Research roundup

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Assessment of vitamin D, exercise and lipid profile associated with excessive daytime sleepiness in school children

Excessive daytime sleepiness (EDS) can adversely impact health-related quality of life, particularly in school-age children, where learning and development can be affected. Identifying EDS is important to determine any association with another disorder and to maximise the health and wellbeing of such children. EDS has been associated with low vitamin D levels and obesity, which may be antecedents or consequences to EDS. Sung et al (2021) set out to identify and rank factors associated with EDS in children aged 10-12. This study recruited 618 children, and the Paediatric Daytime Sleepiness Scale (PDSS) (Drake et al, 2003) was used to determine EDS. A questionnaire was used to assess lifestyle and environmental factors, alongside blood sampling, acoustic rhinometry, sexual maturity rating (SMR) (Euling et al, 2008) and the Total Five Symptom Score for rhinitis severity (Lee et al, 2019). Some 111 children had EDS (507 controls), with no significant difference in age, sex, BMI score, weight status and presence of allergic disease. Those with higher PDSS scores fell into the EDS group (as would be expected), and children with low HDL-C levels had an increased risk of EDS. Key findings from the study were that low levels of circulating vitamin D3 ($25(OH)D_3$), lack of exercise and high BMI were highest ranked factors contributing to EDS. These results are important in that they highlight the need for optimal vitamin D_3, the need for regular exercise and healthy diet/weight management to minimise EDS and maximise health-related quality of life. Such results can influence health education and promotion strategies, and the study merits repeating in other cultures to determine how generalisable the results are.

Sung M, Rhie S, Kim JH et al. Assessment of vitamin D, exercise, and lipid profile associated with excessive daytime sleepiness in school children. *Sleep Medicine*. 2021;77:51—57. https://doi.org/10.1016/j.sleep.2020.11.017

Activating autoantibodies against G protein-coupled receptors in narcolepsy type 1

Narcolepsy, a rare neurological disorder that includes severe daytime sleepiness, nocturnal sleep disturbance, sleep-related hallucinations and cataplexy. Narcolepsy is classified into two types:

- Narcolepsy type 1 (NT1): this is characterised by cataplexy, which is associated with an autoimmune destruction of hypothalamic neurons that produce neuropeptides called orexins or hypocretins. These neuropeptides are involved in the neurological control of wakefulness and rapid eye movement (REM) sleep. The have roles in parasympathetic and sympathetic nervous system regulation and the modulation of pain
- Narcolepsy type 2 (NT2): this does not feature cataplexy (i.e. termed Narcolepsy without cataplexy in many clinical settings), and the link with hypocretins is less clear, with causes largely unknown.

Autoantibodies are key molecules involved in autoimmune disease, whereby they target and react with a person's own healthy cells. G protein-coupled receptors (GPCRs) are cell surface receptors that activate different signalling pathways in response to a variety of factors. If autoantibodies target these receptors, they can activate or inhibit this signalling process, disrupting cell homeostasis. Orjatsalo et al (2021) tested the serum of 10 people with NT1 for autoantibodies for these receptors, with all people having serum M2 receptor autoantibodies, 90% having serum nociceptor autoantibodies and 50% having serum β2 adrenergic receptor autoantibodies. While the sample size

is low and a much larger study is needed to explore this finding further, it indicates the presence of a variety of GPCR-targeted autoantibodies that may be associated with the autonomic occurrences in NT1 or be secondary to the destruction of the hypocretin pathways. These autoantibodies may be the key to prevention or further treatment of NT1. This study highlights the need to investigate these antibodies in a larger study, in order to determine the wider significance of these important and novel findings.

Orjatsalo M, Partinen E, Wallukat G et al. Activating autoantibodies against G protein-coupled receptors in narcolepsy type 1. *Sleep Medicine*. 2021;77; 82—87. https://doi.org/10.1016/j.sleep.2020.11.038

The epidemiology of traumatic brain injury in children of 15 years and younger in south-eastern Norway

In the pursuit of preventing traumatic brain injury, it is paramount to understand the factors involved in order for targeted interventions to be successful in reducing incidence and subsequent mortality and morbidity. Dahl et al (2021) undertook a retrospective study on data from 176 children (via a trauma registry in Norway) with a paediatric traumatic brain injury (pTBI) to describe the incidence and injury characteristics of all severities of pTBI over a 2-year period. They also explored the effect of age on injury mechanism and extent of injury. The Glasgow Coma Scale, including the paediatric version, was used to classify the degree of injury, alongside other data (age, location of injury, injury mechanism). It was demonstrated that boy:girl incidence ratio was 1.9:1, and the leading cause of pTBI was falls (49%); 31% were as a result of transportation accidents, usually involving a bicycle. Blunt head trauma was the primary mechanism of injury. Mean length of stay was 5.8 days. Analysis of the data showed that, while incidence of pTBI was low compared to other regions, many of the incidents were preventable. This is particularly the case in children aged 7 years of age and younger, who appeared to sustain more severe injuries. There is potential for road safety interventions and those targeting parents of children just beginning to walk. The study noted that individualised follow-up for all pTBI cases is advisable, particularly in light of neurorehabilitation services for children being considered by the researchers as less developed than that of their adult counterparts. The study advocates for further research in this area, to uncover the rehabilitation needs of these children and their parents and target those aspects not yet addressed by rehabilitation services.

Dahl HM, Andeli N, Løvstad M et al. Epidemiology of traumatic brain injury in children 15 years and younger in South-Eastern Norway in 2015–16. Implications for prevention and follow-up needs. Eur J Paediatr Neurol. 2020;31:70—77. https://doi.org/10.1016/j.ejpn.2021.02.002

Assessing the efficacy of mild traumatic brain injury management

In a climate of increased pressures on healthcare resources, decisions around follow-up care need to be embedded in evidence and in the best interests of patients. Weber et al (2021) focused their study on routine follow-up of those with mild traumatic brain injury (mTBI) to determine how necessary and effective the use of follow-up head computed tomography (CT) scans are in low-risk traumatic brain injury. The retrospective study included 531 patients, of which 119 met the inclusion criteria, which included specific criteria of what was deemed an mTBI (no patient had neurosurgical intervention). Medical records were reviewed by two independent observers. Descriptive statistics were used to calculate means and the odds of having a repeat head CT scan when transferred from an outlying facility compared to direct admission to a level 1 trauma centre. Results revealed that those transferred to the trauma centre were significantly more likely to have a repeat head CT scan compared to those directly admitted. This may have been due to some level of deterioration that prompted the transfers, leading to a repeat scan. Some 74% of study patients had at least one repeat head CT scan; a low percentage had asymptomatic intracranial haemorrhage expansion or non-focal neurological decline, none of which lead to a neurosurgical intervention. Two patients in the study were readmitted due to seizures; their head CT scan showed no neurological decline, but rather an improved radiological presentation. The researchers concluded that repeat head CT scans in these two patients would not have prevented the onset of seizures. Recommendations from the study include close monitoring of patients with mTBI through neurological assessment to identify and respond to subtle neurological changes, and a low threshold for repeat head CT scan. The researchers highlight that, in the presence of neurological deterioration, a repeat head CT scan

increases the likelihood of neurosurgical intervention by five times in comparison to a routine follow-up scan (where the neurological presentation does not necessarily prompt the decision to scan, but routine does).

Weber M, Nie JZ, Espinosa JA et al. Assessing the efficacy of mild traumatic brain injury management. *Clinical Neurology and Neurosurgery*. 2021;202; 106518.

The return to driving following moderate to severe traumatic brain injury

For those who experience a moderate to severe traumatic brain injury (TBI), it can lead to a temporary or permanent period of not being able, or permitted to, drive a car. Driving has an important role to play in health-related quality of life, as it is associated with access to employment, social integration and meeting a variety of important personal needs. Therefore, a return to driving is often a priority for those recovering from a TBI, with varying degrees of success depending on the severity of injury. Novack et al (2021) highlight that 40—70% of people return to driving following a TBI, but that there is a gap in evidence relating to the timing and other factors. The researchers adopted a follow-up protocol with eight study sites that involved 618 participants to gather additional data on timing of return to driving and the effects of age. Comparisons were made to non-injured drivers. Follow-up was initially by telephone, with a subsequent invitation to participate in a survey. Results showed that the rate of return to driving was greatest in the first 2 years after injury, reaching 62% at that point, with rate of return slowing after that period. Some 78% had returned to driving by 30 years after the injury. Of those involved in the study that remained active drivers, 42% reported returning to driving within 6 months after injury (n=456) and 93% were driving within 2 years (n=423). Results did not differ with age of injury or follow-up, or by gender or location. This study had a large sample and diverse spread in comparison with previous studies, demonstrating that more people return to driving than previously estimated. When those participants who resumed driving and then stopped are eliminated, the present study's findings are more consistent with others (67% active drivers). Uniquely, this study identified that employment, family income, ethnic identity, seizure activity and location were significant factors associated with return to driving; return to driving over time is more influenced by social and demographic characteristics than injury severity. For example, living in a remote area may necessitate returning to driving in comparison to living in an urban area with other transport options. Returning to employment also often necessitates driving, with income also required to afford the costs associated with driving. With driving linked to improved health-related quality of life, provision for timely access to driver assessment and training, regardless of income, employment status, and ethnic identity, is necessary for equality of provision and opportunity.

Novack TA, Zhang Y, Kennedy R et al. Return to Driving Following Moderate-to-Severe Traumatic Brain Injury. **Arch Phys Med Rehabil**. 2021. https://doi.org/10.1016/j.apmr.2021.02.006

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