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FDG-PET FOR ASSESSING THE EFFECTS OF CRANIOPLASTY FOLLOWING DECOMPRESSIVE CRANIECTOMY

In particular situations decompressive craniectomy is regarded as an effective tool to relief the live-threatening increase of intracranial pressure. After revocery from the acute event usually cranioplasty is performed, which has been repeatedly associated with improvement of the neurological and neuropsychological deficits in those patients even though the pathophysiological background therefore is not yet fully understood. Aim of the present study was to investigate, whether cranioplasty causes noticable changes of regional cerebral glucose metabolism as compared to the clinically stable condition after decompressive craniectomy.

So far 11 pts with extensive craniectomy following subdural and intracerebral hematoma or cerebral infarction were studied with FDG-PET before and within 2-16 weeks after cranioplasty (Siemens HR+; cold transmission scan; 2D acquisition). For further evaluation PET data before and after cranioplasty were intra-individually compared using a standardized region map covering cortical and subcortical structures (frontal, central, parietal, temporal, occipital cortex, basal ganglia, cerebellum) and related to the results of transcranial doppler investigations and neuropsychological tests.

In the study after decompressive craniectomy all pts presented with moderately to extensively reduced regional cerebral glucose metabolism. Gyri adjacent to the craniectomy had lost their normal convex surface structure impressing flattened and hypometabolic. Crossed cerebellar diaschisis was present in 9/11 cases at baseline (mean: 12±10%), remaining unchanged in 2/9 and improving in 7/9 after cranioplasty (mean: 8%±9%). As compared to baseline metabolic improvement after cranioplasty ranged from 9% to max. 39% (mean: 23%±11%) in the most severely affected structures, from 1.5% to max. 26% (mean: 13%±6%) in the entire affected hemisphere, and from 0% to 8% (mean 5%±3%) in the primary non affected hemisphere, respectively. FDG PET data were related to changes in flow velocity assessed with TCD as well as neuropsychological test results.

Our data indicate that cranioplasty following decompressive craniectomy may markedly improve cerebral glucose metabolism as assessed with FDG-PET. Therefore, this surgical procedure does not only restore cerebral protection and ensures cosmetic repair but is also associated with partial functional recovery of non-irreversibly damaged cortical and subcortical structures of the primarily affected and also the non-affected hemisphere.

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The Psilocybin Psychosis As A Model Psychosis Paradigm For Acute Schizophrenias: A PET Study with 18-FDG

Background: The indolehallucinogen psilocybin (o-phosphoryl-4-hydroxy-N,N-dimethyltryptamine) is able to induce a psychosis-like syndrome that is very similar to acute schizophrenias (model psychosis paradigm). Little is known about the neurometabolic basis of the psilocbiyn psychosis compared to schizophrenias. It was the aim of this study to investigate the acute effects of psilocybin on cerebral regional glucose metabolism (rMRGlu), and to survey the associations between rMRGlu and the psychopathology.

Methods: In this randomized double-blind study, 16 healthy volunteers received orally either 0.2 mg/kg psilocybin (n=8) or placebo (n=8) 90 - 120 min before 18-FDG injection. Subjects had to perform a constant cognitive stimulation task (word repetition) during 30 min after 18-FDG injection until PET scan started. After absolute quantification of MRGlu (Sokoloff), 39 regions-of-interest were defined on individual 3D-flash MRI data for regional quantification, and were superimposed on the PET data (PET/MRI overlay). Acute psychopathology was assessed by the PANSS score (Positive And Negative Syndrome Scale). Statistical analysis by U-test and by the Spearman correlation coefficient (correlations between rMRGlu and PANSS).

Results: Comparison psilocybin versus placebo showed significant increases of rMRGlu in the right operculum (+7.7%) and the anterior cingulum (+9.8%). Decreased rMRGlu was found in the left precentral cortex (-6.1%) and in the right thalamus (-8.7%); all $p<0.05$. Positive correlations were found between left inferior temporal and delusions ($r=0.73$), left occipital and exitement ($r=0.9$), left occipital and distrust ($r=0.87$), left operculum and difficulties in abstract thinking ($r=0.87$), anterior cingulum and stereotyped ideas ($r=0.76$), left thalamus and stereotyped ideas ($r=0.76$)

Conclusion: The psilocybin psychosis shows functional alterations of the cortico-striato-thalamic feedback loop as postulated for acute schizophrenias. However, there are high correlations between rMRGlu and PANSS beeing totally different from the correlations in untreated acute schizophrenics. It has to be discussed, why a very similar psychopathology may be associated with quite different neurometabolic processes.

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Radiopharmacy and radiochemistry: Ria/Others

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STUDIES ON THE FUNCTION REGULATION OF PROTEIN C SYSTEM AND NOVEL HIGH RISK OF VENOUS THROMBOSIS

Protein C system is an anticoagulation pathway which consists of protein C(PC), protein S(PS), thrombomodulin(TM) and protein C inhibitor(PCI). The procedures for isolation and purification of PC, PS, PCI and antithrombin III(AT III) from human plasma, and TM from human urine were developed. Five RIAs were also developed, on the equilibrium method, by raising the antisera in rabbits. 125I-PC, 125I-PS and 125I-AT III were prepared using the chloramine-T method, 125I-PCI by Iodogen method and 125I-TM by Bolton-Hunter method. All of their sensitivities were below 10ug/L, and the ranges of recovery rates were 94.30% to 105.22%. The antisera provided a linear response from 6.25 to 1024ug/L for PC, 21 to 700ug/L for PS, 4 to 800ug/L for AT III, 4.8 to 1024ug/L for PCI and 8.1 to 560ug/L for TM. The intra- and inter- assay CV were 4.4% and 9.68% for PC RIA, 4.99% and 13.14% for PS RIA, 3.56% and 8.01% for AT III RIA, 2.73% and 8.62% for PCI RIA, 5.10% and 10.94% for TM RIA. The cross reactivities of these methods with factor II and thrombin(Th) were negligible. These methods can be used as effective tools especially for diagnosis of thrombosis and basic or clinical studies of protein C system.

We investigated the functional regulation of protein C system with flow cytometry and the five RIAs. We found: (1)There are very high affinity and saturable specific binding sites for PC on cultured human umbilical vein endothial cells. It is speculated that may be a way for protecting PC against digested-enzymes or storage form or favorable rapid reaction as soon as Th appears. (2)PCI inhibited activated PC(APC) appeared to be dependent on membrane or phospholipid. (3)AT III regulates the production of APC with a rapid regulation manner by the Th- AT III complex dissociates rapidly from TM.

On the basis of the five RIAs, we developed the technique of APC-APTT, which is a simple and reliable method to detect APC-resistance. We also developed a PCR for identification and verification of G1691A transition or point mutation of factor V on homozygotes and heterozygotes. Even though the diagnostic level of APC-APTT were the same as, we have observed that factor V G1691A mutation incidence on Chinese is much lower than on North European. There may be other factors about APC-resistance, such as factor VIII mutation or factor V mutation but not on G1691A in Chinese.

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COMPARISON OF IGF-1 (INSULIN LIKE GROWTH FACTOR) IGFBP-1 (INSULIN LIKE GROWTH FACTOR BINDING PROTEIN) AND E2 (ESTRADIOL) LEVELS IN SERUM AND FOLLICULAR FLUID FROM WOMEN UNDERGOING IN VITRO FERTILIZATION

Insulin-like growth factor (IGF-1) is an anabolic polypeptide structurally and functionally similar to insulin that mediates the actions of growth hormone. Insulin-like growth factor binding protein-1 (IGFBP-1) is a specific carrier protein that regulates the actions of IGF and is growth hormone-independent. In this study the levels of IGF-1, IGFBP-1 and E2 in serum and follicular fluid from women undergoing in vitro fertilization (IVF) were compared and their role in controlled stimulation of the ovaries was studied.

Materials-Methods: Participants were 12 women (36+5,5 years old) undergoing controlled ovarian hyperstimulation with hormone therapy(FSH, LH). Blood samples were collected on the last day the hormones were administered (A) and on the day of the ovum pick-up (B). The levels of E2, IGF-1 (RIA method) and IGFBP-1 (IRMA method) were determined in serum samples A and B and in follicular fluid (FF).

Results: Pregnancy was succeeded in 2 out of 12 women. The levels of E2 (A), E2 (B) and E2 (FF) were 1095±789, 541±445 and 104562±49043 pg/ml respectively, the levels of IGF-1 (A), (B) and (FF) 251±101, 193±93 and 139±69 ng/ml respectively and of the IGFBP-1 (A), (B) and (FF) 59±35, 30±23 and 105±38 ng/ml respectively. The mean number of collected oocytes during ovum pick-up was 10±8 (range 2-31). There was a statistical correlation between the levels of E2 (A, FF) and IGF-1 ($p<0,05$), as well as between the levels of E2 and IGFBP-1 ($p<0,01$). There was also correlation between IGFBP-1 (A), the age of the women and the levels of hormone therapy ($p<0,05$). There was a statistically significant difference between the levels of IGF-1 in women with «positive» fertilization and the rest, $p<0,05$. The levels of IGFBP-1 (FF) were greater than the IGFBP-1 (A), (B) ($p<0,001$). The levels of IGF-1 (FF) were lower than the IGF-1 (A), ($p<0,01$).

Conclusion: Growth factors have a role in IVF. IGFBP-1 may determine the level of controlled ovarian stimulation. The levels of IGF-1 may be a prognostic factor for successful implantation. The role of growth factors in ovum quality and the implantation rate of the process during controlled ovarian stimulation needs to be investigated further.