereas LHEDV did not. None of the baseline preload indices was able to predict a favourable response to volume loading (increase in CO or SV ≥15%).

Conclusion: The pulse contour method (PiCCO) supported by transpulmonary thermodilution allowed for reliable and continuous monitoring of CO without the need for pulmonary artery catheterisation. The PiCCO and VoLEF preload indices closely reflected the changes induced by volume administration. However, similarly to the standard indices, they did not allow to identify the patients who will benefit from fluid administration. The failure of SVV% to predict fluid responsiveness is unexpected but has been reported before [1].

Reference

1 Wiesenack C, et al. Anesth Analg 2003;96: 1254–7.

Influence of selenium supplements on the incidence of infections and pneumonia after major burns

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Infections remain the most important cause of morbidity and mortality after major burns. Cutaneous and pulmonary infections predominate. A previous trial in 20 patients providing selenium, copper and zinc supplements for 8 days had shown a reduction in infectious complications: the present analysis aimed at assessing the same aspects in a larger patient group.

Methods: Two consecutive prospective randomised placebo controlled supplementation trials delivering Cu 59 µmol, Se 4.8 µmol, Zn 574 µmol per day IV (group TE) or vehicle (group V) for 8 to 21 days depending on surface burned. Infectious complications were collected prospectively over 30 days: number of infections, timing, location and antibiotherapy were recorded. Pneumonia occurring during the first 48 hours was not included, as community acquired.

Results: Forty-two patients, aged 42 ± 15 years, burned 46 ± 19% of body surface, including 16 patients with inhalation injury were enrolled in the trial (22 patients TE, and 20 patients vehicle). Demographic characteristics did not differ between groups. Plasma selenium and glutathione peroxidase concentrations were significantly higher in the TE group from day 5. Total number of infections was lower in TE group (2.0 ± 1.0 episodes versus 3.5 ± 1.2 in vehicle, $p = 0.0002$), as was the number of pneumonias (0.6 ± 0.7 vs 1.7 ± 1.1, $p = 0.0005$). Cutaneous and urinary infections were unchanged.

Conclusion: Trace element supplements including selenium were associated in a significant reduction of infectious complications which can be attributed to a reduction in pneumonia. The reinforcement of antioxidant defences is a possible mechanism.

Decompressive craniectomy in patients with subarachnoid haemorrhage and intractable intracranial hypertension

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Background and purpose: To evaluate the clinical course and outcome of patients with subarachnoid haemorrhage (SAH) developing intractable intracranial hypertension after aneurysm clipping and treated with decompressive craniectomy (DC). Indications for DC are discussed.

Methods: Among 193 patients with SAH 38 patients after early aneurysm clipping (<3 days) were treated with primary and/or secondary DC; indications for DC were (1) signs of brain swelling during craniotomy and aneurysm surgery (angry brain) (group 1: primary DC); (2) intracranial pressure(ICP)-

elevations and space-occupying epidural, subdural or intracerebral haematoma after aneurysm surgery (group 2: secondary DC because of haematoma; (3) development of increasing brain oedema and elevated ICP resistant to conventional treatment, without radiological signs of infarctions (group 3: secondary DC without infarction); and (4) development of increasing brain oedema and elevated ICP with radiological signs of infarction (group 4: secondary DC with infarction).

Results: 31 patients (81.6%) suffered from high-grade SAH Hunt & Hess 4 to 5 and 13 patients (34.2%) from symptomatic cerebral vasospasm (CVS). Grouped according to the indications for DC, 21 patients (55.2%) belonged to the group 1 (primary DC), 5 (13.2%) to the group 2 (secondary DC because of haematoma), 6 (15.8%) to the group 3 (secondary DC without infarction) and 6 (15.8%) to the group 4 (secondary DC with infarction). In all patients good functional outcome Glasgow Outcome score (GOS) 4 & 5 could be reached in 20 patients (52.6%), 10 (26.3%) survived severely disabled (GOS 3), none (0%) in a vegetative state (GOS 2) and 8 (21.1%) died (GOS 1). The outcome between the different patient groups differed. After 12 months good functional outcome could be reached in 11 of 21 patients (52.4%) in group 1, in 3 of 5 patients (60%) in group 2, in 5 of 6 patients (83.3%) in group 3 and in 1 of 6 patients 16.7% in group 4.

Conclusions: In more than half of patients with intractable intracranial hypertension after SAH good functional outcome can be achieved after DC. Patients with progressive brain oedema without radiological signs of infarctions and those with haematoma and consecutive ICP elevations may have most benefit from DC. The aetiology of brain swelling (primary oedema due to most severe SAH or secondary oedema due to CVS) seems to be of less importance as a prognostic sign. The indication for DC should, however, be cautiously set, if in CT scans secondary infarcts are already manifest.

Tableau 1

	2001	08.2004 J –2	J 0	J 5	J 9–J 11	J 19	J 28	J 30
interventions et évènements			corticothérapie et plasma-phérèse (J 1–J 10: 6 séances)		ribavirine, PEG-IFN, choc septique		coma	décès
cryoglobuline N: <0,05 g/l	0,365	2,75	–	0,66	–	1,14		0,89
index de viscosité norme: 1,5–2			–	–				1,48

syndrome néphrotique développe un choc septique (péritonite à *E. Coli*) avec défaillance multiorganique à la suite d'un traitement immunosuppresseur et antiviral. Il est traité par laparotomie, antibiothérapie, inotropes positifs et vasopresseurs, corticostéroides, ventilation mécanique, et hémodiafiltration veino-veineuse continue.

Alors que l'évolution est favorable, la survenue brusque d'un coma (score de Glasgow 3) irréversible conduit au décès. Le CT démontre une atteinte ischémique bi-hémisphérique massive, sans obstruction vasculaire.

L'autopsie confirme la glomérulonéphrite membrano-proliférative et la présence de multiples infarctus bi-hémisphériques non systématisés à un territoire vasculaire. Les lésions sont dues à une vasculite aiguë nécrosante diffuse. Il n'y a pas d'atteinte vasculitique d'autres organes (tab. 1).

Conclusion: Ce patient a fait un accident vasculaire bi-hémisphérique dans le cadre d'une vasculite cérébrale documentée histologiquement, fait rarement reporté. Il n'est pas exclu que le taux de Cryo, même s'il n'est pas à sa valeur maximale au moment de l'AVC, ait joué un rôle. Les phénomènes rhéologiques ne paraissent pas être impliqués de manière prépondérante compte tenu d'une viscosité normale. Une intensification de l'immunosuppression en fonction du profil de Cryo pourrait éventuellement prévenir la survenue d'une telle vasculite.

Accident vasculaire cérébral (AVC) massif et cryoglobulinémie (Cryo)

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La survenue de troubles neurologiques est décrite dans le cadre de l'hépatite C avec Cryo. Les mécanismes invoqués comprennent des phénomènes rhéologiques (hyperviscosité) et angiologiques. L'AVC est rarement décrit. La pathogénèse conduisant à l'AVC dans cette situation est mal documentée. Nous rapportons un cas d'AVC massif en relation avec une vasculite cérébrale bi-hémisphérique.

Ce patient avec Cryo de type II sur hépatite C chronique, insuffisance rénale aiguë et

Incidence and risk factors of aspiration syndrome in overdose patients on the ICU

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Aim: To assess the frequency of clinically significant aspiration syndrome in a Swiss ICU population of overdose patients and to identify predisposing factors to aspiration syndrome.

Methods: We evaluated a total of 273 consecutive overdose patients admitted to the medical ICU of the University Hospital Basel within a 3-year period. Clinically significant aspiration syndrome (including aspiration pneumonitis and aspiration pneumonia) was defined as a patient with a confirmed or suspected localised chest-X-ray infiltrate in the presence of significant respiratory dysfunction (defined as one or several of the following: invasive or non-invasive mechanical ventilation, supplemental oxygen >4 l; respiratory rate >20, arterial oxygen saturation <92%, PaO_2 <10 kPa).

Results: We identified 47 patients with aspiration syndromes (17%). Ingestion of opiates, decreased Glasgow Coma Score (GCS) on admittance, increased APACHE II score, increased heart rate, leucocyte count, and serum potassium and lower serum sodium on admittance, respectively, were associated with an increased risk of aspiration syndrome with univariate analysis. Multivariate logistic regression showed two independent risk factors: decreased GCS and ingestion of opiates (odds ratio for each increase in GCS: 0.8; 95% confidence interval [CI] 0.7 to 0.9; p = 0.001; ingestion of opiates: odds ratio 4.5; 95% CI 1.7 to 11.6; p = 0.002).

Aspiration syndrome led to an increased duration of ICU stay but was not associated with a significantly increased mortality.

Conclusion: Clinically relevant aspiration syndrome is a frequent complication of overdose patients admitted to the ICU. Intoxication with opiates and decreased GCS on admittance are independent risk factors for an aspiration syndrome.

Role of matrix metalloproteinases in apoptosis after transient focal cerebral ischaemia in rats and mice

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The involvement of matrix metalloproteinases (MMPs) in cerebral ischaemia-induced

apoptosis was investigated in a model of transient focal cerebral ischaemia in rats treated intra-cerebro-ventricularly with 4-((3-(4-phenoxylphenoxy)propylsulfonyl)methyl)-tetrahydropyran-4-carboxylic acid N-hydroxy amide, a broad spectrum non-peptidichydroxamic acid MMP inhibitor, and in MMP-9 deficient mice. Our results showed that MMP inhibition reduced DNA fragmentation and cerebral infarct after ischaemia. This protection was concomitant with a reduction of cytochrome c release into the cytosol and a reduction of calpain-related α-spectrin degradation, as well as with an increase in the immunoreactive signal of the native form of poly (ADP) ribose polymerase. In contrast, specific targeting of the *mmp9* gene in mice did reduce cerebral damage but did not modify the apoptotic response after cerebral ischaemia. However, intra-cerebro-ventricular injection of the MMP inhibitor, which was used in rats, in MMP-9 deficient mice significantly reduced DNA degradation and contributed even further to the protection of the ischaemic brain. All together, our results suggest that MMPs are actively involved in cerebral ischaemia-induced apoptosis, although MMP-9 would play a minor role.

Haltung verantwortlicher Ärzte schweizerischer Intensivstationen zu Organspende

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Einer der Gründe an Organmangel könnte eventuell mangelnde Motivation und Organisation sein. Im Juli 2003 verschickten wir an alle verantwortlichen Ärzte der Intensivstationen einen Fragebogen, um ihre Haltung gegenüber Organspende zu erfahren, Daten zu sammeln bezüglich der Kasuistik eventueller Spender, der psychologischen Schwierigkeiten in der Kommunikation mit Familienangehörigen und daraus resultierende ethische Fragestellungen mit dem Wunsch, Lösungen zu formulieren und die Anzahl der Organspenden zu erhöhen.

Methode: An 91 von der SGI anerkannte Intensivstationen haben wir Fragebogen verschickt mit 10 Fragen aus der Studie «Donor Action» der «FSOD» (Foundation to Support Organ Donator) und 4 eigens formulierten, um die ethischen Aspekte hervorzuheben.

Ergebnisse: Von den 91 angeschriebenen Ärzten antworteten 64 (70%) (74% deutsche, 52% französische, 100% italienische Schweiz). Sie alle sprachen sich *für* eine Organspende aus, aber gut 65% der intensivmedizinischen Zentren hatten während des ganzen vorangegangenen Jahres 2002 keinen geeigneten Patienten auch unter Anwendung eines Protokolls für die Diagnose des Hirntods (90%). Ebenfalls 90% halten die Diagnose des Hirntods als ein gültiges Kriterium für die Bestimmung des Todes einer Person. 80% fühlen sich nicht in Schwierigkeiten bezüglich der kommunikativen Aspekte, welche die Diagnose des Hirntods und die Frage nach einer eventuellen Zustimmung betreffen. 50% haben noch nie an Fortbildungskursen bezüglich dieses Themas teilgenommen, und 50% sind auch nicht daran interessiert. 80% glauben ausserdem, dass die Organisation der Organspende in der Intensivmedizin zu den ethischen Pflichten des verantwortlichen Arztes gehört, aber 70% glauben nicht, dass die Identifikation eventueller Spender ein Qualitätskriterium für jede Intensivstation sei.

Diskussion: Organmangel in der Schweiz scheint nicht vom Mangel an Motivation oder Organisation oder Kommunikationsschwierigkeiten verantwortlicher Intensivärzte herzurühren, sondern im Grossteil auf wirklichen Mangel an Patienten mit Hirntod, vor allem diejenigen ohne neurochirurgische Abteilungen. Wegen der Subjektivität der Antworten müssten die gesammelten Daten mit den realen Daten aus den Spitälern, welche an der Studie «Donor Action» der «FSOD» teilnehmen, verglichen werden, mit der Hoffnung, dass eines Tages alle Intensivstationen der SGI daran teilnehmen.

Experience with ECMO support after congenital cardiac surgery in a single tertiary centre

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Introduction: Extracorporeal membrane oxygenation (ECMO) has been used as rescue therapy in children since the 1980s for persistent pulmonary hypertension (PHT) of the newborn or in congenital heart disease (CHD) either before or after cardiac surgery. We report here our overall experience.

Methods: Retrospective study with chart review of all patients necessitating ECMO support after congenital cardiac surgery between April 1999 and December 2004.

Results: 17 children needed ECMO support after congenital heart surgery. Their mean age was 1.8 ± 3.3 years (2 days–10 years). The mean weight was 8.4 kg (2.7–30 kg). 4 patients (24%) presented a transposition of the great arteries; 4 patients an unbalanced double outlet right ventricle with or without aortic malposition; 4 patients a ventricular septal defect or aorto-pulmonary window or a complete atrio-ventricular septal defect with secondary pulmonary hypertension; 3 patients a tetralogy of Fallot; 1 patient a critical aortic stenosis and 1 patient a cardiac transplantation. Surgery was in 12 patients (70%) a corrective procedure and in the 5 others patients (30%) a palliation. ECMO was initiated in the OR after failure of weaning from cardiopulmonary bypass in 11 children (65%). In 6 children (35%), it was started in the ICU within 24 hours for low cardiac output or cardiac arrest. The ECMO pump consisted of a Biomedicus membrane oxygenator. In the first 5 patients regular cardiopulmonary bypass canulas were used, thereafter ECMO canulas were used with a completely heparinised circuit and activated clotting time ideally at 190–210. Mean time on ECMO was 98 hours (20–249 hours). In 4 patients the intensive care was stopped because of multiple organ failure or severe cerebral lesions, in 3 patients a technical problem of the ECMO (massive haemorrhage, canulas dislocation or massive thrombosis) lead to death of the patient. 10 patients could be weaned from the ECMO. The immediate survival rate of the ECMO was 59% and the overall survival rate at 30 days post surgery was 41%.

Conclusions: Cardiac support with ECMO after congenital heart surgery permits a long-term survival in about 40% of patients in critical condition who would otherwise die. These results correspond to the results published in big series. It should be available to centres performing congenital heart surgery as a rescue therapy in selected cases.

Déclaration spontanée d'incidents, une classification pourquoi?

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Introduction: Les dispositifs de déclaration spontanée d'incidents participent à l'amélioration de la qualité des soins. Ils constituent une forme de retour d'expérience améliorant la connaissance des services. Notre service a mis en place un tel dispositif depuis 1999. Les incidents déclarés sont traités à 2 niveaux: (1) Un cercle qualité qui analyse les incidents afin de proposer des actions correctrices réalisables et immédiates. (2) Une classification qui permet de réaliser un bilan permettant le suivi de l'évolution de la qualité dans le service. L'importance des incidents est liée à leur fréquence, gravité, détectabilité et leur reproductibilité.

Le but de cette étude est de décrire les incidents survenus dans notre service en 2004.

Méthode: Chaque incident est classé selon:

- Sa nature ou facteur favorisant: 8 catégories sont proposés: traitement, organisation, matériel, équipement, communication, attitude professionnelle, lésion corporelle et délai.
- La gravité de ses conséquences: appréciée selon une échelle simple de gravité: critique *(4)*: grave *(3),* mineur *(2),* service *(1).*
- La détectabilité: évaluée par une échelle simple de 5 points allant de 0 pour une détectabilité élevée à 4 pour insuffisante.
- La reproductibilité de l'incident dans le service: appréciée par une échelle simple de 5 points allant de 0 pour une reproductibilité improbable à 4 pour élevée.

Résultats: Durant l'année 2004, 174 incidents ont été déclarés spontanément dans le service avec une moyenne de 14,5 (SD 4,3) par mois (tab. 1).

Conclusion: Les incidents liés au processus d'administration des médicaments (traitement) sont les plus fréquents. Leur gravité et

Tableau 1

	traitement	matériel	organisation	attitude professionnelle	équipement	communication	lésion corporelle	délai
% total incidents	26%	21%	19%	13%	12%	4%	3%	2%
gravité moyenne (SD)	1,9 (0,9)	1,6 (0,8)	1,5 (0,8)	2 (0,7)	**2,2** (0,7)	1,4 (0,5)	1,8 (0,4)	1,7 (1,1)
détectabilité moyenne (SD)	**1,3** (1)	0,7 (1)	0,8 (1,1)	0,3 (0,4)	0,6 (1)	1,1 (1,5)	0,2 (0,4)	1 (0)
reproductibilité moyenne (SD)	2,5 (0,9)	2 (0,9)	2,5 (1)	2 (0,9)	2 (0,8)	2,6 (0,9)	2 (0,7)	1,7 (0,6)

reproductibilité font partie des plus élevées avec une détectabilité moyenne. Les incidents liés aux équipements (tube endotrachéal, cathéter, etc.) présentent la gravité la plus importante. Les incidents liés aux communications présentent la reproductibilité la plus élevée.

L'évaluation de la détectabilité et de la reproductibilité [1] améliore le suivi de l'évolution des incidents déclarés.

Référence

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Reporting adverse events in ICU: a collaborative safety reporting system (RS) in the 4 intensive care units of Canton Ticino

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Background and methodology: Data from the USA demonstrate that many deaths are annually reported from medical errors and that about 17% of ICU patients suffer serious adverse events. To improve safety, identify threats and hold hospitals accountable for safe practices, new methods such as internal reporting systems recognising and preventing hazards are needed. However, few institutions or units are currently developing plans for reporting errors. We therefore developed and implemented a nonpunitive, spontaneous and patient-confidential incident RS in our multi-site hospital ICUs (33 beds; 3021 patients admitted in 2003; 9295 patient days/yr) of the Ente Ospedaliero Cantonale of Canton Ticino, mainly aiming to analyse factors from reports that contribute to incidents and use this knowledge to improve patient safety.

Results: During the first 6 months, 584 reports (nurse: 80%; doctor: 19%; others: 1%) have irregularly been submitted, mostly in very severely (61%) or severely (29%) ill patients. 45% of reports have been recorded by eyewitnesses. The respiratory and cardiovascular systems accounted for 51% of submitted events and for the most reported errors during invasive procedures, while among the noninvasive procedures, medication and communication errors were the most reported events (34.7% and 30.8% respectively). Concerning medication errors, a wrong dosage in function of time and a wrong starting medical prescription (24.6% and 22% respectively) were the most reported errors. 9% of the incidents occurred during transport outside the ICU and 29% during week-end days. Most incidents occurred during the first diurnal work-shift (48.6%), while the night-shift accounted for only 19.36% of recordings ($p < 0.002$).

Conclusions: The RS works, with the nurses completing most of the reports in spite of personal motivation barriers. Common types of errors are slips and lapses, guidelines not being followed and a high incidence of communication and medication errors. Future directions should focus on understanding barriers to reporting, developing and implementing data-managing systems and preventive expert analysis combined with evidence-based initiatives to improve patient safety.

Kinetische Therapie zur Prophylaxe und Behandlung der pulmonalen Insuffizienz nach aneurysmatischer Subarachnoidalblutung

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Hintergrund: Die pulmonale Insuffizienz durch Pneumonie und ARDS stellt die häufigste nicht zerebrale Todesursache nach aneurysmatischer Subarachnoidalblutung (SAB) dar [1].

Zielsetzung: Untersuchung der Wirksamkeit der kinetischen Therapie als Prophylaxe der pulmonalen Insuffizienz bei Hochrisiko-Patienten nach aneurysmatischer SAB.

Methodik: Zwischen Januar 2000 und Juli 2003 wurden am Departement Neurochirurgie Universitätsspital Zürich 211 Patienten mit aneurysmatischer SAB und frühem Aneurysmaclipping (<48 h) behandelt. Patienten mit therapieresistenten Anstiegen des intrakraniellen Druckes (ICP) (ungenügendes Ansprechen auf Osmotherapie, Trishydroxyaminomethan-Puffer) wurden mit Entlastungskraniotomie und/oder Hypothermie kombiniert mit Barbituratkoma behandelt. Zusätzlich wurden Patienten mit therapieresistenten Vasospasmen (ungenügendes Ansprechen auf hypertensive hypervoläme Hämodilution [Triple-H-Therapie] und intraarterielle Spasmolyse) mit Hypothermie und Barbituratkoma behandelt. 38 Patienten wurden mit Entlastungskarniotomie und/oder Hypothermie/Barbituratkoma behandelt und in die Studie eingeschlossen. Sie wurden als Hochrisikopatienten zur Entwicklung eines Lungenversagens durch Pneumonie oder ARDS klassifiziert und mittels prophylaktischer kinetischer Therapie (Pulmonair, Rotorrest, KCI Mediskus) behandelt. Als Pneumonie galten Infiltrate im Thorax-Röntgen, zusammen mit 2 der folgenden Kriterien (eitriges Trachealsekret, Kerntemperatur >38,5 °C, Leukozytenzahl <1500/uL oder >10 000/uL). Als ARDS-Kriterien galten Beatmungsbedarf ohne Vorliegen einer anderen kardialen oder pulmonalen Pathologie, radiologisch bilaterale Infiltrate und ein PaO_2/FIO_2 <200 mm Hg.

Resultate: 38 Patienten (26 Frauen, 12 Männer) mittleres Alter 48,5 ± 10,3 Jahre wurden in 18 Fällen mit Entlastungskraniotomie, in 30 Fällen mit Hypothermie und in 31 Fällen mit Barbituratkoma behandelt. 27 der 38 Patienten (71%) entwickelten eine Pneumonie. 6 Patienten zeigten einen progredienten Verlauf mit ARDS (15,8%). Davon verstarben 3 Patienten (7,8%). Insgesamt verstarben 9 Patienten (23,7%) (2 an unkontrollierbaren ICP-Anstiegen, 2 an multiplen Ischämien durch Vasospasmen, 2 an kardialem «Low-Output-Syndrom» und 2 an respiratorischem Versagen). 17 Patienten (44,8%) überlebten mit gutem Outcome (10 mit GOS 5; 7 mit GOS 4), 9 Patienten überlebten schwer behindert (GOS 3; 28,9%), 1 Patient vegetativ (GOS 2) und 9 (23,7%) verstarben.

Schlussfolgerungen: Bei der selektionierten Patientengruppe mit hohem Risiko für Pneumonie und ARDS starben nur 3 Patienten (7,8%) an respiratorischer Insuffizienz. Die frühzeitige prophylaktische kinetische Therapie kann als Element in einem Therapiekonzept mit anderen supportiven Massnahmen (lungenschonende Beatmungsstrategie, Antibiotika-Therapie etc.) die Mortalität an Lungenversagen bei Patienten nach aneurysmatischer SAB mit schwerem Verlauf vermindern.

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Extrakorporelle Membranoxygenation (ECMO) bei ARDS: Erfahrungen in Zürich

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Die extrakorporelle Membranoxygenation sichert den Gasaustausch während einer akuten respiratorischen Insuffizienz und ermöglicht der geschädigten Lunge unter optimaler Umgebung (minimale Ventilation/Oxygenation) auszuheilen.

Patienten und Methode: Im Zeitraum von 3 Jahren (2002–2004) wurden total 6 Patienten auf unserer Intensivstation wegen therapierefraktärem ARDS mittels ECMO behandelt. Die Patienten waren im Durchschnitt 35jährig (21–55, 4 Männer, 2 Frauen), hatten ein pa02/Fi02 vor ECMO von 53 (± 12), SAPS II 62, MAP 60 mm Hg, Puls 111/min, Sv02 65%, pH 7,25, Hb 10 g/dl und Tc von 52 000/µl. Ursache des ARDS waren bei 4 Patienten eine Pneumonie (3× Pneumokkoken, 1× Legionellen bei HIV), 1× Engraftment bei st.n. KM-TPL bei AML und 1× eine alveoläre Hämorrhagie bei idiopathischer aplastischer Anämie. Alle Patienten hatten eine Zusatztherapie mit NO, Bauchlage, Katecholaminen sowie Hämofilter, und die Patienten mit Pneumonie (n = 4) erhielten neben der antibiotischen Therapie auch APC.

Resultate: Überleben 66%, ECMO-Dauer 8 (± 3, 5–12) Tage, IPS Aufenthalt 38 Tage, Spitalaufenthalt 50 Tage. Im Median wurden die Patienten vor ECMO-Implantation 3 Tage beatmet (2–19 Tage). Initial wurde der ECMO-Gefässzugang bei 4 Patienten venovenös und 2× veno-arteriell gewählt. Bei 3 Patienten musste im Verlauf der Gefässzugang gewechselt werden (Blutung, Oxygenation). Von den 6 Patienten zeigten deren 5 verschieden schwere direkte ECMO-Komplikationen: 1× Versagen des Oxygenators, 1× Gerinnsel im Schlauchsystem, 1× operationswürdige Lymphfistel, 1× signifikante Hämolyse und 1× multiple Revisionen bei Blutung aus der Anastomose. Die beiden Todesfälle sind nicht direkt mit der ECMO vergesellschaftet und betreffen die beiden hämatologischen Patienten, welche auch vor ECMO-Einlage am längsten beatmet wurden (4 resp. 19 Tage).

Schlussfolgerung: Das Überleben in unserer kleinen Fallzahl entspricht in etwa den Angaben aus der Literatur. Selektioniert man nur die 4 Patienten mit Pneumonie beträgt das Überleben sogar 100% (4 von 4).

Die gute Überlebensrate ist nicht zuletzt auf die technische Verbesserung des ECMO-Systems, insbesondere die periphere Implantation, die verbesserten Zentrifugen, die reduzierte Heparinisierung wie auch die kleinere Rate an schweren Komplikationen (Hämolyse, Blutung), zurückzuführen.

Durch eine interdisziplinäre Zusammenarbeit kann in ausgewählten Situationen bei ARDS-Patienten die Therapie mittels ECMO das Überleben verbessern.

Systemic but not intrathecal MMP inhibition prevents intracerebral haemorrhagic transformation in a rat model of tPA-induced reperfusion following thromboembolic stroke

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Introduction: Several experimental studies of ischaemic stroke implicate matrix metalloproteinases (MMPs) in the haemorrhagic transformation after tPA-triggered thrombolysis, but the origin of the enzymes has not been determined. The aim of this study was to compare the efficacy of intra-cerebro-ventricular (icv) versus intra-peritoneal (ip) administration of an MMP inhibitor in rat focal ischaemia.

Methods: A total of 103 Sprague-Dawley rats were properly subjected to thromboembolic middle cerebral artery occlusion (MCAO). Thrombolytic reperfusion was performed after 6 h of occlusion. The MMP inhibitor was administered immediately before MCAO.

Results: Overall, 22% of these animals showed a spontaneous reperfusion within 3 h; 26% showed a spontaneous reperfusion between 3 h and 6 h and 52% remained occluded until tPA administration at 6 h after occlusion. Macroscopic brain haemorrhage was evaluated at 24 h, as the absence of haemorrhage (No), the presence of petechial haemorrhage (HI) or confluent haematoma (PH). Without treatment, all animals occluded for 6 h developed a macroscopic haemorrhage (HI 54%, PH 46%). Icv injection of the MMP inhibitor did not significantly modify this proportion (HI 60%, PH 40%). In contrast, ip injection decreased the risk of haemorrhage (No 33%, HI 67%). A similar protection was achieved after polymorphonuclear depletion by cyclophosphamide (No 25%, HI 75%). Parenchymal haemoglobin measurements showed a decrease in blood extravasation after ip MMP inhibition (108 g/hemisphere) and leucocyte depletion (121 g/hemisphere) as compared to no treatment (247 g/hemisphere) in the HI groups.

Discussion: Our results show that ip MMP inhibition and leucocyte depletion decrease the risk and gravity of brain haemorrhage. The lack of protection after local MMP inhibition suggests that the haemorrhagic transformation is caused by MMPs produced outside the brain, potentially by activated leucocytes.

Réanimation cardio-pulmonaire prolongée et réchauffement par circulation extra corporelle pour un cas d'hypothermie accidentelle sévère

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Cas: Il s'agit d'un homme de 36 ans qui est trouvé un matin de mai dans un cours d'eau en milieu suburbain, inconscient, semi-immergé avec les voies aériennes libres, bradypnéique (3/min) et bradycardique, sans signes évidents de traumatisme. A cause de l'état d'hypothermie sévère (18,0 °C), le patient développe une asistolie qui durera 4 heures et demie.

Méthode: Réanimation cardio-pulmonaire avec réchauffement actif extracorporel avec air chaude et intraveineux avec colloides réchauffés durant 4 heures et par la suite par circulation extracorporelle.

Résultats: Après 4 heures et demie de réanimation et réchauffement jusqu'à une température de 30 °C, le patient reprend une activité cardiaque (FV) que nous convertissons en rythme sinusal en 2 défibrillations.

Dans la phase post-aiguë, on signale l'apparition d'un syndrome de reperfusion caractérisé par un syndrome de loge du pied gauche, ainsi qu'une insuffisance rénale légère qui est traitée conservativement.

En outre, le patient développe un ARDS sur aspiration; nous diagnostiquons une contusion pulmonaire bilatérale, vraisemblablement causée par le massage cardiaque externe prolongé.

Après 11 jours le patient est transféré à l'étage; et après 28 jours d'hôpital il peut rentrer à domicile, sans présenter ni insuffisances d'organes, ni déficits neurologiques.

Discussion: En cas d'hypothermie sévère (même de 18 °C) avec arrêt cardio-circulatoire prolongé (plus de 4 heures), on peut obtenir une bonne reprise des fonctions physiologiques et cérébrales grâce à un réchauffement actif contrôlé et une réanimation cardio-pulmonaire adaptée à la température corporelle.

Multimodal intervention to reduce agitation and incidents in critically ills

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Introduction: Agitation, an excessive not purposeful motor activity with internal tension, is of major concern in ICUs. It can lead to incidents (adverse events interfering with patients' care). We started a before and after study to test the impact on agitation and incidents of a multimodal quality improvement intervention (educational sessions, feedback on continuous and systematic monitoring of agitation, agitation management reminder).

Methods: We compared patients who stayed >24 hours in our unit during 5 months (*Before* period) with those admitted after the

intervention during 8 months (*After* period). We daily assessed episodes of agitation, incidents and factors potentially associated with their occurrence.

Results: The number of agitated patients decreased from 188/403 (47%) (*Before*) to 217/553 (39%) (*After*) (p <0.04). The number of *agitations*/month decreased from 219 ± 62 /month (*Before*) to 179 ± 52 /month (*After*) (p: NS). Agitation during night shifts were particularly reduced (p <0.04). In the multivariate analysis the occurrence of agitation was positively associated with multiple trauma, Apache II, a longer length of stay and ICU admission before our intervention. The number of patients who developed *incidents* decreased from 72/403 (18%) (*Before*) to 87/553 (16%) (*After*) (p: NS). The number of incidents/month decreased from 31 ± 10 /month (*Before*) to 19 ± 8 /month (*After*) (p = 0.03). The occurrence of violence against caregivers was particularly reduced (p <0.05). In the multivariate analysis the occurrence of incidents was positively associated with the male sex, APACHE II, multiple trauma and daily alcohol intake. If the occurrence of agitation was included in the model, agitation remained the only factor independently associated with the occurrence of incidents. We found a good correlation between the occurrence of agitation and incidents (rho = 0.69, p <0.0001).

Conclusion: The intervention reduced the number of agitated patients and the number of incidents/month. The trend toward a reduction of the number of agitations and of the number of patients who developed incidents needs confirmation. The magnitude of those reductions are important (–18% / –11%) and additional data may allow statistical significance within the next months. These results are in line with our previous findings regarding the factors associated with the occurrence of both agitation and incidents, and the important correlation between these two elements.

Monitoring sedation: different effects of dexmedetomidine/remifentanil and midazolam/remifentanil on event-related potentials in volunteers

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Background: The depth of propofol- and propofol/remifentanil-induced sedation can objectively be monitored with auditory event-related potentials (ERPs) in volunteers [1]. The aim of this study was to evaluate ERPs for monitoring midazolam/remifentanil (mida/remi) and dexmedetomidine/remifentanil (dex/remi) induced sedation.

Methods: In ten healthy volunteers ERPs were measured during stepwise increasing, clinically relevant levels of sedation (Ramsay score [RS] 2–4), induced by randomly either a combination of mida/remi or dex/remi. Auditory evoked potentials at around 100 ms after the stimulus (N 100) were measured by using a paradigm consisting of 40 trains of 4 stimuli separated by 12-s intervals.

Results: During mida/remi-induced sedation, amplitudes of N 100 decreased significantly and uniformly as the level of sedation increased from RS 2 to 4 (table, p <0.001). During dex/remi-induced sedation, N 100 responses did not change significantly. At RS-level 4, mida/remi resulted in drowsiness after awakening, whereas with dex/remi, the subjects were alert and cooperative once awake.

amplitudes (µV)	mida/remi	dex/remi
baseline	–4.84 ± 1.4	–5.23 ± 1.09
RS 2	–4.00 ± 1.2	–5.31 ± 1.2
RS 3	–1.88 ± 1.3	–4.09 ± 2.2
RS 4	0.13 ± 1.0	–3.34 ± 2.5

Conclusions: We conclude that similar to propofol/remifentanil [1], ERPs can be used to monitor mida/remi sedation. In contrast, our findings with dex/remi sedation suggest that dex/remi affects the efferent pathways of a stimulus (the potential to react) stronger than the perception of the stimulus itself.

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Auswirkungen einer Änderung der ärztlichen IPS-Betreuung auf das Outcome der Patienten

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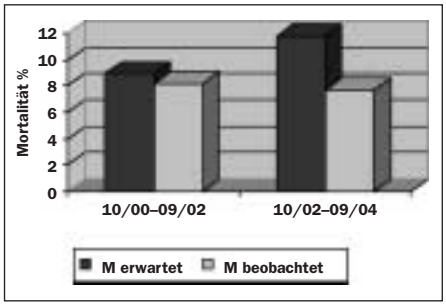
Hintergrund: Intensivpflegestationen (IPS) sind hoch spezialisierte Abteilungen, wo mit grossem Personal- und Materialaufwand vital gefährdete Patienten betreut werden. Die Qualität der Patientenversorgung hängt stark von der Qualifikation und Interaktion des Pflege- und Ärzteteams ab [1, 2]. Bis zum 1.10.2002 wurde die interdisziplinäre 6-Betten-IPS des Lindenhofspitals Bern durch einen Facharzt Intensivmedizin FMH geleitet, nachts und am Wochenende ergänzt durch ein Team von je einem Anästhesisten und Internisten. Seit dem 1.10.2002 decken 3 Fachärzte für Intensivmedizin FMH den ärztlichen Dienst ab.

Methode: Retrospektive Analyse der Daten aller Patienten, welche vom 1.10.2000 bis zum 30.9.2002 (Gruppe 1) und derjenigen, welche vom 1.10.2002 bis zum 30.9.2004 (Gruppe 2) auf unserer IPS behandelt wurden. Erfassung von Alter, Geschlecht, IPS-Indikation, SAPS-II-Score, IPS-Verlauf und Spitalmortalität.

Resultate: In der Gruppe 1 wurden 723 Patienten (Alter 66,8 ± 15 Jahre; 49% Frauen; 47% postoperativ) und in der Gruppe 2 730 Patienten (Alter 67,3 ± 15 Jahre; 49% Frauen; 50% postoperativ) auf unserer IPS betreut. Die Gruppe 1 hat einen tieferen SAPS-II-Score (28 versus 31; erwartete Mortalität 8,9 versus 11,7%, p <0,01). Weitere signifikante Unterschiede der Gruppe 1 gegenüber Gruppe 2 sind: kürzerer IPS-Aufenthalt (2,8 versus 3,3 d), weniger beatmete Patienten (94 versus 154), weniger Dialysetage (81 versus 252), weniger Patienten mit invasiver hämodynamischer Überwachung (25 versus 58).

Die beobachtete Mortalität ist in Gruppe 1 und 2 identisch (8,2 versus 7,7%; p = 0,64). Hingegen ist die relative Mortalität in Gruppe 2 26% tiefer (p <0,001). Die beobachtete Mortalität ist im neuen Dienstsystem 35% tiefer als gemäss SAPS-II-Score erwartet würde.

Schlussfolgerung: Der Wechsel der ärztlichen Versorgung unserer IPS ist zeitlich assoziiert mit einer Reduktion der Risiko-bezogenen Mortalität um 26%.



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Decompressive craniectomy in severe cerebral venous and dural sinus thrombosis

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Objective: To evaluate the outcome of patients with most severe cerebral venous and dural sinus thrombosis (CVT) after decompressive craniectomy. Indications and techniques for decompressive craniectomy and intensive care regimen are discussed.

Methods: Between 2000 and 2004 15 patients with CVT and intracerebral haemorrhage were treated at the Department of Neurosurgery, University Hospital Zurich. Among them, 4 patients with the most severe illness course were treated with decompressive craniectomy. Indications for decompressive craniectomy were deterioration of level of consciousness with CT signs of space occupying brain oedema, venous infarction and

congestional bleeding with mass effect, midline shift and obliteration of the basal cisterns.

Results: Among 15 patients with CVT and intraparenchymatous haemorrhage 4 patients were treated with decompressive craniectomy. Glasgow Coma Scale (GCS) immediately before the operation was in mean 10.2 (range 6 to 13). No patient showed signs of unilateral or bilateral third nerve palsy before surgery. No surgical complications were observed. All 4 patients who underwent decompressive craniectomy recovered with favourable functional outcome (Glasgow Outcome Scale; GOS 4 and 5). Anticoagulation therapy with heparin was reconvened 12 hours postoperatively with half dosage and 12 hours later with full dosage. No enlargement of existing intraparenchymatous haematoma or other intracranial bleeding complications occurred.

Conclusions: Favourable functional outcome in selected patients with most severe courses of CVT can be achieved after decompressive craniectomy. Postoperative anticoagulation therapy with full-dose heparin 24 hours after craniotomy seems to be safe. Precise indications and techniques for combined surgical decompression and thrombectomy deserve to be evaluated in future studies.

Bedside monitoring of cerebral blood flow in patients with cerebral vasospasm after subarachnoid haemorrhage with the NIRS ICG dye dilution technique

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Background: Radiographic cerebral vasospasm (CVS) does not reflect cerebral haemodynamics and may occur in the absence of clinical deficit and vice-versa. The established methods for bedside measurement of cerebral blood flow (CBF) are technically difficult or need a transport of the patient with a possible high risk. Recently a new method for bedside monitoring of CBF could be validated in healthy volunteers [1].

Methods: 4 NIRS optodes were placed bilaterally on the forehead (NIRS-system Oxymon, Nijmegen). Central venous injections of 0.5 mg/kg indocyanine green (ICG) were performed. The ICG dye dilution curves were recorded and regional values for the mean transit time (mtt), cerebral blood volume (rCBV) and cerebral blood flow (rCBF) were quantified. Measurements were performed with the occurrence of CVS immediately before and after intraarterial spasmolysis.

Results: Before papaverin instillation rmtt over the left hemisphere (with CVS) was longer than over the right hemisphere (mtt left 9.3 s to mtt right 8.2 s). After papaverin instillation into the left middle cerebral artery (MCA) mtt left decreased to 8.1 s, whereas the mtt values over the right hemisphere remained unchanged. Otherwise, due to increasing leftsided brain oedema in CT scans, leftsided values for CBV and CBF decreased after spasmolysis (before CBV left 1.2 ml/100 g and CBF left 7.5 ml/100 g/min; after CBV left 0.3 ml/100 g and CBF left 2.4 ml/100 g/min).

Conclusions: Mtt values may be the most important values to observe treatment effects of CVS especially with increasing brain oedema. The new methodology could be a powerful tool in detection and treatment of CVS.

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Membrane-microdialysis: evaluation of a new method to assess splanchnic anaerobic tissue metabolism

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Objective: Inadequate oxygen delivery to abdominal organs contributes to increased morbidity and mortality in critically ill patients but is difficult to detect. Hence, measuring peritoneal lactate concentrations could be useful. The aims of this study were to evaluate whether a new membrane-based microdialyser was able to detect in-vivo a clinically relevant decrease in splanchnic blood flow.

Design: A membrane-based microdialyser was first validated in-vitro. The same device was afterwards tested in a randomised, controlled animal experiment.

Setting: University experimental research laboratory.

Interventions: An extra-corporeal shunt with blood reservoir and a roller pump was inserted between proximal and distal abdominal aorta, and a microdialyser was inserted intra-peritoneally. In 12 animals, total splanchnic blood flow was reduced by 43% (34–79%; median, range) by activating the shunt; 12 animals served as controls.

Measurements and results: The in-vitro lactate recovery rate was 0.59 (0.32–0.83 after 60 minutes and 0.82 (0.71–0.87) after 90 minutes, and was not dependent on the lactate concentration. Mesenteric blood-flow reduction resulted in an increase in peritoneal microdialysis lactate concentration from 1.7 (0.3–3.8) mmol/l to 2.8 (1.3–6.2) mmol/l ($p = 0.006$). At the same time, mesenteric venous lactate concentration increased from 1.0 (0.4–2.3) mmol/l to 3.6 (1.5–8.8) mmol/l ($p = 0.003$), mesenteric venous-arterial lactate gradient from 0.1 (–0.2–0.8) mmol/l to 0.3 (–0.3–1.8) mmol/l ($p = 0.032$) and mesenteric venous-arterial pCO_2 gradients from 12 (8–19) mm Hg to 21 (11–54) mm Hg ($p = 0.005$).

Conclusions: Peritoneal membrane microdialysis provides a method for the assessment of splanchnic ischaemia with a potential for clinical application.

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Elevated ICU mortality in medical patients with a pathologic procalcitonin plasma level and a diagnosis other than infection on admission

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Background: Procalcitonin (PCT) is an established marker of inflammation in systemic bacterial infections. Various conditions other than infection have been reported to also induce PCT elevation. PCT has not been evaluated as a prognostic marker in non-infected patients. Therefore, we prospectively measured PCT and C-reactive protein (CRP) blood values in an unselected population of critically ill patients admitted to our medical intensive care unit (ICU) during 4 months.

Methods: PCT and CRP plasma levels were measured on admission and then daily until discharge from the ICU or ICU day 3. Patients hospitalised for longer than 3 days before admission to our ICU were excluded. We used the homogeneous immunoassay for the determination of PCT (Kryptor, Brahms), upper limit of normal <0.5 ng/ml, and the immunoturbidimetry assay (Roche) for CRP, upper limit of normal <5 mg/l. The SAPS II score and associated probability of death was calculated for each individual patient.

Results: During the observation study 371 patients were admitted to our ICU, 253 (72 women) patients were included in our study. Median age was 60 years (IQR 50–73). The diagnosis on admission was infection in 30 of the 253 patients. The mean (SD) PCT levels was 68.7 (174) mg/L in infected and 3.0 ng/ml (12.1) in non-infected patients ($p < 0.001$). Corresponding CRP levels were 242 (108) mg/l and 92 (72) mg/l ($p < 0.001$), respectively. Among those patients without infection ($n = 223$) 40 had PCT value ≥0.5 ng/ml (18%) and 180 a CRP ≥5 mg/l (81%). The ICU mortality in non-infected patients with a PCT ≥0.5 ng/ml was 37% (15/40) compared to 4.4% (8/183) in those with a PCT value <0.5 ng/ml ($p < 0.001$). The ICU mortality in non-infected patients with a CRP ≥5 mg/l was 12% (21/180) compared to 5% (2/43) in those with a CRP value <5 mg/l ($p = 0.17$). Patients with a cardiac diagnosis and a PCT level ≥0.5 had a mortality of 42% compared to 10% in those with a CRP ≥5 mg/l. The SAPS II score predicted mortality for a PCT ≥0.5 ng/ml was on average 39% and for a CRP ≥5 mg/dl 18%.

Conclusions: In non-infected patients admitted to a medical ICU elevated PCT levels are frequent and are associated with elevated ICU mortality. Cardiacs compared to non-cardiac patients with a PCT ≥0.5 ng/ml are at a high risk of death. Our results suggest that in non-infected patients admitted in a medical ICU, PCT is the better prognostic maker than CRP.

Computer-driven ventilation reduces duration of weaning: a multicentre randomised controlled study

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Introduction: Weaning from mechanical ventilation has been improved by the introduction of protocols. A knowledge-based algorithm introduced in a ventilator may act as an automatic and continuous protocol and we thus hypothesised that this new method might hasten the whole weaning process.

Methods: We conducted a multicentre randomised controlled study to compare usual weaning protocols to computer-assisted weaning. The specific software was implemented in Dräger Evita 4 ventilators. This expert weaning system is fed with physiological variables (tidal volume, respiratory rate and endtidal CO_2) and continuously adapts the level of pressure support with the goals of: (a) keeping the patient in a respiratory "comfort zone"; (b) automatically decreasing the level of pressure support; (c) testing the patient's ability to breathe spontaneously (T-tube trial equivalent). In five universitary intensive care units, 145 patients in the very early stages of weaning were enrolled. Patients were managed either with the expert weaning system (n = 74) or with the weaning protocols applied in each centre (n = 71).

Results: Compared to usual weaning protocols, the expert weaning system reduced weaning duration from a median of 4 (2–8) days to 2 (2–6) days (p = 0.015), the total duration of mechanical ventilation from 9 (6–15) days to 6 (3–12) days (p = 0.020), the intensive care unit length of stay from 17 (9.5–33) to 12 (6.3–21.8) days (p = 0.018), and the need for post-extubation non-invasive ventilation from 36 to 19% (p = 0.0095). Fewer patients in the expert weaning system group remained under mechanical ventilation for more than 21 days (1 versus 9, p = 0.0074). No specific complications occurred with this expert system.

Conclusion: Computer-driven expert weaning system is safe, and, when compared to standard clinical protocols, can reduce the duration of mechanical ventilation and intensive care unit length of stay.

Grant acknowledgement: Material was supplied by Drager to the participating centres.

Peroxynitrite exerts a dual effect on nuclear factor kappa B: abbrogation of IKKbeta-dependent pro-inflammatory signalling concomitant to activation of NIK and IKKalpha phosphorylation

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Introduction: Peroxynitrite (PN) is a potent oxidant and nitrating species proposed as a direct effector of myocardial damage in numerous cardiac pathologies. Whether PN also acts indirectly, by modulating cell signal transduction in the myocardium, has not been investigated. We therefore examined a possible role of peroxynitrite on the activation of NF-kappaB (NF-κB), a crucial pro-inflammatory transcription factor, in cultured H9C2 cardiomyocytes.

Methods and results: H9C2 cells were stimulated with TNFalpha or LPS following a brief (20 min) exposure to PN. NF-κB activation (phosphorylation and degradation of its inhibitor IkappaB, nuclear translocation of NF-κB p65 and NF-κB DNA binding) triggered by LPS or TNF was abrogated by PN. PN also inhibited NF-κB in 2 human endothelial cell lines activated with TNF or IL-1beta. These effects were related to oxidative, but not nitrative chemistry, being still observed while nitration was suppressed by epicatechin. The mechanism of NF-κB inhibition by PN was a complete blockade of phosphorylation and activation of the upstream kinase IKKbeta, required for canonical, pro-inflammatory NF-κB activation. At the same time, PN activated phosphorylation of NIK and IKKalpha, known to be involved in an alternative, non canonical NF-κB pathway. Suppression of IKKbeta-dependent NF-κB activation translated into a marked inhibition of the transcription of NF-κB dependent genes by PN.

Conclusion: Thus, PN has a dual effect on NF-κB, inhibiting canonical IKKbeta-dependent NF-κB activation while activating NIK and IKKalpha phosphorylation, suggesting its involvement in an alternative pathway of NF-κB activation. These findings offer new perspectives in the understanding of the relationships between redox stress and inflammation.

Quality of life one year after ICU: are we able to predict it? Preliminary results

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Introduction: Research about the outcome of critically ills was mainly focused on mortality. Many instruments were created to predict this event. However, patients are more concerned about their future quality of life (QOL). Caregivers are often asked by patients or their families to describe how their future QOL would be. This question is often a central point in the therapeutic's decision process for patients, families and caregivers. We tested the accuracy to predict at ICU discharge the QOL of the patient at one year by physicians, nurses, families and patients.

Methods: We included all adults admitted to our surgical ICU, who stayed in the unit >36 h and signed the informed consent. We collected patients' demographic and admission data and the QOL before ICU admission, measured by the Euro-QOL visual analogue scale (EQ-VAS). This is a scale from 0 to 100 anchored at one end by 0 (worst imaginable QOL) and at the other end by 100 (best imaginable QOL). At ICU discharge we asked the patient, the family, the attending nurse and the senior physician, to predict the EQ-VAS of the patient at one year after ICU. After one year we re-contacted the patients to obtain their actual EQ-VAS.

Results: From 10/2002 to 11/2003 we screened 1400 and included 283 patients. We analysed 208 patients (33 died, 5 could not and 32 refused to respond). The mean (SD) age was 55 (± 18), 67% were men. The mean (SD) Charlson score was 1 (± 1.4). Causes of admission were for 41% cardiovascular, 22% trauma, 17% gastrointestinal, 11% neurosurgical and 9% miscellaneous. Their ICU length of stay was 3/0–90 (median/range) days. They were mechanically ventilated 5.3/0–573 hours (median/range). Patients had a mean (SD) EQ-VAS of 71 (± 26) before ICU admission and 72 (± 20) (p = NS) at one year after ICU.

The interclass correlations between the measured EQ-VAS at one year and the prediction by the patient (0.212), the family (0.217) and the nurse (0.256) were very bad, and even worse by physicians (0.105). The agreement (by Bland and Altmann) between the EQ-VAS at one year and the predictions by the patient, nurses and physicians was poor (–7 ± 47,–3 ± 49,+3 ± 53 respectively), slightly better by the family (–4 ± 23).

Conclusions: Caregivers should be very careful when informing patients or families about the future QOL of patients after ICU or when they try to integrate it in therapeutic decisions. Indeed, we are not able to predict with enough accuracy the QOL at one year after ICU.

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Therapeutic hypothermia after prolonged cardiac arrest due to pulseless electric activity/asystole

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Background: Therapeutic hypothermia (TH) is indicated to improve the outcome after prolonged cardiac arrest (CA) due to ventricular fibrillation (VF). However, whether this treatment can be of any benefit after CA secondary to non-VF rhythms is still uncertain.

Objective: We preliminary addressed this issue by analysing the effectiveness of TH in patients with prolonged CA due to pulseless electrical activity (PEA) or asystole.

Methods: Patients resuscitated after CA due to PEA/asystole with persistent coma at entry were treated according to our protocol of TH. All patients had strict haemodynamic monitoring with an intra-arterial and a Swan-Ganz catheter and received sedation, analgesia and paralysis. Mild hypothermia (to a central temperature of 33 °C) was induced with an external cooling method (ice packs + cooling mattress) and maintained for 18 hours. Feasibility (time needed to reach target temperature), safety (number of major complications during the treatment) and outcome at hospital discharge were assessed.

Results: 8 patients were studied, 3 had CA due to PEA (1 massive pulmonary embolism, 1 severe aortic stenosis, 1 coronary ischaemia) and 5 had CA due to asystole (1 acute myocardial infarction, 2 severe hypoxaemia, 1 malignant arrhythmia, 1 anaphylactic shock). Patient characteristics at admission to the emergency room are shown in table 1.

Table 1

characteristics	
patient number	8
age (years)	62.5 (± 10)
time from collapse to return of spontaneous circulation (min)	29 (± 4)
lactate (mmol/l)	10.6 (± 3.1)
pH	6.9 (± 0.1)
mean arterial pressure (mm Hg)	91 (± 26)
heart rate (beats/min)	122 (± 34)
shock before starting TH (%)	75

Data are means ± SD.

The median time to reach the target temperature of 33 °C was 4 hours. No major complications were observed during TH. However, all patients required inotropic and vasopressor support. Patient outcome at hospital discharge is depicted in table 2.

Table 2

type of CA	alive	dead	good outcome (%)
PEA	0	3	0
asystole	2	3	40
total	2*	6	25

* Alive with good neurological outcome = returned home with no/moderate disability.

Conclusions: Therapeutic hypothermia can be safely and effectively applied to patients with prolonged CA due to non-ventricular fibrillation rhythms. Our preliminary data indicate that it could have some benefit to improve outcome after CA due to asystole but not PEA.

Acute coronary syndrome and glucose metabolism: mortality and management

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Admission blood glucose level is a predictive factor of mortality in diabetic (DM) patients (pts) and in non-DM pts with acute myocardial infarction (AMI). In DM pts with AMI, mortality is 2-fold increased. However, a 30% reduction of 1-year mortality is obtained with insulin-glucose infusion in acute phase of AMI and 3 months of intensive insulin therapy. Recently, a study showed that, with intensified treatment in DM pts, hospital mortality after AMI is comparable to that of non-DM pts. In this retrospective study, we evaluated, in pts admitted to the Intensive Care Unit (ICU) for an acute coronary syndrome (ACS), the prevalence of glucose intolerance and compared the management and hospital mortality in DM pts and in non-DM pts.

Medical records of 442 pts admitted to ICU in 2003 were evaluated; 180 pts were excluded (transfer, ACS third diagnosis, re-hospitalisation). Definition of DM, glucose intolerance (GI) and controls (CL) was done with random venous glycaemias (during complete hospitalisation), according to WHO: DM ≥11.1 mmol/l or previous antidiabetic treatment; GI ≥7.8 mmol/l and <11.1 mmol/l; CL ≤7.8 mmol/l. Therapeutic approaches, median glycaemia in ICU and hospital mortality were evaluated.

Two hundred and sixty-two pts were included, aged 65 ± 14 years, 73% men. Eighty-one were DM pts (31%), 86 GI (33%) and 92 CL (36%). Hospital mortality was 18% in DM pts, 6% in GI pts (OR = 3.0, p = 0.02) and 1% in CL pts (OR = 16.3, p <0.0001). In multivariate analysis matched for age and sex, DM was an independent predictive factor of mortality. In DM pts, 86% underwent coronary angiography, vs 97% of CL pts (p = 0.01). Two- or 3-vessel disease was present in 60% of DM pts vs 52% of CL pts (p = NS). A coronary bypass was performed in 15% of DM pts vs 1% of CL pts (p = 0.001). In ICU, median glycaemia of DM pts was 8.2 mmol/l (5.8–13.4) the 1st day and 7.7 mmol/l (5.3–10.4) the 2nd day. The 1st day in ICU, 28% of DM pts did not receive insulin. At hospital discharge, 34% of DM pts did not have insulin treatment, and diagnosis was not mentioned on the discharge letter in 29% of DM pts and 83% of GI pts.

Hospital mortality after an ACS was 16-fold increased in DM pts compared to CL pts. Diabetes and glucose intolerance were not accurately recognised and hence not treated accordingly to current guidelines. In pts with ACS, diagnosis of diabetes should be improved and insulin therapy intensified to decrease the high mortality linked to this metabolic condition.

Peroxynitrite triggers the cleavage of caspase-3 and PARP in cardiomyocytes: new insights into the mechanisms of peroxynitrite-dependent cytotoxicity

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Introduction: Peroxynitrite (PN) is a potent oxidant considered as a potential culprit of myocardial damage in a wide array of cardiac pathologies. The mechanisms of PN-mediated cytotoxicity are not fully understood and most data so far indicate that PN triggers cell death via the necrotic pathway, through the induction of DNA damage and activation of the NAD-consuming enzyme poly(ADP-ribose) polymerase (PARP). Whether PN elicits alternative modes of cell death in myocardial cells remains largely unknown. We therefore designed the current study to evaluate the possibility that PN might induce apoptosis rather than necrosis in cultured H9C2 cardiomyocytes.

Methods: Cell were briefly (20 min) exposed to authentic or decomposed PN (100–500 μM in PBS), and were then returned to cell culture medium for periods ranging from 2 to 6 h. Cell viability was assessed by the MTT assay. Apoptosis was evaluated by the detection of cytoplasmic ologonucleosomes and the cleavage of caspase-3 and PARP, two central apoptotic effectors.

Results: Our results show that (1) PN, but not decomposed PN, elicits necrotic cell death in a time- and concentration-dependent way; (2) cytotoxicity of PN is associated with the cleavage of caspase-3, starting at 2 h and increasing up to 6 h, and (3) PN induces the cleavage of PARP at 3 and 6 h after stimulation.

Conclusion: These preliminary data indicate that PN is a potent inducer of the apoptotic machinery in H9C2 cardiomyocytes, and contrary to previous belief that PN only induces cell death by activating the *enzymatic activity of PARP*, our results provide the first experimental demonstration that PN also triggers the *cleavage of PARP*. Ongoing studies are more thoroughly investigating the signalling cascade leading to caspase-3 and PARP cleavage in response to PN in H9C2 cardiomyocytes.

Adrenal insufficiency in patients with septic shock: incidence and outcome

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Background: There is a consensus for administration of low doses of corticosteroids to patients with septic shock (sepsis surviving campaign). However, published data suggest that only non-responders to ACTH-stimulation (relative adrenal insufficiency) would benefit of such a treatment.

Objectives: To determine the incidence of relative adrenal insufficiency among patients admitted to our ICU with septic shock, as well as its impact on 28-day mortality.

Methods: Retrospective study searching for ACTH-stimulation test on patients admitted with septic shock between January 2003 and December 2004. Relative adrenal insufficiency is defined as an increase of <250 nmol/l of basal cortisol after an iv injection of 250 μg of ACTH.

Results: 126 patients were treated for septic shock during this two-year period (56 in 2003, mortality 30%, 70 in 2004, mortality 27%). Overall >60% of patients were given corticosteroids, although only 38 ACTH-stimulation tests (30% of patients) were performed (20 in 2003 and 18 in 2004). Among these 38 patients, 28-day mortality was 45%. Incidence of relative adrenal insufficiency was 22/38 (58%), with a 28-day mortality of 12/22 (55%). In contrast, only 5 out of 16 patients without relative adrenal insufficiency (31%) were dead at 28 days.

Conclusions: In our institution, while a majority of septic shock patients received corticosteroids, investigation for adrenal insufficiency was done only in one third of patients, for as yet undetermined reasons. Among patients undergoing the ACTH test, 58% were non-responders, in accordance with previously published data. Mortality among non-responders was higher than among responders in spite of the administration of corticosteroids, suggesting that relative adrenal insufficiency may be considered as an early prognostic marker of mortality in septic shock.

Utilité du CT cérébral de perfusion dans l'évaluation du patient pédiatrique lors de TCC sévère

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Introduction: L'évaluation de la perfusion cérébrale chez l'enfant présentant un traumatisme crânio-cérébral pourrait devenir un outil pronostique et thérapeutique important. Le CT de perfusion, dont la réalisation dure 35 s, complètent le CT standard; les paramètres calculés sont le volume sanguin cérébral régional (rCBV), le temps de transit moyen (MTT) et le débit sanguin cérébral régional (rCBF), donnant une évaluation quantitative de la perfusion cérébrale. Nous avons déjà publié les valeurs normales chez l'enfant de 7 jours à 18 ans.

But de l'étude: Evaluer l'utilité du CT de perfusion chez les enfants présentant un TCC sévère.

Résultats: A ce jour, 5 patients d'un âge moyen de 7,3 (± 2,7) ans, ont bénéficié d'un CT de perfusion pour un TCC, dont 4 secondaires à un accident de circulation et 1 à la réception sur le vertex d'une plaque de fonte. Le GSC est bas (3–4) chez 2 patients. Pour l'un (GSC 3), le CT de perfusion montre une diminution des trois paramètres, en regard d'une large zone de contusion intra parenchymateuse sur le CT standard. Ce patient est dans un état neurovégétatif, par refus des parents d'arrêter les soins. Pour l'autre (GSC 4, décès à J3), le CT révèle une diminution nette des rCBV et rCBF et une augmentation du MTT en regard d'une large zone d'ischémie frontal-pariétale G. Les 3 autres patients présentent un TCC modéré (GSC 9–15). Pour celui avec une fracture embarrée du vertex, le CT montre une augmentation du MTT et du rCBV compatible avec une stase veineuse secondaire à une compression du sinus longitudinal. Ces valeurs se normalisent après désembarrure. Le 4e patient bénéficie d'un CT suite à une péjoration secondaire; les rCBV et rCBF sont diminués et le MTT allongé en regard d'une contusion frontale D. Les images standard et de perfusion se révèlent normales chez le dernier patient dont l'évolution est favorable.

Conclusion: Chez ces 5 patients, une concordance entre les images standard et le CT perfusion est observée chez ce petit groupe de patients. Une évaluation plus large de cette nouvelle technique reste nécessaire.

Craniectomie de décompression chez l'enfant: l'expérience lausannoise

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Introduction: La pratique de la craniectomie de décompression chez l'enfant lors d'hypertension intracrânienne, notamment lors de traumatisme crânio-cérébral sévère reste en phase d'évaluation en terme de devenir neurologique. Un premier consensus semble toutefois se dessiner sur la nécessité d'une ouverture large et unilatérale de la boîte crânienne pour qu'elle soit efficace et non délétère. Nous présentons ici l'expérience lausannoise de cette nouvelle approche chez l'enfant.

Résultats: A ce jour, 9 patients d'un âge moyen de 8,4 (± 7,0) ans, ont bénéficié d'une craniectomie de décompression, 6 secondairement à un traumatisme crânio-cérébral sévère, 2 suite à une cérébellite aiguë et 1 en raison d'un AVC sylvien gauche massif. Parmi les 6 patients ayant subi un TCC, tous avaient un GSC bas à l'admission (3–4). Deux sont décédés; le premier avait une valeur de PIC initiale à 45 et a subi une craniectomie occipitale relativement étroite et a évolué en mort cérébrale; le deuxième patient avait une pression intracrânienne initiale à 100, diminuant à 75 seulement après la craniectomie. Chez les survivants, un patient a subi une craniectomie fronto-pariétale en raison d'une hypertension intracrânienne avec des valeurs de PIC à 40 à la pose du capteur. Il vit actuellement en état neurovégétatif suite au refus des parents d'arrêter les soins. Enfin, les trois derniers patients, ont tous présentés des PIC initiales inférieures à 40, mais avec une élévation rapide au-delà de 70 pour deux d'entre eux avant la craniectomie. Le suivi de ces trois patients révèle une évolution favorable avec des GOS de 4 à 5. L'évolution des deux patients ayant présenté une cérébellite avec des signes importants d'hypertension intracrânienne ont bien évolué et leur GOS est évalué à 5 pour les deux. Enfin la patiente ayant bénéficié d'une craniectomie de décharge suite à un AVC avec œdème cérébral secondaire très important présente actuellement un GOS à 4.

Conclusion: Chez ces 9 patients, une craniectomie de décompression a permis une survie chez 7 d'entre eux, dont 6 avec des séquelles neurologiques mineures ou sans séquelles.

Are terminally ill patients dying in the ICU suitable non-heart beating organ donors (NHBOD)?

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Introduction: There is emerging evidence that ICU patients not developing the criteria of brain death, but dying of catastrophic neurological illness can provide kidneys with acceptable function for transplantation after they die of cardiac arrest (so called controlled NHBOD). There is, however, little information regarding practical aspects of patient management during the phase of treatment withdrawal, although centres practising this approach usually restrict the delay between treatment withdrawal and cardiac death to one hour.

The aim of the present study was to analyse how patients potentially eligible for NHBOD are managed in our surgical ICU. We specifically aimed to evaluate the time spent between therapy withdrawal and cardiac arrest to evaluate the feasibility of this approach, hence the opportunity to consider implementing such a program in our institution.

Method: Analysis of data from the electronic clinical information system for consecutive patients younger than 80 years, with a severe brain injury, dying in the ICU after withdrawal of support between 2002 and 2004.

Results: Treatment was withdrawn for neurological reason in 47 of 227 deceased patients. These patients survived 5.5 (0.1–38) hours (median [range]). 17% died during the first hour, 25% after 2 hours, 50% after 6 hours. Glasgow coma score at the time of treatment withdrawal amounted to 3 in 75%, and to 4 in 15%, confirming the severity of their neurological problem. 72% received morphine infusion (0.1 ± 0.09 mg/kg/hour), and 30% received i.v. sedation (midazolam or propofol). 50% were extubated during the withdrawal process. 50% were hypotensive (mean arterial pressure <60 mm Hg) one hour before cardiac death, 66% 30 minutes before, and 80% were hypotensive 10 minutes before death.

Discussion: 20% of patients dying in our ICU were retrospectively identified as potential non-heart beating organ donors. However, the delay between treatment withdrawal and cardiac death was considerable, and it may limit the feasibility of organ procurement in this category of patients. We speculate that this finding may be related to our current practice of avoidance of heavy sedation in terminal, deeply comatose patients.

Gentamicin pharmacokinetics in PICU: new dosing guidelines

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Aim: The purpose of this study was to produce guidelines for individual dosing of gentamicin for paediatric intensive care patients to achieve adequate peak levels and low trough levels to avoid drug retention and toxicity.

Material and methods: We studied 16 patients aged 2 d–15 y receiving gentamicin in paediatric intensive care. A plasma concentration profile was obtained by measuring 6–10 levels between 10 min and 24 hrs after injecting a 7.5 mg/kg dose of gentamicin intravenously over 4–10 min. Gentamicin was measured by immunoassay. A 2- or 3-compartment model was fitted.

Results: A smooth plasma disappearance curve was obtained in all cases, which did not become mono-exponential until at least 2–6 hrs post injection. Volume of distribution was high (0.35–0.81 l/kg) and elimination very variable (clearance 0.6–3 ml/kg/min, final half-time 2–16 hrs). 60-min levels were 11–17 mg/l. Some extra-cellular fluid compartments have a delayed and lower peak level (mathematically modelled). Single compartment kinetics were not obeyed.

Conclusions: A dose of 7.5 mg/kg results in adequate peak levels in all patients. Two levels timed at approximately 6 and 10 hours after the first dose will predict final plasma decay and determine the correct dose interval for the individual. Dose interval sometimes needs to be more than 24 hours, especially in infants. The time has come to abandon the practice of doing peak and trough levels after the third or fourth dose if effective and safe dosing is to be achieved.

Pressure-volume relationship in different recruitment manoeuvres in ventilated sheep

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Background: Outcome in acute respiratory distress syndrome (ARDS) has improved with newer ventilation strategies. The 'open lung approach' is advocated to improve outcome but controversy exists on how to optimally recruit lungs.

Methods: 13 ventilated sheep were exposed to smoke inhalation injury. 5 different pressure-volume manoeuvres with identical top pressure (45 cmH_2O) were performed pre and post injury: (I) conventional dynamic pressure-volume curve (PV); (II) continuous inflation with stepwise deflation (sPV); (III) deflation to and re-inflation from stepwise increasing pressure levels (rePV); (IV) deflation to and re-inflation from stepwise decreasing pressure levels (rePVrev); and (V) super syringe technique with stepwise increase/decrease in volume (SS). Only pressure/volume relationships on the deflating limb were considered for analysis. Results are presented as additional recruited volume compared to PV.

Results: SS resulted in significantly less recruitment at all pressures pre and post smoke inhalation. sPV improved recruitment compared to PV <27 cmH_2O (pre) and <21 cmH_2O (post). rePV improved recruitment >9 cmH_2O (pre and post). rePVrev increased volumes at all pressures (pre) and <21 cmH_2O (post). Differences in recruited volumes are significantly larger pre compared to post smoke inhalation.

Conclusion: The 5 recruitment manoeuvres showed significant differences in recruited volumes on the deflation limb. Pressure-regulated recruitments (PV, sPV, rePV, rePVrev) compare favourably to volume-regulated manoeuvres (SS). Inflation/deflation manoeuvres (rePV, rePVrev) result in best recruitment whereas rePVrev seems to be superior in the clinically relevant pressure range. Time of exposure to a certain pressure proves to be crucial to improve recruitment but does not seem to be the only factor. Long-term effects of these findings need yet to be determined.

A new smoke inhalation model for acute lung injury in ventilated sheep

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Background: Smoke inhalation can cause acute lung injury, which is characterised by severe ventilation maldistribution. In the past systems delivering smoke inhalation were cumbersome and their effect hardly reproducible. A new highly reproducible smoke inhalation model in ventilated sheep is presented.

Methods: Smoke was generated within a closed circuit comprising a one way inlet valve, a plexiglass cylinder with a sliding piston and a perforated iron plate. The iron plate was heated to 750 degrees and placed into the circuit on top of layers of cotton. A tidal volume of 200 mL was generated by manually displacing the piston. Six sheep were exposed to the smoke of 48 g of cotton. Carboxy haemoglobin (COHb) levels were measured pre and post smoke inhalation. Change of ventilation distribution was assessed using a multiple breath sulfur hexafluoride washout calculating lung clearance index (LCI) and using electrical impedance tomography (EIT). Sheep were ventilated with 3 cmH_2O of PEEP for two hours and lung function repeated.

Results: Mean COHb 5 minutes after smoke inhalation was 57% (range 50–67%). End expiratory lung volume decreased from 1.15 ± 0.21 L (SE) pre smoke inhalation to 0.69 ± 0.14 L ($p < 0.05$) two hours after smoke. LCI increased from 12.0 ± 0.40 to 15.4 ± 1.9 ($p < 0.05$) post smoke. EIT images demonstrated a shift of ventilation distribution from dependent to independent lung.

Conclusion: A highly reproducible acute injury could be obtained with high COHb post smoke exposure. The smoke inhalation also caused a highly reproducible ventilation maldistribution. In contrast to any surfactant depletion by lung lavage the proposed smoke inhalation model is a "real world" model.

Overexpression of connexin 40 associated with recovery from endothelial dysfunction in the aorta of septic rats

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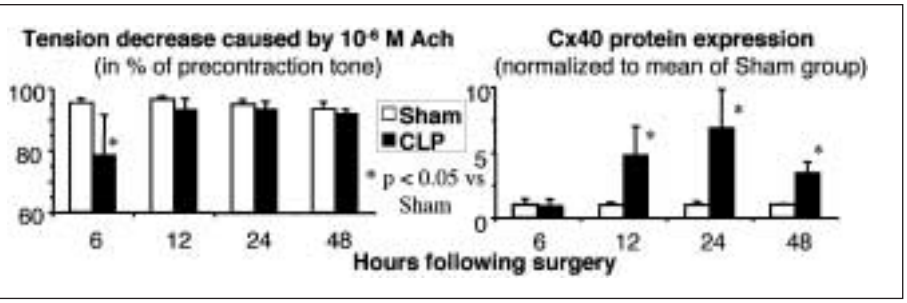
Introduction: Connexins (Cx) are protein constituents of gap junctions, membrane channels which allow adjacent cells to exchange small molecules and electrical signals. The vascular endothelium expresses several Cx, among which Cx40. We have previously reported that the sepsis induced in the rat by cecal ligation and puncture (CLP) causes an overexpression of Cx40 in the aortic endothelium, but the possible functional meaning of this observation is unknown. Sepsis is classically associated with endothelial dysfunction, i.e. a decreased ability of the endothelium to elicit relaxation of the underlying vascular smooth muscle. The present study was designed to test for a possible parallelism in the time-courses of aortic endothelial dysfunction and abnormal Cx40 expression in rat CLP.

Methods: Male adult Wistar rats underwent either CLP or a *Sham* operation and were sacrificed 6, 12, 24, or 48 hours (h) later. The thoracic aorta was divided into two parts, one for the determination of protein Cx40 expression (Western blot) and the other for the *in vitro* evaluation of endothelium-dependent relaxation to acetylcholine in vascular rings precontracted with phenylephrine.

Results: At 6 h, sepsis clearly induced endothelial dysfunction but did not change Cx40 expression. The reverse was true at all

Figure 1



later time-points (fig. 1; mean ± SE, n = 4–5 rats per group, * p <0.05 vs Sham).

Conclusion: In this model of sepsis, aortic endothelial dysfunction occurs early and transiently. Its subsequent correction is associated with a marked elevation of aortic Cx40 overexpression. We speculate that Cx40 overexpression may have an adaptive value in these conditions.

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Preload and blood flow assessment using PAC and PiCCO in patients with heart failure and sepsis

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Background: Haemodynamic monitoring based on transpulmonary thermodilution technique (PiCCO) is rapidly gaining popularity as an alternative to the more invasive pulmonary artery catheter (PAC). However, there is still limited experience with the PiCCO in particular clinical settings such as heart failure (HF).

Methods: We retrospectively analysed haemodyamic measurements from 6 patients with HF and 9 patients with sepsis monitored simultaneously using the PiCCO-device (Pulsion Medical System, Germany) and a PAC (Baxter Healthcare, USA). The following measurements of blood flow and preload were analysed: cardiac index (CI-PAC and CI-PiCCO), cardiac function index (CFI = CI / GEDI, normal 4.5–6.5 min^{-1}), pulmonary artery occlusion pressure (PAOP), global end-diastolic volume index (GEDI). Results are given as median (range) or mean (± SD).

Results: There were 75 and 64 simultaneous haemodynamic measurements in patients with HF and sepsis, respectively. The average length of combined recordings per patient was 4 (1–13) days. Using PAC the CI in HF and sepsis patients were 3.0 (± 0.9) and 4.5 (± 1.4) l/min/m^2 (p <0.001), and the PiCCO 3.1 (± 0.9) and 4.8 (± 1.6) l/min/m^2 (p <0.001), respectively. The CFI in HF patients was 3.5 (± 1.8) and 5.9 (± 1.9) min^{-1} in septic patients (p <0.01). The bivariate correlation coefficient between CI-PAC and CI-PiCCO was r = 0.88 (p <0.001) in both, patients with HF and sepsis. In septic patients we found a positive correlation between CI-PiCCO and GEDI (r = 0.31, p = 0.012), but a negative correlation (r = –0.35, p = 0.003) in HF patients. Inverse correlations were found between CI-PAC and PAOP for both, HF (r = –0.70, p <0.001) and sepsis (r = –0.28, p = 0.027). GEDI and PAOP did not correlate in both groups.

Conclusions: Our results confirm an excellent correlation between CI assessed by PAC and PiCCO in patients with HF or sepsis. The inverse relationships between CI-PAC and PAOP, and CI-PiCCO and GEDI in patients with HF suggest a dilated heart with impaired myocardial compliance, whereas in septic patients the direct relationship between CI-PiCCO and GEDI indicates volume deficiency. Thus, GEDI is a valuable marker of preload only in septic and not in HF patients.

Flagellin from gram-negative bacteria is a potent mediator of pro-inflammatory signalling in cardiomyocytes

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Introduction: Flagellin (FLAG) is a 55 kDa monomer obtained from bacterial flagella, a polymeric rod-like appendage extending from the outer membrane of gram-negative bacteria. Recent studies indicated that FLAG may induce pro-inflammatory responses in vitro, mediated via the Toll-like receptor 5 (TLR5). Gram-negative sepsis is associated with myocardial failure, which is related to myocardial cytotoxicity and inflammation triggered by putative circulating mediators. Whether FLAG may exert such a cytotoxic role during gram-negative sepsis has not been evaluated. Thus, the aim of the present study was to explore a potential role of FLAG as an inducer of cardiomyocyte inflammation.

Methods: H9C2 rat cardiomyocytes were stimulated with recombinant *Salmonella* FLAG (1–100 ng/ml). The amount of contaminating lipopolysaccharide (LPS), another product from gram-negative bacteria, was negligible (<0.2–20 pg/ml). Pro-inflammatory effects of FLAG were evaluated by its ability to activate nuclear factor kappa B (NF-κB), a crucial pro-inflammatory transcription factor. NF-κB activation was monitored by the degradation and phosphorylation of its cytoplasmic inhibitor IkappaB (western blotting), the nuclear translocation of the p65 subunit of NF-κB (western) and the transcription of a transfected reporter gene (NF-κB-luciferase gene reporter assay). We also determined whether H9C2 cardiomyocytes express the FLAG receptor, by evaluating the level of TLR5 mRNA by PCR.

Results: FLAG induced a strong activation of NF-κB, already at a concentration as low as 1 ng/ml. These effects were not due to contaminating LPS. FLAG most probably acted via TLR5, as H9C2 cells disclosed a strong transcription of TLR5 mRNA.

Conclusion: Flagellin is a potent mediator of pro-inflammatory signalling in cardiomyocytes, and may thus represent a novel and previously unrecognised mediator of myocardial failure during gram-negative sepsis.

Fahrtauglich mit einem $PaCO_2$ von 23 kPa?

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Frau B., 1934, leidet seit Jahren an einem schweren alveolären Hypoventilationssyndrom bei COPD und restriktiver Ventilationsstörung bei Status nach Radionekrose der Thoraxwand mit plastischer Rekonstruktion. Sie steht unter Langzeitsauerstofftherapie über einen SCOOP-Katheter sowie nächtlicher nicht-invasiver Beatmung über eine Gesichtsmaske. In der Vergangenheit waren wiederholt schwere hyperkapnische respiratorische Dekompensationen aufgetreten. Sie ist in regelmässiger pneumologischer Kontrolle. Der betreuende Pneumologe zog die Fahrtauglichkeit der Patientin in Zweifel und verlangte eine verkehrsmedizinische Beurteilung durch ein Institut für Rechtsmedizin. Dort wurde der Patientin volle Fahrtauglichkeit bescheinigt. Im Rahmen ihrer Hyperkapnie verlor die Patientin am 3.1.05 die Kontrolle über ihren Wagen und verursachte einen Selbstunfall. Bei der komatösen Patientin betrug der $PaCO_2$ 23 kPa (Referenzwert 4–6 kPa), ein Wert, der für viele Menschen tödlich sein kann.

Betreffend Fahrtauglichkeit im Alter müssen sich, laut Gesetz, über 70jährige Patienten alle 2 Jahre einer medizinischen Untersuchung unterziehen, wobei die kognitiven, auditiven, visuellen und neuropsychologischen Fähigkeiten überprüft werden. In der Verkehrszulassungsverordnung steht ebenfalls als medizinische Mindestanforderung das Fehlen von periodischen Bewusstseinstrübungen oder -verlusten. Im Alltag gelten als klar nicht fahrtauglich Patienten mit aktiver Epilepsie, Diplopie sowie gehörlose einäugige Patienten. Im Gegensatz dazu wird bei Patienten mit Einäugigkeit oder einseitiger Erblindung (Visus mindestens 0,8, korrigiert oder nicht korrigiert) volle Fahrtauglichkeit erteilt. Im Falle einer fraglichen Fahrtauglichkeit, wie zum Beispiel nach zerebrovaskulärem Insult, wird je nach Situation mit dem Spezialisten Rücksprache genommen oder sogar mit den kantonalen Behörden. Auf jeden Fall darf das Erteilen der Fahrtauglichkeit nicht erfolgen, wenn körperliche oder geistige Krankheiten vorhanden sind, die das sichere Führen eines Motorfahrzeuges gefährden (SVG Art. 14).

In der Literatur wird über gehäufte Autounfälle im Rahmen folgender Krankheiten

berichtet: Demenz, Diabetes und kardiovaskuläre Erkrankungen. Ebenfalls nicht zu vergessen sind die Medikamente, wie zum Beispiel Benzodiazepine, Angiotensin-converting-Enzyme Hemmer, NSAR und orale Antikoagulantien. Gewisse Krankheiten wurden bezüglich vermehrter Autounfälle genauer studiert: So wurde zum Beispiel eine signifikante Abnahme von Autounfällen bei Patienten mit Schlaf-Apnoe-Syndrom beobachtet, wenn sie mit nächtlicher CPAP behandelt wurden.

Betreffend unserer Patientin mit einer CO_2-Narkose bei schwerem alveolärem Hypoventilationssyndrom bestand eine chronische Erkrankung mit hoher Gefahr für periodische Bewusstseinstrübungen, was per se, laut Gesetz, zum Entzug des Führerscheins hätte führen sollen. Gewisse chronische Krankheiten können Patienten und Drittpersonen erheblicher Gefahr aussetzen, weshalb der Entzug des Fahrausweises nicht nur dem Selbstschutz dient.

Bedürfnisse von Angehörigen auf der Intensivstation – Entwicklung eines Fragebogens

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Hintergrund/Ziel: Die primären Ziele der intensivmedizinischen Betreuung eines Patienten sind Überleben und Lebensqualität. Ein weiterer wichtiger Aspekt ist die Zufriedenheit von Patienten und deren Angehörigen mit der ärztlich-pflegerischen Betreuung [1]. Validierte Fragebogen zur Erfassung der Bedürfnisse und Zufriedenheit von Angehörigen wurden für Nordamerika entwickelt [2, 3]. In Europa gibt es, ausser in Frankreich [4], keine entsprechenden Instrumente. Ziel der vorliegenden Studie ist die Entwicklung und Validierung eines deutschsprachigen Fragebogens zur Erfassung der Bedürfnisse und Zufriedenheit der Angehörigen von kritisch kranken Patienten.

Methodik: Von einem validierten, kanadischen Fragebogen [2] wurde durch Übersetzung und Rückübersetzung eine erste deutsche Version erstellt. Um die Gültigkeit *(validity)* dieser Version zu prüfen, wurde der Fragebogen Patienten, Angehörigen, Pflegefachpersonal und Fachärzten für Intensivmedizin vorgelegt. Es wurden Bezug zum Thema *(face validity)*, Verständlichkeit sowie Relevanz für Schweizer Kultur geprüft. Daneben wurde nach Inhalt und Länge des Fragebogens *(content validity, coverage)* und nach dem Gesamteindruck gefragt.

Resultate: 39 zurückgesandte Fragebogen konnten analysiert werden.

Umfang *(coverage)*

absolut oder weitgehend vollständig	82,0%
unvollständig	2,6%
keine Antwort / weiss nicht	15,4%

Verständlichkeit insgesamt

*	90,0%

Relevanz für Schweizer Kultur

*	85,5%

Gesamteindruck

ausgezeichnet oder sehr gut	71,8%
genügend	10,3%
ungenügend oder schlecht	5,1%
keine Antwort / weiss nicht	12,8%

* Nur der Anteil «ausgezeichnet» oder «sehr gut» ist aufgeführt.

Diskussion: Die vorliegende deutsche Version des Fragebogens ist betreffend Gültigkeit *(validity, coverage)* optimiert. Im Vergleich zur Originalversion [2] wurden weder Fragen gestrichen noch hinzugefügt. Alle Fragen mit einer Zustimmung betreffend Verständlichkeit oder Relevanz <90% und solche mit Kommentaren wurden diskutiert. 13 Fragen wurden zur Verbesserung der Verständlichkeit umformuliert.

Interne Konsistenz *(construct validity)*, Reliabilität *(reliability)*, Sensitivität *(sensitivity)* und Machbarkeit *(feasibility)* werden im zweiten Teil dieses Projektes überprüft.

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Effect of heliox on inspiratory effort and work of breathing in intubated COPD patients during weaning with pressure support

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Introduction: Heliox can reduce intrinsic PEEP (PEEPi) and work of breathing (WOB) in both spontaneously breathing and mechanically ventilated COPD pts.

Purpose: To determine the impact of heliox in COPD pts ventilated in pressure support (PS) during weaning.

Methods: 10 intubated patients in PS mode sequentially breathing (45 min each): (1) air-O_2; (2) heliox; (3) air-O_2. Level of PS (14 ± 3.4 cmH_2O) and FIO_2 (0.33 ± 0.06) were maintained constant throughout the protocol.

Measurements: Respiratory rate, tidal volume, oesophageal (DPes) and transdiaphragmatic (DPdi) pressure changes, oesophageal pressure-time product (PTPes/min), total WOB/min, PEEPi (table 1).

Conclusion: In intubated COPD patients undergoing PS during weaning, replacing air-O_2 by heliox reduces the level of PEEPi, the number of ineffective inspiratory efforts, the magnitude of inspiratory efforts and the total WOB, for the same minute volume. Heliox could thus prove useful in difficult-to-wean COPD patients.

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Table 1

results: mean (SD)	*air-O_2 1*	heliox	air-O_2 2
resp. rate *n/min*	24 (6)	19 (5)*	23 (5)
ineffective breaths *n/min*	9 (5)	4 (5)*	6 (4)
tidal volume *ml*	601 (228)	621 (276)	611 (258)
minute volume *l/min*	9 (3)	8.3 (5)	9.4 (3)
PEEPi *cmH_2O*	5 (3)	4 (3)*	5 (3)
DPes *cmH_2O*	9 (5)	7 (2)*	9 (5)
DPdi *cmH_2O*	7 (6)	6 (2)*	7 (5)
PTPes/min *$cmH_2O.s/min$*	67 (65)	42 (37)*	70 (66)
WOB/min *J/min*	4 (5)	2 (1)*	4 (6)

* $p < 0.05$ vs air-O_2 1 and 2

Prediction of outcome in paediatric acute hypoxaemic respiratory failure

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Background: Various respiratory indices are used to assess severity of acute hypoxaemic respiratory failure (AHRF). Usefulness of these parameters for outcome prediction in children is controversial.

Study Design: Prospective observational cohort study.

Methods: Ventilator settings and arterial blood gases were recorded for all patients meeting entry criteria ($FiO_2 \geq 0.5$ with PEEP $\geq$6 mm Hg for $\geq$12 hours required for adequate oxygenation). Exclusion criteria were congenital or acquired heart disease, age <1 month, and severe mental retardation. Oxygenation Index (OI = MAP*FiO_2/PaO_2), alveolo-arterial O_2 difference (A-aDO_2 = FiO_2*(P_{atm}–P_{H20}) – $PaCO_2/0.8$–PaO_2), and P/F-ratio (PaO_2/FiO_2) were calculated. Primary study endpoints were death on the ventilator or survival to extubation. Statistical analysis was done by competing risks analysis and multiple logistic analysis.

Results: 131 patients (2.3% of the population) fulfilled entry criteria, mean age 4.9 years (range 1 month to 18 years), 55% boys. Overall mortality was 27.5%. OI measured at any point in time and PRISM score assessed within 12 hours of intubation were identified as independent predictors of mortality. While A-aDO_2 and P/F-ratio were also related to mortality, the relationship was not as strong as with OI. Survival to extubation peaked at about one week with a more gradual decline thereafter, whereas death appeared as a constant risk over time.

Conclusion: Mortality of paediatric AHRF has improved compared to previously published data [1]. Severity of AHRF assessed by OI predicts outcome in a time-independent manner. A-aDO_2 and P/F-ratio may be less suitable surrogate markers for outcome prediction.

Literature

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Incidence of ethical decisions on an intensive care unit

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Background: In contrast to medical diagnoses, no data on the incidence of ethical decision making on intensive care units (ICU) are available. The aim of the present study was to determine the frequency and the kind of ethical decision making on our ICU.

Methods: We analysed all patients hospitalised on our medical ICU from July to September 2004. We defined three categories of ethical decision making: "starting decisions", "limiting decisions" and "withdrawal decisions". Starting decisions were defined as decisions during the first 24 hours of the ICU stay about non-invasive or invasive ventilation, haemodynamic support, haemofiltration or medical therapy. Limiting decisions were defined as decisions about limiting the abovementioned activities beyond the first 24 hours of the ICU stay. Withdrawal decisions were defined as decisions about withdrawing life-supporting therapies during any time of the ICU stay. We registered whether the patient was able to communicate his/her preferences, whether a written or verbal directive was available, or whether the patient's preferences were not known at all.

Results: In 48 of 256 patients (18.8%; mean age 66 ± 17 years, 29 men) ethical decisions were taken. Starting decisions were made in 27 patients (artificial ventilation 12, vasoactive agents 1, other drugs 1, haemofiltration 1, all activities 12). In 24 patients, limiting decisions occurred (ventilatory support 9, vasoactive agents 2, haemofiltration 2, drugs 2, all activities 9), and they took place after 3.5 ± 3.4 days (range 2–14 days) of ICU stay. Withdrawal decisions were made in 13 patients, after 8 ± 8.5 days (range 1–25 days). Thirteen of 48 patients (27%) were able to communicate their preferences, 7 (14.5%) patients had a verbal directive, and no patient had a written one. In the remaining 28 patients (58%) nothing was known about their preferences. Twenty-one of the 48 patients (43%) died during hospitalisation, and mean duration of ICU stay was 13 days (range 1–73).

Discussion: Ethical decisions are frequent on our ICU, occurring in almost one fifth of our patients. Approximately 40% of the patients concerned are either able to communicate their preferences, or have done so orally or in writing prior to hospitalisation. In approximately 60% of patients nothing is known about their preferences.

Oral sildenafil alone and combined with inhaled iloprost significantly improves acute haemodynamics in pulmonary hypertension

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Objective: To assess the acute haemodynamic effect of oral sildenafil alone and combined with inhaled iloprost in patients with severe pulmonary hypertension.

Methods: We assessed pulmonary haemodynamics using a flow-directed Swan-Ganz-Catheter in 11 patients (3 women, mean age 57 ± 18 years) with severe pulmonary hypertension in WHO functional class III and IV. Pulmonary haemodynamic was measured at BL and 60 minutes after the oral intake of 50 mg sildenafil. Thereafter, patients inhaled iloprost (10 µg) and pulmonary haemodynamics were reassessed 30 minutes after inhalation was started. Cardiac index was measured by thermodilution. To assess selectivity of pulmonary vasodilatation and the effect on gas exchange using standard formulas we calculated the ratio between pulmonary and systemic vascular resistance (PVR/SVR) and the pulmonary shunt fraction (Qs/Qt), respectively.

Results: After sildenafil alone, we found a significant reduction of mean pulmonary artery pressure (mPpa) from 50.7 ± 23.6 to 44.6 ± 20.7 mm Hg ($p = 0.009$) and PVR from 690 ± 330 to 513 ± 280 dyn.s.m^{-5} ($p = 0.003$), and an increase in CI from 2.6 ± 0.4 to 3 ± 0.6 l.min^{-1}.m^2 ($p = 0.012$). PVR/SVR tended to decrease from 0.46 ± 0.35 to 0.44 ± 0.34 ($p = 0.05$) whereas Qs/Qt did not change (from 30.9 ± 14.2 to 33.9 ± 11, $p = 0.25$). Addition of inhaled iloprost tended to decrease mPpa (41.3 ± 23.8, $p = 0.07$) and increase cardiac index (3.3 ± 1.0, $p = 0.05$), and significantly decreased PVR (479.16 ± 479.35, $p = 0.01$) without significant effect on the PVR/SVR ratio and Qs/Qt.

Conclusion: In patients with advanced pulmonary hypertension sildenafil alone or in combination with iloprost cause a rapid and selective pulmonary vasodilation without compromising gas exchange, property making these drugs suitable for the treatment of right heart failure in patients with pulmonary hypertension in the ICU setting.

Propofol infusion syndrome during treatment of refractory status epilepticus

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Background: While propofol infusion syndrome (PIS) is well known in paediatric patients, it may also occur, although rarely, in critically ill adults. PIS is so severe that guidelines limit the propofol infusion to 63 µg/kg/min for less than 48 hours.

Objectives: To report a case of survival after PIS complicating the treatment of refractory status epilepticus.

Case-report: A 30-year-old man voluntarily intoxicated with NSAID, benzodiazepines and alcohol, developed after an injection of 0.5 mg flumazenil a status epilepticus confirmed by EEG, not resolving in spite of administration of clonazepam and phenytoin. Burst suppression was therefore performed with a propofol infusion at a maximal rate of 5.3 mg/kg/h for 44 hours (cumulative dose of 19'708 mg).

On day 2, shortly after interruption of propofol infusion, lactic acidosis developed, suggesting the possibility of PIS in absence of other common aetiologies. This was followed by rhabdomyolysis, acute renal failure, hyperkalaemia, and cardiac abnormalities with elevated troponin levels and ECG conduction disturbances (sinus bradycardia, first-degree atrio-ventricular block and left bundle branch block). PIS was diagnosed. The patient

recovered after institution of supportive measures and administration high iv-doses of L-carnitine and thiamine.

Conclusions: This case report underlines the importance of controlling administration of propofol to prevent development of this usually fatal syndrome, and the necessity of monitoring carefully the apparition of a lactic acidosis to guide appropriate measures. Role of L-carnitine administration is still undetermined.

The peroxynitrite decomposition catalyst MnTBAP exerts potent beneficial effects during myocardial infarction in the rat

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Introduction: The strong oxidant peroxynitrite (PN) is considered a key effector of myocardial damage during myocardial ischaemia-reperfusion. We therefore investigated whether a strategy reducing PN, using the PN decomposition catalyst Mn(III)tetrakis(4-benzoic acid) porphyrin (MnTBAP), would have an impact on myocardial injury following myocardial infarction in the rat.

Methods: Anaesthetised and mechanically ventilated rats underwent 45 min of left coronary artery ligation followed by 2 h of reperfusion. Rats were either untreated or treated with MnTBAP, 1 mg/kg (intraperitoneally) 20 min before, and 30 and 60 min after reperfusion. At the end of experiments, rat hearts were excised and infarct size was determined by a colorimetric technique. Rat hearts were also processed for the determination of myeloperoxydase activity (MPO), a marker of neutrophil infiltration, and of malondialdehyde (MDA), a marker of oxidative stress. The influence of MnTBAP on myocardial apoptosis was also evaluated by determining the myocardial levels of caspase-3/cleaved caspase-3, and poly(ADP-ribose) polymerase-1 (PARP-1)/ cleaved PARP-1 (two central effectors of apoptosis) in myocardial tissue.

Results: Myocardial infarct size was markedly reduced by MnTBAP. This was associated with a complete prevention of the increase of MDA and a significant reduction in heart MPO activity. Also, the cleavage of caspase-3 and PARP-1 triggered by ischaemia-reperfusion was eliminated by MnTBAP.

Conclusion: A strategy aiming at reducing myocardial peroxynitrite generation produces considerable beneficial effects during myocardial ischaemia-reperfusion injury. Further studies are going on to evaluate whether the morphological benefits of MnTBAP translate into an improved myocardial systolic and diastolic function after myocardial infarction.

Stress and burnout in ICU: associated factors and coping strategies

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Introduction: ICU caregivers deal with stressful situations, a physically demanding workload and a high requirement of skills. These stressors may have consequences on the welfare of the caregivers and lead to burnout (BO). The welfare of caregivers is important for patients' quality of care. BO is a psychological response to chronic emotional and interpersonal stressors. BO is composed of 3 dimensions: the exhaustion component, the depersonalisation, and the personal accomplishment. We previously found that caregivers feel stressed, found their job psychologically hard, and present medium to high risks of BO. The aim of this study was to evaluate the factors associated with higher risks of BO, and to investigate caregivers' personal resources to cope with stress and BO.

Methods: All nurses, nurse-assistants and physicians of our 18-bed surgical ICU received the questionnaire. We investigated the stress and BO indicators (Maslach Burnout Inventory), as well as the factors associated with higher risks of BO. We further assessed the strategies and personal resources to cope with stress and BO.

Results: 114/132 (86%) questionnaires were returned. 11/110 (10%) caregivers are at high risk of BO for emotional exhaustion, 21/110 (19%) for depersonalisation, and 39/110 (35%) for personal accomplishment. Only 22/110 (20%) are at low risk of BO in all 3 dimensions. Factors associated with higher risks of BO are linked to job characteristics (length of service in our ICU), private life (having no child, no hobby), self-perception (to feel isolated, to be unable to communicate), or physical symptoms. 103/114 (90%) caregivers suffer of physical symptoms possibly linked with stress. 52/114 (46%) take medicine and 46/52 (88%) attribute it to the job. 105/109 (96%) have hobbies or extraprofessional activities, such as relaxing family activities, housework, or sports. 97/108 (98%) want more hobbies if they could have the opportunity. Caregivers use a variety of coping strategies, such as positive reappraisal, seeking social support, avoidance.

Conclusion: ICU caregivers at high risks of BO are those staying longer in this job or lacking extraprofessional activities. They have problems of self-perception. Most of them suffer of physical symptoms and almost half of them take medicine. Some of the coping strategies seem to be constructive, but some could be deleterious in the long run. Further investigation is needed to determine how to alleviate the suffering of the ICU caregivers.

Do Swiss patients wish to be involved in Do Not Attempt Resuscitation (DNAR) orders?

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Introduction: There are neither legal regulations on patient involvement in the decision to perform or to forego cardiopulmonary resuscitation (CPR) in Switzerland nor data on whether and under what circumstances Swiss patients would like to be involved in this kind of decision. Many "Do Not Attempt Resuscitation" (DNAR) orders are made without patient involvement [1]. We performed a prospective study with hospitalised patients to collect data on their preferences in this respect.

Methods: A questionnaire with 13 key questions was distributed by a study nurse to all eligible patients admitted to the departments of internal medicine and of general surgery at our hospital, between January and March 2004. Exclusion criteria were admission for end-of-life care, severely altered mental state or poor general health condition precluding active participation and patients' illiterateness in French.

Results: 205 out of 429 patients agreed to participate and to complete the questionnaire. 51 patients refused to participate, 85 could not be included for medical and 88 for logistic reasons. The median age of the participating patients was 63.5 years, range 18–93 years. 82% considered the opportunity to talk about what should be done in case of a cardiopulmonary arrest (CPA) as important to very important. 70% wished to take the decision to undergo or forego CPR by themselves, either alone, together with family members (40%) or with a physician (27%). 78% proposed that the discussion on CPR/DNAR should be initiated by the physician, either systematically at hospital admission (45%) or when health status changes (44%). Only a very small minority (<15%) declared to have had the opportunity to discuss CPR/DNAR orders with a physician so far. 33% of participating patients stated that they would not wish CPR in case of an unexpected CPA. This attitude was associated with age, 50% of patients over the age of 75 y refusing CPR. DNAR orders had been written by hospital physicians for 8% of included patients.

Conclusion: The great majority of Swiss patients wishes to be involved in the decision to undergo or forego CPR. This contrasts distinctly with the small minority of patients having had the opportunity to do so. Great efforts have to be accomplished to respect patient autonomy with regard to CPR. National, if not European guidelines, based not only on legal regulations but also on patient preferences, should be implemented on the enactment of DNAR orders.

Reference

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Monitoring adverse events: building safety into ICU Care. A preliminary report

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Background, aims and methodology: Data from the USA demonstrate that many deaths are annually reported from medical errors and that about 17% of Intensive Care Unit (ICU) patients (pts) suffer serious adverse events. To improve safety in ICU care, identify threats and hold hospitals accountable for safe practices, new methods such as internal reporting systems recognising and preventing hazards are needed. We therefore developed and implemented a non-punitive, spontaneous and patient-confidential incident reporting system (IRS) in our multisite hospital ICUs (33 beds; 3021 patients admitted in 2003; 9295 patient days/yr) of the Ente Ospedaliero Cantonale (EOC) of Canton Ticino, mainly aiming to analyse factors from reports that contribute to incidents, use this knowledge to improve patient safety and report the impact of the structural change in the nurse team. The run-in phase included an intense staff education and training programme, aiming to promote a sense of responsibility and confidence. The data collection is carried out with a descriptive multiple choice questionnaire, divided into 9 main chapters. Adverse events are then regularly checked, analysed and classified according to a severity scale and to a reoccurrence probability, by the ICU nurse and medical heads.

Results: After the first 6 months, 584 reports (nurse: 80%; doctor: 19%; other 1%) have been submitted, mostly in very severely (61%) or severely (29%) ill pts. The event collection tendency was characterised by up and down trends according to punctual interventions of the persons in charge. Most incidents occurred during the first diurnal workshift (48.6%), while the night-shift accounted only for 19.36% of recordings ($p < 0.002$). Among the non-invasive procedures, medication and communication errors were the most reported events.

Conclusions: The incident reporting system works, with the nurses completing most of the reports in spite of motivation barriers. Common types of errors are slips and lapses, guidelines not being followed and a high incidence of communication and medication errors. Future directions should focus on understanding barriers to reporting and on developing evidence-based initiatives in the nurse team to sustain the cultural change for building a continuous strategy for learning from errors.

L'intégration des nouvelles infirmières(iers) aux soins intensifs, un dispositif de formation à évaluer

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L'intégration des nouvelles infirmières(iers) se fait depuis 2002 par un dispositif de formation. Ce dispositif permet de réaliser un apprentissage en situation des compétences minimums requises pour assurer les soins auprès des patients.

Le dispositif est composé de 3 phases: (1) 2 journées d'accueil dans le service. (2) 5 semaines d'encadrement en alternance. (3) un suivi jusqu'aux 6e mois ponctué par des enseignements cliniques (EC) et un tutorat. Il met en scène en plus de l'infirmière à intégrer (IE), les infirmières du service et 5 infirmières formatrices de l'intégration (IFI).

En 2003 la première évaluation du dispositif avait mis en évidence des critères d'évaluation pour ce dispositif du point de vue de sa gestion et de l'acquisition des compétences.

L'objectif de cette étude est l'évaluation du dispositif de formation pour l'intégration du nouveau personnel infirmier.

Méthode: L'étude est réalisée de manière rétrospective par la lecture du dossier d'intégration de l'ensemble des infirmières(iers) inclus dans le dispositif en 2004.

Les critères d'évaluation de la gestion du dispositif sont: le nombre de jours d'encadrement avec les IFI, la réalisation de 5 EC sur six mois et le nombre de tutorat.

Les critères d'évaluation de l'acquisition des compétences professionnelles sont: la validation des gestes et techniques de soins avant 3 mois, la validation du tour de lit et de la synthèse de la situation de soins avant 3 mois et la validation des EC pour 5 situations de soins prototypiques.

Résultats: 10 personnes ont bénéficié du dispositif en 2004. La durée moyenne de l'intégration est de 191 jours ± 37. Le nombre de jours d'encadrements avec les IFI est en moyenne 12,9/25 jours d'encadrement (minimum: 11, maximum: 16). 100% des IE ont bénéficié de l'encadrement requis. Le nombre moyen d'EC dispensés par IE est de 6,25 ± 1,16, les tutorats ont été dispensés avec une moyenne de 1,25 ± 1,39 par IE.

La validation des gestes et techniques de soins avant 3 mois est réalisée en totalité pour 20% des IE. La validation du tour de lit et de la synthèse de la situation de soins avant 3 mois s'est réalisée pour 100% et 80% des IE respectivement.

Conclusion: Les objectifs de gestion du dispositif de formation pour l'intégration des nouvelles infirmières sont réalisés en 2004. La validation des gestes et technique de soins en situation n'est pas performante. Les différentes modalités d'évaluation et leurs enregistrements dans le dossier d'intégration pourraient expliquer ces résultats. Pour le tour de lit et la synthèse de la situation de soins les performances d'acquisition sont bonnes.

Gebrauch der Neecham-Tabelle für eine bessere Diagnose des akuten Verwirrtheitszustandes beim älteren Menschen in der Intensivpflege

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Einführung: Die Diagnose «akuter Verwirrtheitszustand», eine nicht seltene Realität auf der Intensivstation besonders für ältere Patienten, wird nicht immer rechtzeitig und vollständig gestellt. Mit dieser Studie haben wir nach einem Mittel gesucht, das das Pflegeteam dabei unterstützt, eine solche pathologische Situation zu erkennen und sich entsprechend zu verhalten.

Methode: Während 3 Monaten haben wir ungefähr 100 Patienten von 65 Jahren an aufwärts untersucht. Wir beobachteten ihr Verhalten im Vergleich zu Patienten anderer Altersgruppen und registrierten die klinischen Manifestationen des Verwirrtheitszustandes. Das Erfassen dieser epidemiologischen Situation kam ohne Hilfsmittel zustande. Das Fortschreiten der Studie hat auch dazu geführt, dass wir uns Gedanken machten über das Umfeld der Intensivstation und seine Auswirkungen auf die Patienten, besonders auf die Älteren.

Ergebnisse: Von 92 untersuchten Patienten entwickelten 13 einen akuten Verwirrtheitszustand. Die bei der Datensammlung aufgetretenen Schwierigkeiten haben nur die Notwendigkeit bestätigt, dass man als Referenzpunkt einen objektiven einheitlichen Massstab haben sollte. Um den akuten Verwirrtheitszustand beim älteren Patienten feststellen zu können (ausgehend von den Kriterien DSM-IV), wurde die Neecham-Tabelle ausgewählt. Die Einführung der Neecham-Tabelle hat sich zeitweise als schwierig erwiesen. Auf den ersten Blick erscheint sie als etwas zu lang und zu umfangreich, und ihre Benutzung in der täglichen Praxis kommt nie so spontan zustande, wie man es eigentlich gerne möchte. Aus diesem Grunde wäre es interessant die CAM-ICU-Tabelle zu beurteilen, um anschliessend beide Tabellen miteinander vergleichen zu können. Andererseits bleibt als vorrangiger Aspekt für eine optimale Pflege des älteren Menschen immer noch das vorzeitige Erkennen der Umstände, die zum Auftreten eines akuten Verwirrtheitszustandes führen, und wir sind überzeugt davon, dass die Notwendigkeit besteht, solch auslösende Faktoren objektiver, als es bis jetzt geschieht, zu erkennen.

Evolution du contrôle de la glycémie aux soins intensifs de chirurgie du CHUV

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Plusieurs études récentes ont montré qu'un contrôle glycémique strict en soins intensifs (SI) était associé à une amélioration de la survie. Dès 2001, l'insuline a été prescrite

Tableau 1

glycémie	n patients	n analyses	<2,6 mmol/l	2,6–4	8,1–10	10,1–12	>12 mmol/l
2000	315	4052	0,3%	0,7%	50,7%	26,0%	22,4%
2004	803	11051	0,7%	2,9%	63,3%	19,4%	13,8%

avec des glycémies cibles de 5–8 mmol/l. Le contrôle glycémique serré semble difficile à réaliser. L'étude présente a pour but de comparer les profils glycémiques des patients des SIC en 2000 (avant l'étude VanDen-Berghe 2001) et 2004 en vue de l'implantation d'un nouvel algorithme strict.

Méthodes: Extraction des valeurs de glycémie de la base de données informatisées sur 2 périodes équivalentes de 9 mois en 2000 et 2004. Analyse de la proportion de résultats dans les 6 paliers de glycémie prédéfinis. Dès 2002 la prescription médicale fait mention d'une fourchet de glycémie cible de 5–8 mmol/l.

Résultats: Un total de 1118 patients ont eu 15103 déterminations pathologiques de glycémie, sur un total de 38829 analyses. Le nombre des analyses par patient a augmenté (40 en 2004 versus 23 avant). Les normoglycémies représentent 22,5% des examens en 2000, et 35% en 2004. En 2004 la fréquence des hypoglycémies est un peu plus élevée, sans qu'aucune n'ait eu de conséquence clinique. Les hyperglycémies >10 mmol/l sont en diminution significative: 63,3% des hyperglycémies se situent dans la fourchette 8,1–10 mmol/l (tab. 1).

Conclusions: Les hyperglycémies sont plus nombreuses en chiffres absolus en 2004 qu'en 2000, mais en diminution quand on analyse la proportion des glycémies hors normes. L'introduction des prescriptions plus serrées a eu un effet favorable significatif avec une augmentation des glycémies normales et des hyperglycémies modérées, mais insuffisant. Les hypoglycémies sont inquiétantes pour le corps infirmier et nécessitent l'implantation d'un algorithme plus précis.

Validation de l'estimation de la taille par la mesure de la distance talon–genou en soins intensif adulte – préliminaire

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Plusieurs aspects des traitements de soins intensifs (SI), comme le réglage de la ventilation mécanique, la prescription de médicaments et de nutrition, dépendent de la connaissance de la taille et du poids idéal du patient: or la taille est souvent inconnue. La longueur des os longs est le meilleur indicateur anthropométrique de la taille des sujets. La distance talon–genou a été validée en gériatrie pour l'estimation de la taille des adultes grabataires, mais pas en SI. Le but de l'étude est de valider la formule de Chumlea en SI en l'appliquant à des patients de tout âge, pour améliorer la précision des traitements.

Méthode: Etude prospective de patients consécutifs admis en SI de médecine et de chirurgie au CHUV. Variables saisies: âge, taille officielle (carte ID), taille estimée par l'équipe, taille mesurée (ruban métrique), poids anamnestique, distance talon–genou (dTG) droit et gauche. Mesure de la dTG: patient couché sur le dos, genou levé, faisant un angle de 90° entre la jambe et la cuisse. La partie fixe du calibreur est placée sous le talon de la jambe, la partie mobile au dessus des condyles fémoraux, l'axe de la toise étant parallèle à celui du tibia. Les équations suivantes sont utilisées pour calculer la taille: taille-homme = (2,02 × dTG cm) – (0,04 × âge) + 64,19; taille-femme = (1,83 × dTG cm) – (0,24 × âge) + 84,88. Statistiques: moyenne et SD, régressions linéaires simples.

Résultats: 55 patients (37 hommes/18 femmes) âgés de 63 ± 15 ans (19–89 ans), pesant 81,5 ± 19,5 kg ont été étudiés. Il n'y a pas de différence significative entre la dTG droit et gauche: une détermination suffit. La différence entre les tailles mesurées et calculées est de 1,0 ± 4,5 cm (F = 136,9, p <0,0001), celle entre les tailles mesurées et estimées est de 3,0 ± 7,5 cm. La corrélation semble plus précise chez les sujets >60 ans comparée aux <60 ans (F = 166,04 versus 20,7; p <0,0001), et chez les hommes comparé aux femmes (F = 43,9 versus 25,2; p <0,0001, différence ns).

Conclusions: La mesure de la distance talon–genou semble permettre une détermination précise, simple et rapide de la taille des patients de SI. Le nombre de déterminations limité (n = 55, objectif 200) doit être augmenté pour permettre la validation sur les 2 sexes et les patients de moins de 60 ans.

Référence

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Die Implementierung des Konzepts Basale Stimulation® auf der Klinik für Intensivmedizin (KIM) am Inselspital in Bern anhand des von der Pflegewissenschaftlerin Patricia Benner adaptierten Dreyfus-Modells

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Ausgangslage: Die Klinik für Intensivmedizin besteht aus 5 interdisziplinär geführten Einheiten zu je 6 Betten. Pro Jahr werden ca. 3050 Patienten (9,9% Kat. 1a, 80,6 Kat. 1b) betreut. Insgesamt arbeiten ca. 240 Pflegende und davon sind ca. 60 Mitarbeiterinnen in der Weiterbildung in Intensivpflege.

Im Oktober 1996 hielt Frau Bienstein einen Vortrag über das damals noch wenig bekannte Konzept Basale Stimulation® auf der KIM.

Seit 1998 finden durch interne Praxisbegleiterinnen regelmässig Basiskurse statt.

Ziel der Implementierung: Aus der anfänglichen Begeisterung einzelner hat sich die Klinikleitung nun auf folgendes Ziel in der Anwendung des Konzeptes festgelegt:

- verbindliche Anwendung des Konzeptes bei den Pflegeschwerpunkten «Kontaktaufnahme, Initialberührung, Waschung, Positionsunterstützung» sowie
- Integration der offiziell definierten zentralen Ziele [1] der Basalen Stimulation.

Rahmenbedingungen: Folgende Rahmenbedingungen wurden in den letzten 5 Jahren erarbeitet:

- Jede Mitarbeiterin muss den Basiskurs in Basaler Stimulation besucht haben.
- Aufbaukurse werden regelmässig angeboten.
- Jede Mitarbeiterin erhält einen halben Tag Praxisbegleitung pro Jahr durch eine interne Praxisbegleiterin.
- Lagerungsmaterial und andere Hilfsmittel werden durch ein eigenes, für dieses Konzept zur Verfügung gestelltes Budget finanziert.
- Zur Förderung des Konzeptes führt eine Arbeitsgruppe regelmässig interne Fortbildungen durch und berät und unterstützt die Kolleginnen am Bett.

Methodik: Das Dreyfus-Modell [2] wurde durch die Pflegewissenschaftlerin Patricia Benner bekannt und für die Pflege modifiziert. Es stellt den Kompetenzerwerb im Wechselspiel von Theorie und Praxis dar.

Dem Dreyfus-Modell zufolge durchläuft eine Lernende beim Erwerben und Vertiefen einer Fähigkeit fünf verschiedene Leistungsstufen: Neuling, Fortgeschrittene Anfängerin, Kompetent, Erfahren, Expertenstufe.

Resultat: Mittlerweile ist das Konzept Basale Stimulation auf der KIM kompetent umgesetzt. Zur Überprüfung wurde ein Standard mit Ergebniskriterien entwickelt, dazu werden die jährlich neu aufgestellten Ziele regelmässig durch die Arbeitsgruppe und die internen Praxisbegleiterinnen kontrolliert.

Viele Mitarbeiterinnen sind nach dem Dreyfus-Modell bereits sehr «Erfahrene» und einige verfügen über das «Expertinnenniveau».

Ausblick: Ziel ist die definitive Implementierung des Konzeptes Basale Stimulation mit einem hohen Anteil an «Erfahrenen» und «Experten» in der Klinik für Intensivmedizin am Inselspital in Bern.

Literatur

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Extubations non planifiées en soins intensifs: incidence et circonstances

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Dans la littérature, l'incidence des extubations non planifiées (EXTNP) est rapportée jusqu'à des taux de 16% chez les patients (pts) de soins intensifs en ventilation mécanique (VM). Alors que l'EXTNP paraissait anecdotique dans notre centre, l'annonce de plusieurs cas dans le système de report d'événements à risque nous a alerté et a motivé la présente étude. De manière rétrospective, les rapports médicaux de sortie et les feuilles de suivis infirmiers informatisées ont été analysés pour détecter les EXTNP sur une période de 2 ans.

En 2004, sur 370 pts intubés, 18 ont eu une EXTNP (4,9%), en nette augmentation par rapport à 2003, où seuls 5 pts parmi 363 ont eu une EXTNP (1,5%). En 2004, le collectif était composé de 13 hommes et 5 femmes d'âge moyen de 51 ans (23–80). Il y a eu 17 auto-extubations et 1 extubation accidentelle. Lors de l'EXTNP, la sédation était interrompue chez 13 pts. Une contention physique était appliquée chez 6 pts. La majorité des pts (11) étaient décrits comme calmes, coopérants, sédatés ou somnolents dans l'heure précédant l'extubation. Il n'y avait pas de plages horaires privilégiant cet événement, survenant de nuit comme de jour. Une ventilation non-invasive s'est avérée nécessaire chez 9 pts (50%) et une ré-intubation orotrachéale chez 8 pts (44%). Cette forte augmentation des EXTNP était peut-être due à plusieurs facteurs: changement de la méthode de fixation des tubes oro-trachéaux, application plus stricte des scores et des protocoles de sédation, projets d'extubations rapides, pénurie de personnel infirmier.

En conclusion, les extubations non-planifiées, même en phase de sevrage du respirateur ne sont pas sans risque, comme en témoigne le recours à la ventilation mécanique invasive et non-invasive. La forte augmentation des extubations non-planifiées suggère une diminution de la qualité dans la prise en charge des pts en ventilation mécanique. Toutefois, pour le confirmer, une analyse précise et prospective des circonstances s'avère nécessaire.