

The Malta Medical Journal Students' Corner

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Sleep and the Brain: Neurological Insights into Rest and Cognition

Andre Mifsud, MD3; John Cefai, MD3

Sleep is a fundamental yet often overlooked biological process essential for maintaining optimal brain function, cognition, and physical recovery. This review synthesizes current evidence on the neurophysiological, cognitive, and restorative dimensions of sleep, with emphasis on its translational relevance for medical students, student athletes, clinicians, and patients. We explore the underlying neurological mechanisms governing sleep regulation, including circadian rhythms, neurotransmitter activity, and neural control systems such as the VLPO and orexin pathways. The cognitive implications of sleep are examined through its role in attention, learning, and memory consolidation, supported by theories like synaptic homeostasis and stage-dependent neuroplasticity. Furthermore, we analyse how sleep deprivation and disorders such as sleep apnoea detrimentally affect physical performance, emotional stability, and overall health. The physiological basis of muscle recovery during sleep and the consequences of inadequate rest on repair and endurance are also discussed. Finally, emerging innovations in sleep science, including wearable technologies, pharmacological aids, and neurotechnological research, are reviewed to highlight future directions and challenges. Collectively, this literature review underscores sleep as an active, restorative process vital for cognitive integrity, physical resilience, and long-term wellbeing.

Nutraceuticals for Cystic Fibrosis

Manuela Grech, MD4

Cystic Fibrosis (CF) is a prevalent genetic disorder characterized by a diverse array of clinical presentations affecting multiple organ systems. The primary objective of this paper is to delve into the aetiology and pathophysiological mechanisms underlying CF, with a particular focus on exploring the potential therapeutic benefits of various nutraceutical interventions in alleviating the clinical manifestations associated with this condition. Notably, certain nutraceutical compounds have emerged as promising candidates for mitigating the adverse effects of CF and improving the overall well-being and quality of life among affected individuals. Through a comprehensive examination of these nutraceutical agents, this study aims to shed light on their mechanisms of action and efficacy in managing CF-related symptoms and complications.

Innovations in home-based care for older adults and their impact on quality of life in Malta

Sybilie Mireille Cauchi, MD3

Malta's over-80s population will triple by 2050, straining community care facing 130-day waits and 40.3% isolation. This study evaluates how Smart home technology and Active aging enhance quality of life. Analysis reveals residential care costs the state €47.71/night, while residents contribute 80% of their pension. This is significantly more onerous than community care, where daily costs can be as low as

€0.57. Main gerontology recommendations include establishing a Quality Assurance Unit and mandatory training. These reforms in Malta are vital for achieving a sustainable society by 2030.

Paediatric Oesophageal atresia with tracheoesophageal fistula and duodenal atresia (case study)

Peter Calleja, MD3 ; Luke Camilleri, MD4

A complicated type of paediatric surgery case as reviewed in this paper consists of a neonate with two special types of GI atresias : a duodenal atresia (DA) and oesophageal atresia (OA) with distal tracheo-oesophageal fistula (TEF). Atresia can be defined as the congenital absence or obstruction of a normally patent lumen or orifice. DA is due to a failure of duodenal recanalization around the 4th to 10th week of gestation. OA/TEF arises from a defect in the formation of the tracheo-oesophageal septum.

The patient was prenatally diagnosed with DA via the double bubble sign on ultrasound. Post natally, an attempted nasogastric (NG) tube insertion failed and coiled, confirming OA. The double bubble sign being present simultaneously (such as in DA).

Surgical goals involve fistula ligation , division and restoration of continuous lumen. The standard procedure for OA/TEF (most commonly type C) is primary repair via thoracotomy or thoracoscopy, with end to end anastomosis. DA is primarily repaired via duodeno-duodenostomy, using the Diamond shaped (Kimura) procedure/anastomosis. The management includes utilising a replogle tube for suction and sham feeding.

Addressing the Long-term Effects of Cancer Treatments

Waleed Ahmed , MD1

Cancer survivorship has become a growing area of clinical and public health focus as advancements in early detection and treatment have significantly improved survival rates worldwide. However, the increase in long-term survivors has brought to light a spectrum of chronic physical and psychological sequelae that can persist years after treatment. This literature review examines the enduring physiological sequelae,

including cardiotoxicity, endocrine dysfunction, neurological impairment, and musculoskeletal decline. Psychological challenges such as anxiety, depression, post-traumatic stress symptoms, fear of recurrence, and body image disturbances are also discussed. It explores current and emerging interventions, including multidisciplinary survivorship care models, survivorship care plans (SCPs), rehabilitation programmes, and digital health innovations that aim to enhance post-treatment quality of life. The review also analyses emerging research trends in precision survivorship care, which seek to translate evidence-based interventions into sustainable practice. Policy and healthcare-system implications are discussed with particular emphasis on Malta, where the National Cancer Plan (2017–2021) outlines a framework for integrated survivorship care but faces challenges in implementation, equity, and long-term funding. The review concludes by stating that the long-term effects of cancer treatment demand coordinated multidisciplinary care, robust policy frameworks, and continued research to improve survivor outcomes and quality of life.

CaMKII α Overactivity and Epileptogenesis in TLE: Proposing Novel Inhibitors

Simone Bottai , MD3

Ca²⁺/Calmodulin Dependent Kinase II (CaMKII α), a serine/threonine kinase abundantly expressed in neurons throughout the brain, plays a crucial role in regulating synaptic plasticity. This dodecameric complex presents a regulatory domain (T-site residues 274–314) and a Ca²⁺/calmodulin-binding site (S-site residues 301–314) in each subunit which together form a contiguous groove mediating the enzyme's synergistic activation. CaMKII α is critical for long-term potentiation (LTP) and long-term depression (LTD). The balance between these opposite forms of plasticity and the degree of enzymatic activity depends on the frequency of excitatory synapse activation and the specific site of CaMKII α autophosphorylation.

Temporal Lobe Epilepsy (TLE), the most common yet typically treatment-resistant focal epilepsy, is characterised by recurrent unprovoked seizures and dyscognitive symptoms greatly affecting patients' quality of life. Synaptic plasticity is central to its pathogenesis, with key players being CaMKII isoforms

and glial fibrillary acidic protein, as evidenced by their increased expression in affected tissue. Evidence proposes increased CaMKII signalling as a contributor to maladaptive synaptic remodelling and epileptogenesis, although the causal relationship between this overactivity and TLE remains unclear. Consequently, this data highlights CaMKIIa inhibitors (e.g., AIP, Evans Blue) as promising novel focus for antiepileptic therapy studies.

ADHD in Women's Health: The Influence of Hormonal Transitions During the Menstrual Cycle, Pregnancy, and the Postpartum Period *Abhishek Sah Frendo, MD2; Martha Cassar, MD2*

Attention-deficit/hyperactivity disorder (ADHD) in women is shaped by hormonal transitions across the menstrual cycle, pregnancy, and the postpartum period. Fluctuations in oestradiol and progesterone influence dopaminergic function, executive control, and emotional regulation, producing phase-dependent variation in symptoms and treatment response. Adolescence is marked by heightened neuroendocrine sensitivity, pregnancy by heterogeneous clinical trajectories, and the postpartum period by oestrogen withdrawal, sleep disruption, and increased psychiatric vulnerability. Evidence supports phase-sensitive assessment, individualised pharmacological and behavioural management, and early reproductive planning. Longitudinal research integrating neuroendocrine, clinical, and functional outcomes is required to guide evidence-based care for women with ADHD across the reproductive lifespan.

Keywords: ADHD, women, menstrual cycle, pregnancy, postpartum, hormones

A literature review of the effect of energy drink consumption on academic performance amongst medical students

Shazney Falzon, MD2

Energy drinks are widely consumed among university students, particularly those enrolled in academically demanding programmes such as medicine. Existing literature indicates that students often consume energy drinks to combat fatigue, enhance alertness,

and improve concentration, especially during examination periods. The primary active ingredient, caffeine, has been shown to provide short-term improvements in attention, reaction time, and perceived cognitive performance.

Despite these potential short-term benefits, numerous studies have raised concerns about the adverse effects of frequent or excessive energy drink consumption. High caffeine intake has been associated with sleep disturbances, including reduced sleep duration, poorer sleep quality, and delayed sleep onset. Poor sleep quality has consistently been linked to impaired academic performance, diminished cognitive functioning, and reduced memory consolidation. Additionally, research suggests that energy drink consumption may be associated with increased stress, anxiety symptoms, and other negative health outcomes among university students.

Effect of obesity on natural fertility in women of reproductive age: A literature review

Leanne Cassar, MD2

The global prevalence of obesity has risen substantially in the recent decades, while also raising concerns about its impact on women's reproductive health, particularly among those of reproductive age. Obesity is associated with multiple factors that may impair natural fertility, including hormonal dysregulation, ovulatory dysfunction, and adverse metabolic changes. This literature review aims to examine and synthesize current evidence regarding the relationship between obesity and natural fertility in women of reproductive age. It explores proposed biological mechanisms, including endocrine and metabolic alterations, as well as observed effects on ovulatory function and time to conception. By summarizing existing research, this review highlights the potential influence of obesity on natural fertility and underscores the importance of weight management in supporting reproductive health.