NEWS

Non-invasive fingertip blood sensor reduces delay in the therapeutic plan

Hemorrhage and its resultant hypovolemia remains as a challenging domain in clinical practice, especially in trauma patients, as the clinical signs and symptoms are nonspecific and can be confounded by multiple factors, such as traumatic brain injury, anxiety, or drug intoxication.[1] Thorson *et al*., reported that the hemoglobin (Hb) measurement at the time of admission, predicts the adverse outcomes in trauma patients.[2] Recently, trauma surgeons at the University of Arizona, Tucson, has conducted the largest study for evaluating the use of the Spot check Pronto-7® Pulse CO-oximeter in 525 critically injured patients.[3] Spot check Pronto-7® Pulse CO-oximeter has a spectrophotometric sensor that senses multiple wavelengths of light.[4] The pulse CO-oximetry method detects the distinctive light-absorption characteristics of different Hb species and applies proprietary algorithms to determine Hb levels.[4] In this study, the Spot check readings in about 86% of patients had a significant correlation with their invasive Hb measurements. Generally, clinical laboratory analysis to estimate the patient's blood level or Hb count, can take 10 min or longer. This spot check device uses a fingertip sensor, much like that used in hospitals and clinics for reading patient's temperature or pulse within 40 s. Studies have reported that up to 70% of deaths among trauma patients occurred within the first 24 h of admission, especially 30–40% of trauma deaths are mainly due to severe blood loss. Therefore, the ability to measure Hb, a key indicator of internal bleeding, using spot check Pronto-7® Pulse CO-oximeter can facilitate rapid assessment of the patient's condition and therapeutic plan of management.

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Methylation of brain-derived neurotrophic factor: Marker for attempted suicides

Suicide is a global public health concern with nearly 1 million people dying per year (World Health Organization figures, 2012). Studies suggest that brain-derived neurotrophic factor (BDNF), one of the widely distributed neurotrophins, influences the development and survival of neurons in the central nervous system.[1] BDNF, after binding with and activating receptor tyrosine kinase B (trk B), is directly involved in many physiological functions in the brain, including cell survival and synaptic plasticity.[1] Dwivedi *et al*., has the studied expression of BDNF and trk B isoforms in prefrontal cortex in Brodmann area 9 and hippocampus, in the postmortem brain of suicidal subjects. The expression of BDNF and/or trk B isoforms were found to be significantly reduced in suicidal subjects compared with nonpsychiatric control subjects.[2] Recently, it has been reported that suicidal subjects showed an 8-fold greater number of methylated C-phosphate-G sites relative to controls. This study suggests increased DNA methylation as the possible contributor to neuropathology and psychopathology underlying the risk of suicide.[3] Keller *et al*., has revealed a novel link between epigenetic alteration in the brain and suicidal behavior by reporting the hypermethylation of BDNF promoter in the Wernicke area of the postmortem brain of suicidal subjects irrespective of genome-wide methylation levels. This indicates that a gene-specific increase in DNA methylation could contribute

to the down regulation of BDNF expression in suicide subjects.[4] Researchers have also observed higher BDNF promoter methylation status to be significantly associated with previous suicidal attempt history, suicidal ideation during treatment, and poor treatment outcomes for suicidal ideation. Therefore, BDNF methylation status can be used as a proxy marker for previous suicidal attempts and a clinical biomarker for poor treatment outcomes in suicidal subjects.[5]

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Stem cell therapy restores cognitive function in cancer patients

Radiation therapy (RT) either alone or in combination with chemotherapy, is the major treatment for primary and metastatic brain tumors. For majority of patients with brain tumors, RT will have a significant negative impact on their quality of life and neurocognitive function. Radiation-induced brain injury is a complex and dynamic process involving all cells in the brain (endothelial and oligodendroglia cells, astrocytes, microglia, neurons, and neuronal stem cells), which mainly acts by increasing the oxidative stress and inflammation.[1] A study published in 'Cancer Research', a journal of the American Association for Cancer Research, has reported that stem cell therapy may restore cognition in patients with brain cancer who experience functional learning and memory loss often associated with radiation treatment.[1] It was long believed that healthy brain cells, once damaged by radiation, cannot regenerate, but scientists from Johns Hopkins University has found that the neural stem cells, are resistant to radiation, and can be roused from a hibernation-like state to reproduce and generate new brain cells. These transplanted neural stem cells are able to migrate, replace injured cells and potentially restore lost function.[2] Human neural stem cells when transplanted into the brains of rats that had undergone radiation treatment, migrate throughout the hippocampus (a region known for the growth of new neurons) to develop into new brain cells. Studies have also found that transplanting as few as 100,000 human neural stem cells was sufficient to improve cognition after cranial irradiation.[3] After the surviving process, about 15% of these cells turned into new neurons, while others supported the functioning of cerebral neurons. Stem cell therapies have implications not only for brain cancer patients, but also in patients with progressive neurological diseases such as multiple sclerosis and Parkinson's disease.[1] Stem cell therapy appears to be a promising mainstay treatment to reverse radiation-induced damage of healthy brain tissue.

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VIEWS

Acute modulatory effects of binge drinking on immunity

Alcohol consumption has gained social acceptance in various strata of society especially in developing countries like India, with the prevalence of 21.4%. Evidences state that light to moderate alcohol consumption reduces the risk for cardiovascular disease, stroke, and diabetes. However, when individuals exceed moderate levels of alcohol intake, either regularly or episodically, it may lead to variety of health and social problems. The National Institute on alcohol abuse and alcoholism defines binge drinking as a pattern of drinking that brings blood alcohol concentration levels to 0.08 g/dL. This typically occurs after 4 drinks for women and 5 drinks for men in about 2 h. Studies have also reported that binge pattern of alcohol exposure during puberty permanently alters the system by which the brain triggers the body to produce stress hormones. Researchers at Loyola University Chicago Stritch School of Medicine have observed that binge drinking in young, healthy adults significantly disrupts their immune system. This study included volunteers, who drank enough shots of vodka to meet the definition of binge drinking. Their blood samples were taken at 20 min, 2 h and 5 h after peak intoxication. It was observed that though there was increased immune system activity, 20 min after peak intoxication with higher levels of leukocytes, monocytes, natural killer cells and cytokines that signal the immune system to ramp up, 2 h and 5 h after peak intoxication, circulating monocytes, natural killer cells and cytokines were decreased indicating that the immune system is less active. In addition to increasing the risk of traumatic injuries, binge drinking also impairs the body's ability to recover from such injuries. These studies highlight the importance of focusing on drinking patterns rather than the average levels of drinking, as predictors of health and mortality outcomes.

Masked hypertension: least inspected clinical condition

Masked hypertension (MH) is a clinical condition, gaining importance in recent years. MH refers to blood pressure (BP) readings that are normal in the clinics but are high when measured at home. This discrepancy could be due to lower anxiety level in the presence of a physician and the benefits of time away from potential home and work stress factors. Patients with MH or normal BP in clinic, but elevated BP when measured at home are associated with increased cardiovascular mortality and morbidity compared with those who had normal BP in both the clinic and at home. On the contrary, some patients have a higher level of anxiety while at clinics rather than at home, which could lead to increased BP in clinic but not at their home, a phenomenon called 'white coat hypertension'. According to a study published in the journal of the American College of Cardiology, MH is much less known than the white coat hypertension but carries a distinctly more serious prognosis. Recently, it has been reported that MH may represent about one-third of the hypertensive population and thus, a normal BP at the doctor's office may not necessarily mean that the patient is not at risk for hypertension. Measurements of home BP monitoring (HBPM) can be implemented in the routine assessment of hypertension risk. In addition, HBPM showed improved stratification of risk in those with MH but did not predict the cardiovascular morbidity and mortality in individuals with severe hypertension. Especially in this era of technology advancement, smart phone applications are available for monitoring the BP trends over time. Therefore, MH known to be a precursor of sustained hypertension should be monitored and tested regularly to ensure early diagnosis.

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