and football). TBI is associated with secondary neuronal changes that induce cognitive deficits that develop over time and may associate with dementia. Presently there are no outstanding medicines of choice for the management of secondary pathological changes in victims of TBI, thus the ensuing cognitive deficits impose huge burdens on family members and healthcare providers alike. The objective was to evaluate a defined neuroprotective agent for use in mild TBI.
Methods: This study utilized a mouse model that represents the more common form of concussive TBI: a closed head weight drop model. Subsequent to TBI (a 30 g weight dropped from 80 cm above the head impacting between the eye and ear), this study examined the following behaviours: novel object recognition and Y-maze. An agent currently used clinically for the management of type 2 diabetes mellitus (T2DM) was assessed; the glucagon-like peptide-1 analogue exendin-4 (Ex-4). In prior studies involving a series of neurodegenerative disorders Ex-4 was found to possess neuroprotective and anti-apoptotic properties. As apoptosis is a pathological process known to be relevant to human TBI, it was hypothesized that this agent may translate favourably to rodent models of TBI and hopefully to clinical TBI. Ex-4 was administered as a clinically relevant dose via ALZET mini pumps implanted subcutaneously either prior to (48 hours) or immediately after the induction of TBI.
Results: Significant, long-lasting TBI-induced behavioural deficits were observed from 7 days post-injury. Ex-4 treatment induced marked benefits in animal behaviours when administered prior to and after the induction of TBI. In a cohort of Ex-4 pre-treated TBI animals, hippocampal gene expression profiles were examined at 14 days post-injury, a time point after the development of behavioural deficits. Marked changes in gene expressions were observed as a result of TBI; pre-treatment with Ex-4 effectively reversed the trauma-induced changes in many molecular pathways, several of which were related to Alzheimer's disease.
Conclusions: These studies provide insight into molecular changes associated with TBI-induced cognitive impairments that may relate to the development of neurodegenerative disorders or dementia later in life. Additionally they support the rapid implementation of Ex-4, an agent in safe and effective clinical use for the management of T2DM for investigation in the clinical setting of human, concussive TBI. Ongoing studies are investigating possible benefits of Ex-4 treatment in a blast shockwave model of TBI-induced changes in behaviour and hippocampal gene expressions; a model with relevance to the battlefield.

0102

TBI in infancy and early childhood—Findings from the ICTBI research project

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Objectives: The main objectives of the Icelandic research project on early traumatic brain injury (TBI), the ICTBI research project, were (1) to estimate the nationwide incidence and prevalence of early TBI and TBI-related long-term consequences; (2) to assess the prognostic value of injury-related and non-injury-related factors for late outcome; and (3) to serve as a foundation for the development of goal-oriented prevention and intervention in Iceland.
Methods: Participants were all children and adolescents 0–19 years old diagnosed with TBI (ICD-9 850–854) in Iceland from 15 April 1992 to 14 April 1993 (the ICTBI study group (SG)) ($n = 550$) and a control group (CG) ($n = 1232$) selected from the Icelandic National Registry in 2008, using a stratified random sampling method. Demographic and injury data were collected in 1992–1993. Follow-up of the SG took place 4 years and 16 years post-injury. Participants responded to questionnaires and clinical outcome scales. In the present context the emphasis is on findings on TBI in the youngest age group, 0–4 years old.
Results: The youngest age group was at greatest risk of sustaining mild TBI treated at emergency departments. The youngest children seemed to be at greatest risk of not being brought to medical attention or included in medical records in rural areas. The incidence rates of hospitalized mild, moderate and severe TBI in the youngest age group was comparable to the corresponding incidence rates in the older age groups. Parents of children in the youngest age group were least likely to report symptoms attributed to TBI 4 years post-injury. Four years post-injury six young children in the SG had been diagnosed with developmental disabilities, without reference to the early TBI. In the study group, the youngest participants were most likely not to report to have sustained TBI. Not reporting the medically confirmed TBI was not related to better cognitive outcome on clinical scales 16 years post-injury. Only 1% of participants reporting TBI-related disability in the youngest age group had been evaluated for or awarded compensation. Absence of evaluation was not associated with better outcome on clinical scales. Age at injury did not predict late outcome.
Conclusions: The findings of the ICTBI research project suggest that there is still a tendency to minimize early TBI. TBI appears under-reported, under-diagnosed or under-recorded, under-treated and its consequences under-estimated. This may be especially so in the youngest age group. Challenges as regards accurate estimates of TBI severity in infancy and early childhood are acknowledged. However, alertness to possible long-term consequences, continued follow-up and appropriate intervention in the case of emerging developmental problems with age may help reach optimal outcome.

0103

Incidence, prevalence and prognostic factors—Findings from the ICTBI research project

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Methods: Participants were all children and adolescents 0–19 years old diagnosed with TBI (ICD-9 850–854) in Iceland from 15 April 1992 to 14 April 1993 (the ICTBI study group (SG)) ($n = 550$) and a control group (CG) ($n = 1232$) selected from the Icelandic National Registry in 2008, using a stratified random sampling method. The CG was in the same age range as the SG in 2008, 15–35 years old. Demographic and injury data were collected in 1992–1993. Follow-up of the SG took place 4 years and 16 years post-injury. Participants responded to questionnaires and clinical outcome scales.

Results: The incidence rates of paediatric TBI in Iceland was comparable to corresponding incidence rates in the neighbouring countries. The incidence of mild TBI treated at emergency departments was higher in the Reykjavik area than in rural areas. The prevalence of TBI in the 15–35 year old CG (49.5%) was higher than previously reported in general population samples and so was the prevalence of TBI-related moderate disability (7.0%). Force of impact to the head and more than one TBI sustained had greatest prognostic value as regards reports of late symptoms. Reports of late symptoms were reflected in worse outcome on clinical outcome scales assessing cognition, mental health, adjustment and behaviour. *Conclusions*: The ICTBI research project highlights the benefits of long-term follow-up studies and nationwide samples.

0104

Using person-oriented methods for investigating the individual context within large groups with paediatric TBI

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Most research on cognitive outcome after paediatric TBI describe outcome of groups, providing an important overview of the field. However, individual variation of outcome is large, even within groups based on severity, and several variables are found to influence outcome. Individual patterns of co-working variables can instead be studied with person-oriented methods. One of those is Cluster analysis, linking similar individual profiles of chosen variables into clusters, studying the individual context, still in large groups. Two longitudinal studies using Cluster-analysis rendered both new and similar results as research on groups with TBI. One interesting result suggests that long-term developmental change takes place on a continuum, where plasticity of the young brain at one end of the continuum is connected to good recovery after TBI, whereas vulnerability at the other extreme is associated with elevated risk of poor recovery. The usefulness of Cluster analysis as a method in those studies will be discussed.

0105

The effect of attrition on post-concussion syndrome incidence: Initial findings from a meta-regression of mild traumatic brain injury cohort studies

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Objectives: How frequently post-concussion syndrome (PCS) follows mild traumatic brain injury (MTBI) is controversial and the factors that account for wide discrepancies in incidence rates are unclear. Follow-up data points that are Missing Not At Random (MNAR) may be one important source of bias. That is, if participants who drop out of prospective longitudinal MTBI studies systematically have better or worse outcomes than participants who complete a study, PCS incidence rates may be inaccurately high or low, respectively.
Methods: An electronic literature search with data extraction and meta-regression was conducted. Cohort studies and randomized controlled trials recruiting participants consecutively from an Emergency Department and following them prospectively for at least 1 month were included. For studies with multiple follow-up assessments, only the last one was included. For randomized controlled trials, intervention and control arms were collapsed. The primary outcome was the PCS event rate, using study-specific operational definitions of PCS; these were coded on a 3-point ordinal scale for stringency, where the mid-point was 3+ post-concussion symptoms of any severity. Studies defining PCS more laxly (one or two symptoms endorsed) were dummy coded as −1 and those with a higher threshold for PCS diagnosis (e.g. 4+ symptoms or 3+ symptoms with functional impairment) were dummy coded as +1.
Results: Thirty-six studies involving 8922 participants with MTBIs met eligibility criteria. Attrition rates ranged from 0–68% ($M = 23.9$, $SD = 16.8$). Estimates of the incidence of PCS varied from 5–82% ($M = 37.0$, $SD = 17.7$) at a median of 6 months post-injury. The Pearson correlation between attrition and PCS was 0.46 ($p = 0.005$). Controlling for PCS case definition stringency and time post-injury in a weighted least squares regression model, higher attrition rate was related to higher PCS incidence rates ($B = 0.437$, $t = 3.01$, $p = 0.005$). For every 10% of cases lost to follow-up, the PCS incidence rate rose by 4.4%. Restricting the definition of PCS to a constellation of symptoms (i.e. dummy codes of 0 or +1) and setting attrition to 0 gave a hypothetical PCS incidence rate of 17–28% across 3–12 months post-injury in this aggregated ED cohort.
Conclusion: Attrition in MTBI inception cohort studies appears to contribute to an over-estimation of PCS, suggesting that asymptomatic participants are more likely to drop out. Ignoring the bias introduced by attrition will contribute to a more negative view of prognosis following this injury. A systematic review (PROSPERO registration #CRD42013003623) is now underway to obtain a more comprehensive set of cohort studies and refine the effect of attrition and other methodological factors on PCS incidence.

0106

Sexual quality-of-life, sexual satisfaction and relationship satisfaction in partnered individuals with traumatic brain injury

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