

Gargi College under the aegis of IQAC and
Indian Academy of Neurosciences
presents

NEUROEUNOIA 2020 A NEUROSCIENCE AFFAIR

A JOURNEY INTO THE BRAIN: THE UNIVERSE WITHIN
16-17 OCTOBER 2020

Visit <https://neuroeunoia.wordpress.com/>



ABSTRACT BOOK

ISSUE 01

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IMAGE CREDIT: OLEG SHUPLYAK



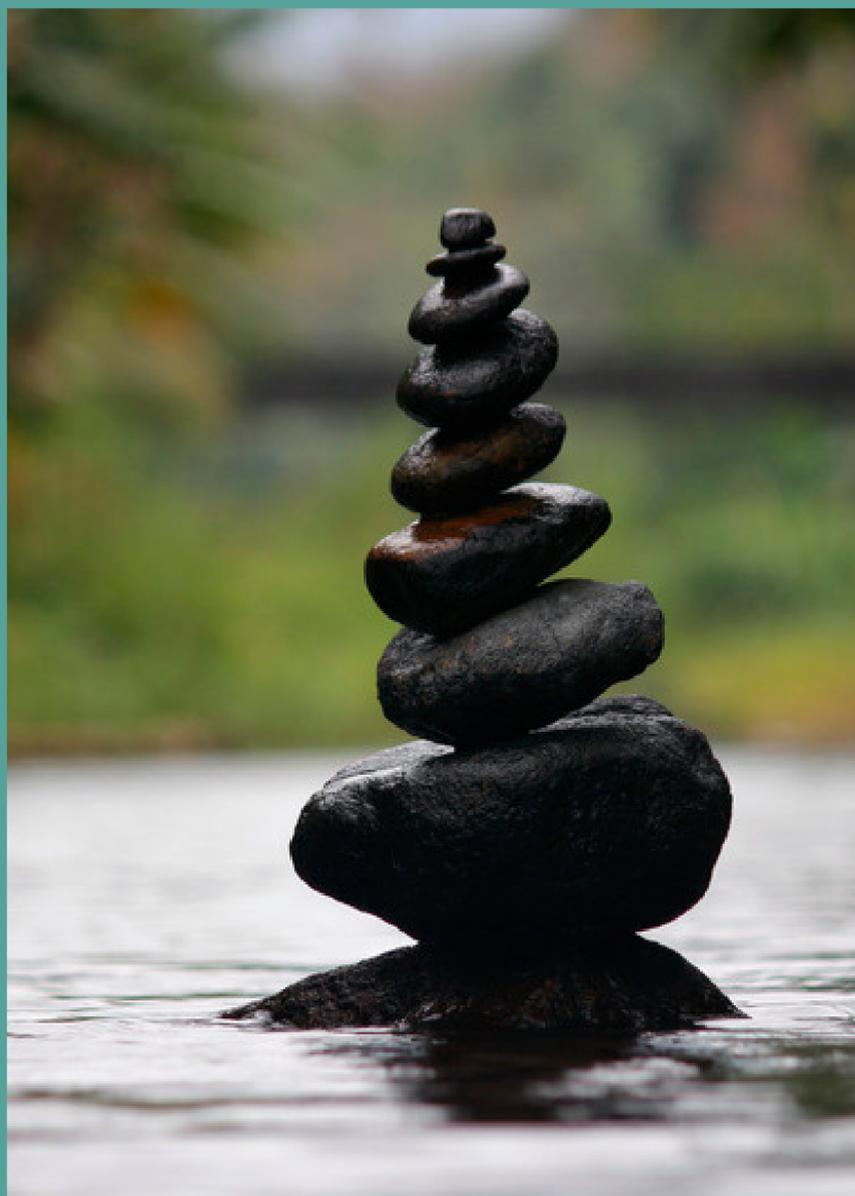
NeuroEunoia

Perceptions !!!

- 33** Neural Disorders and Treatment of Neural Disorders
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In rhetoric, eunoia is the goodwill a speaker cultivates between themselves and their audience !

INCEPTION



CONFERENCE

According to a NMHS report one in every twenty people in India are suffering from depression. Generally speaking, it is critical that the current youth be aware of various mental health related aspects.

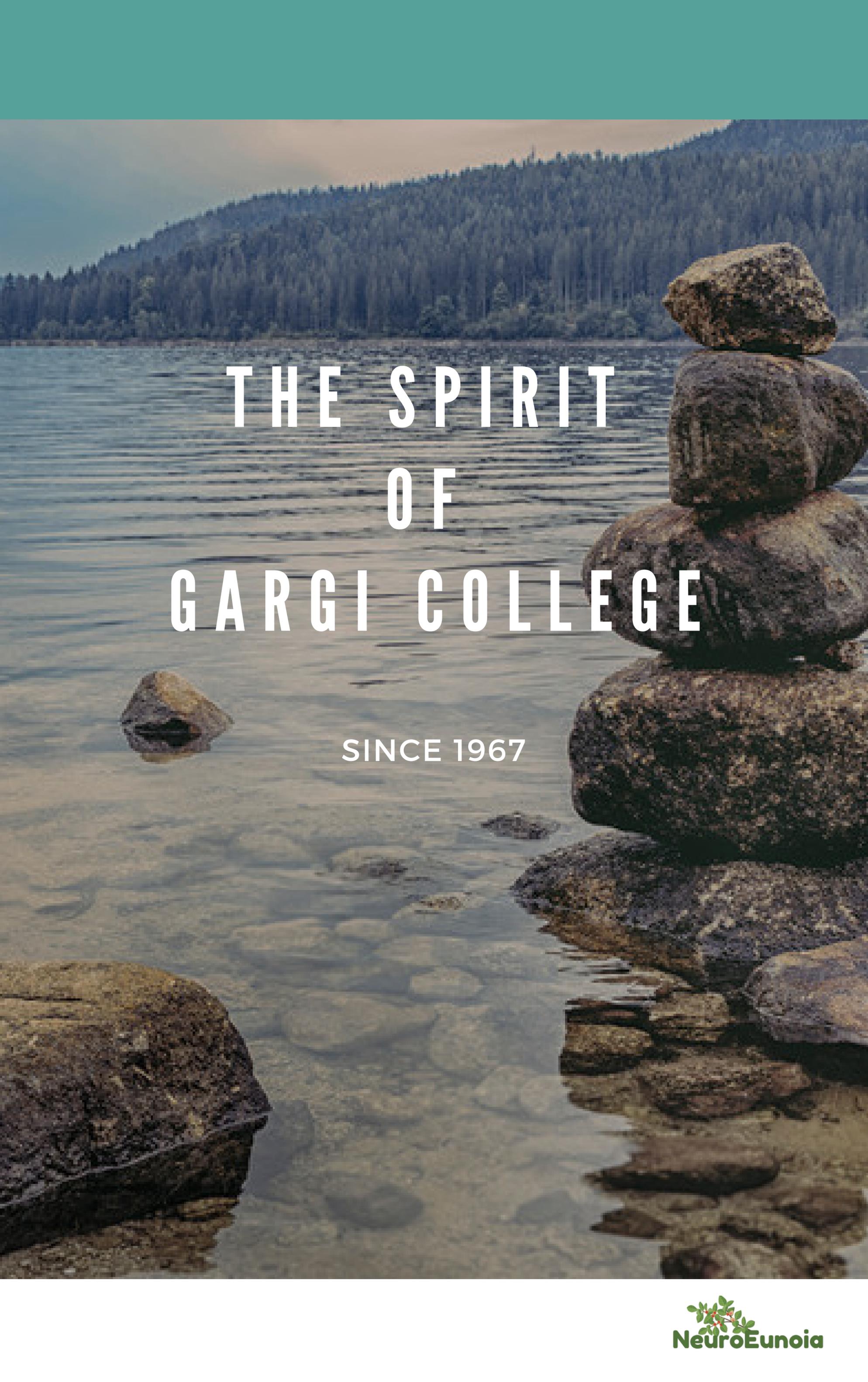
This is essential for both individual wellbeing and society. Sleep and mental disorders usually occur at a similar time, and untreated sleep disorders later in life might increase the chances of developing psychiatric conditions, such as depression. It is also important that students realise the importance of sleep, which is the most compromised in the current scenario. Depression, anxiety, and drug abuse are the most common mental problems related to sleep complaints. Neurodegenerative disorders remain one of the biggest mental health problems. Some rather age dependent disorders are growing nowadays, as the elderly population has recently risen as a result of developments in medical facilities. It is therefore important that youth become interested in pursuing neuroscience research. This kind of change needs to be consciously promoted and supported. This Conference is a minuscule effort to mine frontier knowledge and pave the way for a next generation of breakthroughs.

LOGO

Logo: The logo is inspired by the need for a healthy mind and, therefore, a mind that is receptive to all opinions. In rhetoric, eunoia is the goodwill a speaker cultivates between themselves and their audience/ A well-mind/ Beautiful Thinking. Many people would wonder why in a conference logo on neuroscience the need for leaves, well those leaves are from the plant *Withania somnifera* commonly known as Ashwagandha, Indian ginseng.

Some research suggests that Ashwagandha may be able to delay the onset, prevent or even cure such neurodegenerative diseases that cause loss of cognitive function as seen in Alzheimer's and Dementia disease. So, the meaning of the term 'NeuroEunoia' and Ashwagandha lies in returning to nature and healing our mind, body and soul.





THE SPIRIT
OF
GARGI COLLEGE

SINCE 1967



Gargi Vachaknavi (born about c. 700 BCE) was an ancient Indian philosopher. In Vedic Literature, she is honored as a renowned expounder of the Vedas, and known as Brahmavadini, a person with knowledge of Brahma Vidya. In the Sixth and the eighth Brahmana of Brihadaranyaka Upanishad, her name is prominent as she participates in the brahmajajna, a philosophic debate organized by a great King and challenges the sage Yajnavalkya with perplexing questions on the issue of atman (soul). She is also said to have written many hymns in the Rigveda. She remained a celibate all her life and was held in veneration by the conventional Hindus (Adapted from Alchetron).

Gargi College (established in 1967), is an elite all-girls college of the University Of Delhi. It offers quality education in the streams of Science, Arts, Commerce and Education, with about 4,000 students on its rolls. In 2009, the Department of Biotechnology, Ministry of Science and Technology, Government of India awarded Star College Grant to the college. In 2016, NAAC has accredited Grade A to Gargi College. The college's alumni include several prolific personalities from various walks of life. Gargi gets its name from the ancient and philosopher Gargi Vachaknavi.

NEUROEUNOIA 2020

ABSTRACT BOOK / ISSUE 01

THE TEAM

"Has it ever struck you ... that life is all memory, except for the one present moment that goes by you so quickly you hardly catch it going? It's really all memory ... except for each passing moment"

ERIC KANDEL

DR PROMILA KUMAR

**PATRON, NEUROEUNOIA 2020
PRINCIPAL (OFFICIATING)
GARGI COLLEGE, UNIVERSITY OF DELHI**



011 2649 4544



neuroeunoia2020@gmail.com



Siri Fort Rd, Siri Fort
Institutional Area, Siri Fort,
New Delhi, Delhi 110049



<https://gargicollege.in/>

DR JASVINDER KAUR

CONVENER

ASSISTANT PROFESSOR
GARGI COLLEGE, UNIVERSITY OF DELHI



DR POONAM SHARMA

CO-CONVENER

ASSISTANT PROFESSOR
GARGI COLLEGE, UNIVERSITY OF DELHI



DR SUPRIYA SINGH

CO-CONVENER

ASSISTANT PROFESSOR
GARGI COLLEGE, UNIVERSITY OF DELHI



DR UDITA MUKHERJEE

CO-CONVENER

ASSISTANT PROFESSOR
GARGI COLLEGE, UNIVERSITY OF DELHI



ORGANISING COMMITTEE MEMBERS

DR. NEERA PANT
GARGI COLLEGE

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GARGI COLLEGE

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GARGI COLLEGE

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DYAL SINGH COLLEGE

DR. JASPREET KAUR
MAITREYI COLLEGE

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(THE ENERGY AND RESOURCES
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DR. SUKANYA LAL
(UNIVERSITY OF DELHI)

DR. RAVI TOTEJA
(UNIVERSITY OF DELHI)

**TAKE THE
ROADS LESS
TRAVELLED!**

WORDS OF WISDOM

Dr. Sanjay Pratap Singh

CHIEF-GUEST



The human brain is possibly the most complex organ in the known universe. It has a 100 billion neurons, each of which can have up to 10,000 connections. Thus, the number of 'brain states' can exceed the number of known particles in existence. This is our master organ; it controls or influences every part of our body. It is the final frontier of science. Neuroscience along with theoretical physics will unravel the mysteries of human beings and the known universe respectively. This is the age of Neuroscience; discoveries of the brain will profoundly change human existence as we know it. It is such an exciting time to be a part of this field, you have the opportunity to go where no human has gone before.

Thus I want to commend the organizers of NeuroEuonia 2020, as this will bring state of the art neuroscience to audiences in India. It will serve to update scholars and inspire younger attendees to become a part of this Neuroscience revolution. It will stimulate new vistas of the very organ it plans to study. Our ancient Indian tradition of scholarship which had unlocked the great mysteries of the Universe and of the human mind will motivate our young scholars to embark on this exciting journey to the final frontier.

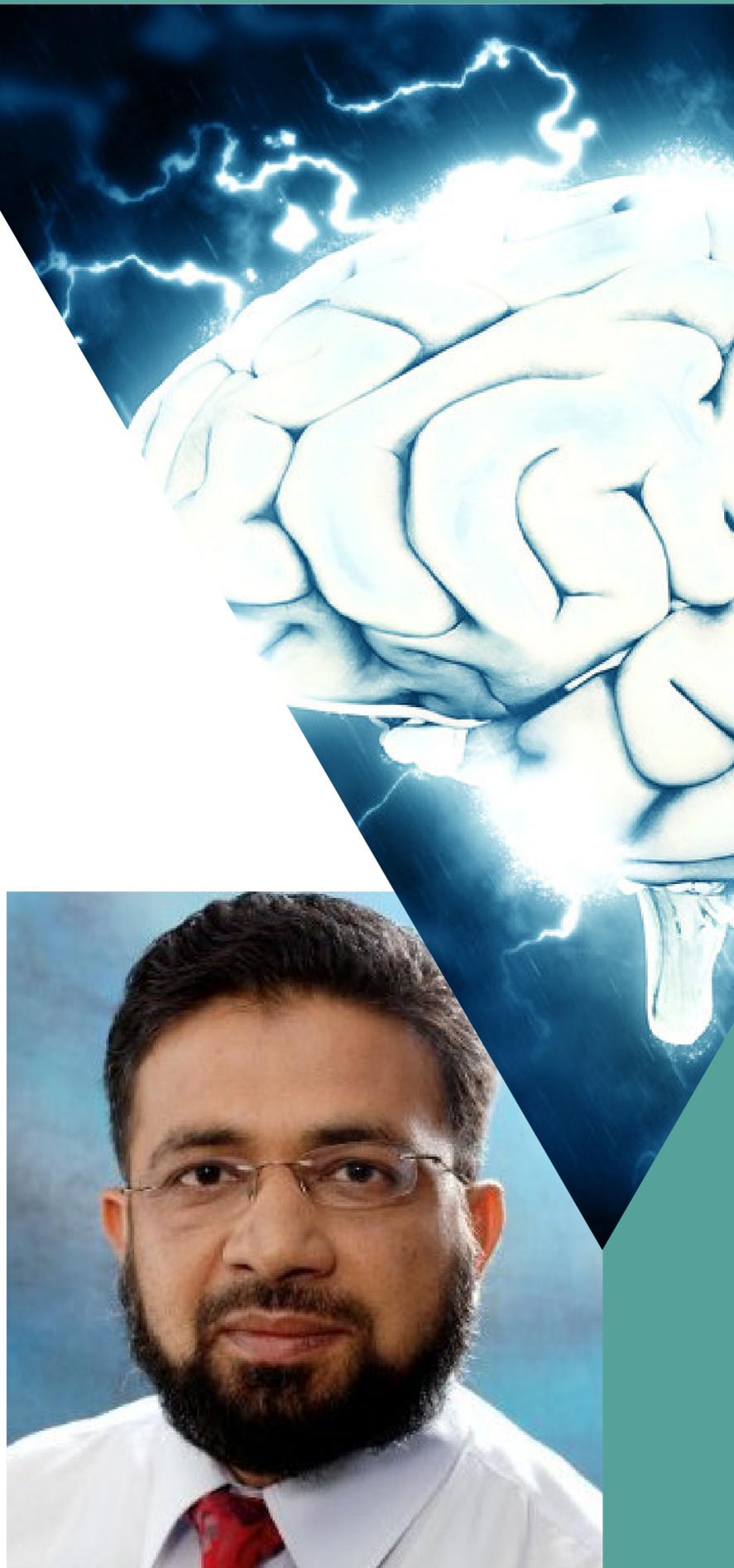
Prof. Rihan Khan Suri

CHAIRMAN

“Biology gives you a brain, life turns it into a mind”, This statement is true for each one of us, right from the point of us being a neonate and then getting on the journey of life, being constantly exposed to stimulus, emotions and information. It is indeed perplexing to even think of imagining half of Leo Tolstoy’s quote, “...If it is true that there are as many minds as there are heads...”. We have always wondered about where the distinction lies between the mind and the brain.. Or is it mere subjectivity or objectivity, respectively?

Many such questions bubble up and vanish every day with little introspection and observation.

I am happy to know that Gargi college is organising International Virtual Conference "NeuroEunoia 2020" which is an attempt to get answers to the intriguing complexities of the brain by organising this event, the first of its kind International Conference on Neuroscience from 16th October to 17th October 2020. I appreciate this unique effort to uncover the mysteries of the brain which is important in terms of interpreting the basic concept of neuroscience with an objective to increase the participation of women in sciences, especially neuroscience. I extend my greetings and felicitations to the entire team of the event and wish the Conference a great success.



Dr. Promila Kumar

PRINCIPAL

Mental health is a very misunderstood term, rather a term, less understood!

We, at Gargi College, have always strived to create a conducive and a compassionate environment for everyone. Today, humanity is suffering from a global trauma of COVID-19 pandemic. In such distressing times, the importance of the well-being of the mind has come to the fore-front for each one of us as this seems to be the best antidote currently available. It is therefore my great pleasure to say that we at Gargi are here to organize the first of its kind E- conference NeuroEunoia, 2020 on October 16th- 17th, 2020. Although it is a neuroscience affair, the topics covered in the lectures by our eminent speakers are sure to affect all of us.



Many times, a discussion about mental wellness makes us look into ourselves, and tends to make us feel a bit uncomfortable. We aim to abolish this taboo, so that we nurture the mind-scape to look for reasons, finding solutions and not to shy away from talking about it.

ISSUE NO 1



THE NEURO EUNOIA

OCTOBER 2020

Prof. Rup Lal

GUEST OF HONOUR

As quoted by Dr. Francis Crick, 'there is no scientific study more vital to man than the study of his own brain. Our entire view of universe depends on it'. It gives me immense pleasure to welcome you all to the International E-conference entitled "NeuroEunoia 2021: A Neuroscience affair" by Gargi College, University of Delhi.

This conference is an attempt to unite academicians, researchers, postgraduates, and undergraduates to unfold the latest research trends. The conference will also address the impact of environmental factors on our mental health and day to day life. Neuroscience is one of the most exciting branches of science because the brain is the most fascinating object in the universe.

I feel privileged to be a part of this conference with the aim to benefit young scientific minds with knowledge during this lockdown. Hope the young generation gets maximum benefit out of it.



Prof. Pravat Mandal

GUEST OF HONOUR

I am extremely pleased to know this exciting and timely event "NeuroEunoia 2020", to be held at Gargi College, Delhi. This will have a high impact and wishing it a grand success.

Dr. Jasvinder and her colleagues have made commendable efforts to make it a reality.



Dr Jasvinder Kaur
Dr Poonam Sharma
Dr Supriya Singh
Dr Udit Mukherjee

CONVENER & CO-CONVENERS

Prof. V.S Ramachandran said in one of his BBC Reith Lectures, “Science tells us we are mere beasts, but we don’t feel like that. We feel like angels trapped inside the bodies of beasts, forever craving transcendence”.

Since the very inception of the human race, people have been wondering about what makes us humans, what makes us behave like humans. It was the observation of the normal behavior and the varied behavior that led philosophers to dwell on the existence of the mind and then eventually drawing a very thin line between the mind and the brain. The field of Neuroscience as it is today, is a product of vast and meticulous observation complemented by scientific advancements. It has come so far, that as of today, several artificial intelligence applications are being developed to try to reach the elusive goal of these applications functioning exactly like the human brain does.

Stemming from the steeply growing importance of Neuroscience, happened the conception of NeuroEunoia, 2020. As the subject of Neuroscience was introduced in our college, it very quickly wrapped us snugly in its wonderful intricacies. The more we dwelled into it, the more we saw its imprints in our daily lives, in the people we all interact with and ultimately telling us who we are!

With the aim of creating awareness about mental well being, to try to create an all inclusive empathetic society, we thought of beginning charity at home. We are indeed grateful to our dear Principal, Dr. Promila Kumar, and everyone who associated with us on this journey to help us realise our beautiful dream! We will not shy away from stating that each of our eminent speakers who agreed to join us, restored our faith in goodness in this world in such testing times.

Words indeed fall short to express how humbled and grateful we are to each one of you who joined us in this journey!

CONFERENCE PROGRAMME



FRIDAY & SATURDAY, OCTOBER 16-17

Webex Virtual Platform

HOSTED BY GARGI COLLEGE, UNIVERSITY OF DELHI

MIRACLES OF THE BRAIN

*Let's untangle the knots!
with*

Dr. Sanjay Pratap Singh

*Chairman & Professor, Department of
Neurology, Creighton University School of
Medicine, Director - Neurological Institute,
CHI Health, Omaha*

PRE-CONFERENCE
SUPER PREVIEW
19 SEPTEMBER 2020

16 OCTOBER 2020



DAY 1

Friday, October 16, 8.30 am–5.30 pm



DR. JASVINDER KAUR

Assistant Professor, Gargi College/ Convener

Welcome Address | 8.30 am



PROF. RIHAN KHAN SURI

Chairman, Governing Body

Address | 8.40 am



DR. PROMILA KUMAR

Principal (Officiating) / Patron

Address | 8.50 am



DR. SANJAY PRATAP SINGH

Chairman & Professor, Department of Neurology, Creighton University School of Medicine, CHI Health, Omaha

Brain, the final frontier | 9 am



PROF. PRAVAT MANDAL

Scientist VII/Senior Professor/ Division of Computational Neuroscience and Neuroimaging, National Brain Research Centre, Manesar, Gurgaon

'Brahma', the Indian Brain Template | 11 am

16 OCTOBER 2020



PROF. RUP LAL

NASI Senior Scientist Platinum/ Jubilee Fellow, The Energy and Resources Institute, Delhi

Emerging Evidence Linking the Gut Microbiome to Neurological Disorders | 12 am

BREAK

BRAIN TEASERS | 1 PM



DR. ARUN SASIDHARAN

Scientist C (Neuroscience) Centre for Consciousness Studies, Neurophysiology, NIMHANS, Bangalore

Sleep Cognition and Consciousness | 1.30 pm



PROF. MADHURI BEHARI

Professor & Head/ Department of Neurology/ Fortis Hospital, Vasant Kunj

Dementia- The Pandemic Threatens | 2.30 pm



PROF. GURCHARAN KAUR

Former Dean, Faculty of Life Sciences

Department of Biotechnology, Guru Nanak Dev University, Punjab

From Ayurvedic folk medicine to preclinical neurotherapeutic role of a miraculous herb, *Tinospora cordifolia* | 3.30 pm

VIRTUAL POSTER DISPLAY

BRAIN TEASERS| 4.30 pm

OCT
17
2020



ART
MEETS
SCIENCE
YET AGAIN!

**ENJOY SOULFUL
MUSIC**

9 AM ONWARDS

17 OCTOBER 2020


DAY 2
Saturday, October 17, 8.30 am–3.30 pm


SARANGI NAWAZ USTAD SABIR KHAN

(Jaipur Gharana)

Musical Extravaganza | 9 am



DR. JOHN A. BELLONE

Clinical Neuropsychologist Advanced Neurobehavioral Health of Southern California, USA

Becoming a Super-Ager | 9.30 am



PROF. SUBRATA SINHA

Professor and Head, Department of Biochemistry/ All India Institute of Medical Sciences, New Delhi

Neurobiology of Dyslexia | 10.30 am



PROF. SHIV KUMAR SHARMA

Scientist VI & Professor, National Brain Research Centre, Manesar, Gurgaon

Molecular and Synaptic Mechanism of Memory Function | 11.30 am

BREAK
12.30 pm

17 OCTOBER 2020



DR. UPASANA GALA

Founder & CEO - Evolve Brain Training, Dubai, UAE

Unlocking ADHD | 1 pm



PROF. SUMAN JAIN

Professor, Neurophysiology Laboratory, Department of Physiology, AIIMS, New Delhi

Synaptic Plasticity and Neuroregeneration | 2 pm

VALEDICTORY

3 pm

OCT. 2020 | ISSUE 1

A walk through the talks!

The first publication of NeuroEunoia2020



WHAT TO EXPECT

Leaders in the field would discuss their groundbreaking research during the invited lectures. These talks would be meant for the general audience and would essentially provide an overview of the topic. The invited speakers would be highlighting the key developments, and deliver the talk as if telling a story; therefore, these presentations shall prove excellent for students.

BRIEF OF TALKS INSIDE:

19 September 2020

16 October 2020

17 October 2020

MIRACLES OF THE BRAIN

Dr Sanjay Pratap Singh

This is a new era in the science of the brain. This is when we are at the edge of an era, when we will be able to enhance neurological abilities, modify memories and even modulate human consciousness. The American Academy of Neurology has had to recently come out with guidelines on Neural enhancements for physicians. This certainly tells us that this era of being able to enhance human mental abilities is just around the corner. The study of Savants and our new understanding of brain function is leading to the novel science of 'manufacturing geniuses'. The science of memory has evolved from the work of Eric Kandel to the effect of adrenalin on memory and then to the recent concept of stable and unstable memory.

To the labelling of individual memories and finally to the downloading of human memories, this is a fascinating journey of just one aspect of the human brain.

And finally, the mystery of human consciousness, which used to be a subject of philosophers is now finally being understood by Neuroscientists. We now have an insight into the fundamental circuit of human consciousness. And this knowledge has allowed to modulate human consciousness. And yet we have people diagnosed as being in Coma who are actually conscious. These are just a few miracles of the brain that gives us a peek into this new era in human existence.

“

AS YOU KNOW, IN MOST AREAS OF SCIENCE, THERE ARE LONG PERIODS OF BEGINNING BEFORE WE REALLY MAKE PROGRESS
- ERIC KANDEL

”

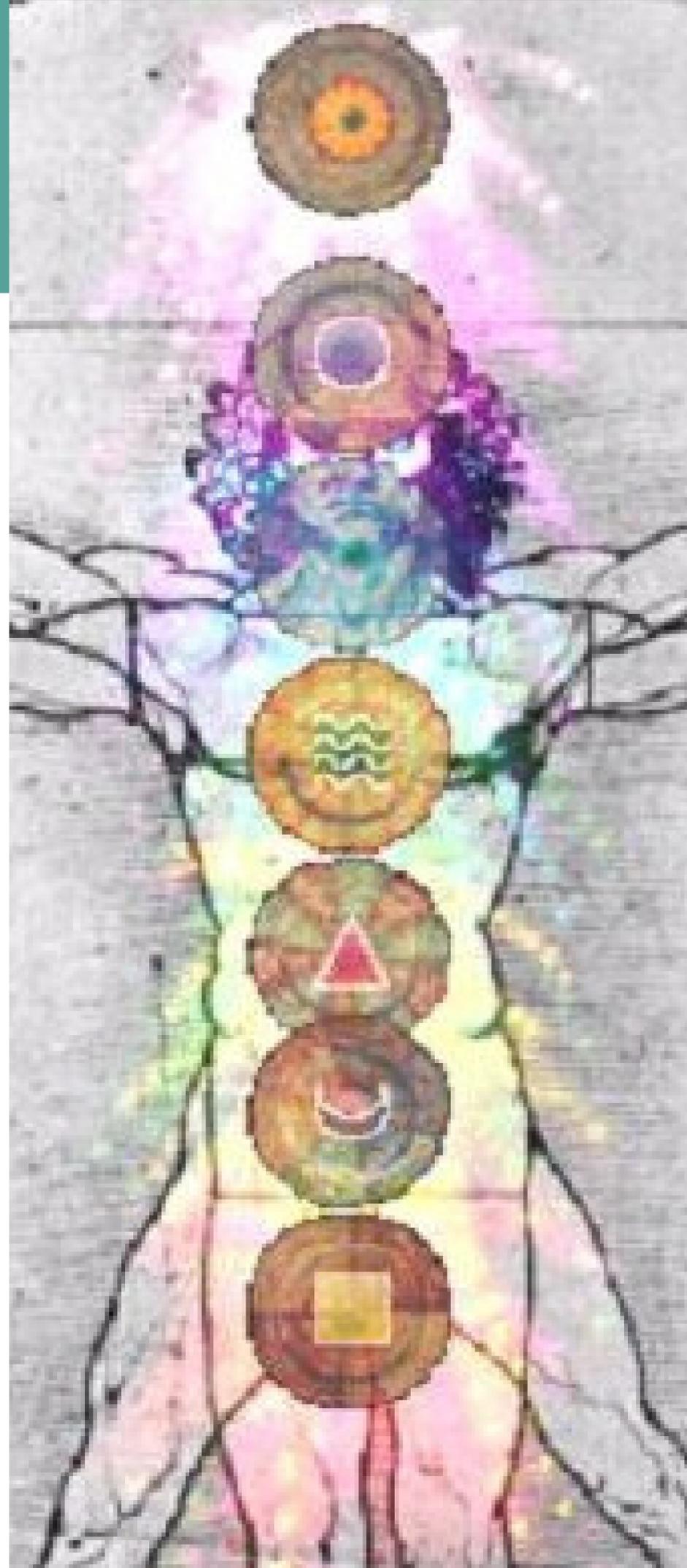


SOURCE: [NGM.NATIONALGEOGRAPHIC.COM/2010/01/BIONICS/THIESSEN-PHOTO...](https://ngm.nationalgeographic.com/2010/01/bionics/thiessen-photo...)

“BRAHMA- THE INDIAN BRAIN TEMPLATE”

PROF. PRAVAT MANDAL

Brain template is a gross representation from various brain images to understand brain functionality in healthy as well as in diseased conditions. Studies have so far been conducted to develop a standard brain template that is compatible with different populations. As the human brain is highly different in shape and size between individuals and basic demographics. Due to lack of any Indian brain template, previously Indian scientists and clinicians use Canadian brain template (MNI) for comparative analysis for Indian brain study or any surgical reference point. Thanks to this new Indian Brain template named as “Brahma”, which is generated from high quality images using high resolution images using 3T MRI scanner. It took two years of intense brain mapping across India. The striking feature is that this template is validated from functional MRI experiments using finger tapping and working memory tasks. This DST funded project outcome as template generation pipeline and the template BRAHMA itself is available for academic use free of charge as a good example of **Atmanirbhar Bharat**.



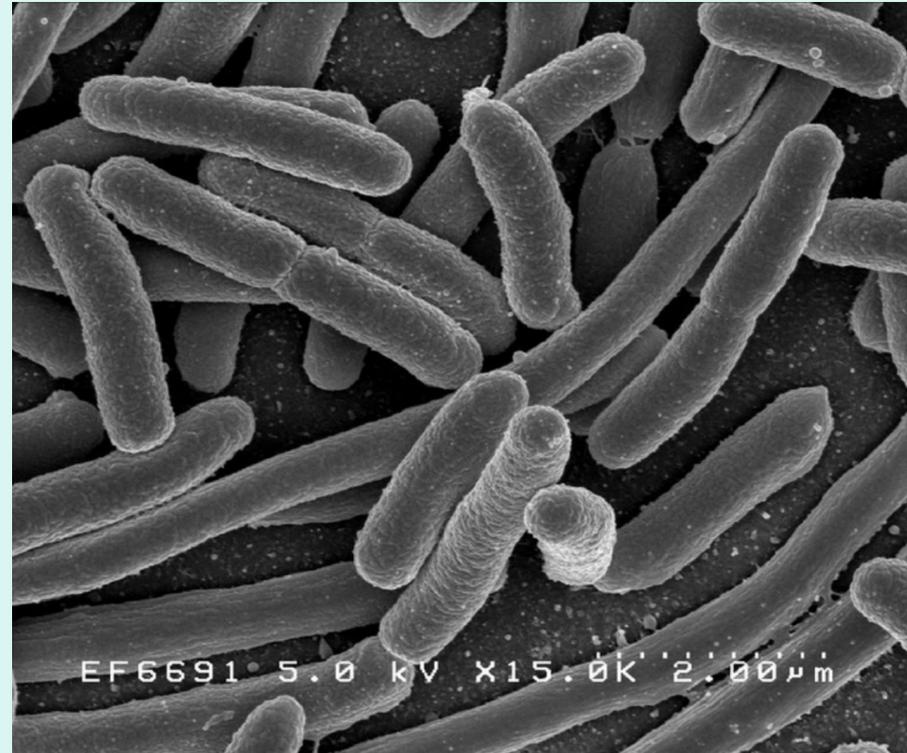
Sahasrara or crown chakra is generally considered the seventh primary chakra, according to most tantric yoga traditions. Often referred to as a thousand-petaled lotus, it is said to be the most subtle chakra in the system, relating to pure consciousness, and it is from this chakra that all the other chakras emanate.

EMERGING EVIDENCE LINKING THE GUT MICROBIOME TO NEUROLOGICAL DISORDERS

DOES YOUR BELLY CONTROL YOUR BRAIN?

PROF. RUP LAL

In recent years, growing evidences have indicated a key role of gut microbiota in contributing to mental health. The connection between gut and brain is modulated by microbes via neural, neuroendocrinal and metabolic pathways that are mediated through various neurotransmitters and their precursors, hormones, cytokines and bioactive metabolites which are transported by gut brain axis. Impaired functioning of this connection can enhance the severity of mental disorders. Around 1 billion of the world population is suffering from emotional, psychological and neurological imbalances. Thus, understanding the role of gut microbes in mental disorders may provide a lead in therapeutics and treatments. Since, variations occur in the conditions associated with different mental disorders and some of them have overlapping symptoms, it becomes important to have a holistic understanding of gut dysbiosis in these disorders.



CREDIT: ROCKY MOUNTAIN LABORATORIES, NIAID, NIH

A variety of therapeutic interventions including administration of live microbes (psychobiotics) to treat mental health disorders and/or their symptoms have been employed and tested. In many case studies, diet control, faecal microbiota transplantation (FMT) and psychobiotics has proven effective to an extent on relieving the manifestations of patients suffering from mental disorders and on restoring the normal gut microbiota. Hence, combinations of microbe-based therapeutic interventions to modulate gut microbes and in-use psychological treatment practices can be integrated and based on patient's gut microbiome can be potentially adopted for effective treatment of the mental disorders.

NEUROLOGICAL DISORDERS

NEUROBIOLOGY OF DYSLEXIA

PROF. SUBRATA SINHA

Dyslexia is a heritable neurodevelopmental disorder characterized by difficulties in reading and writing. It is a specific learning disorder, in that the difficulties are manifested without globalised intellectual disability or lack of opportunity eg. caused by poverty, lack of schooling etc. It could be predisposed by different genes, and also by gene environment interactions. There may be different biological components acting in different individuals, giving rise to what are called different 'endophenotypes' - a common endpoint on the assessment scale resulting from diverse biological causes. It has with a strong familial pattern. Dyslexia affects 5-10% of the population, and could exist by itself or with other comorbidities, like ADHD. There are a number of genetic studies on dyslexic, both population and family based. Methods of classical genetics as well as next generation sequencing have been utilized. There have been a number of candidate genes demonstrated with varying degrees of replicability. We are studying large extended multi-generational families from different endogamous groups in order to understand the genetic biology of dyslexia predisposition. We are studying three multi-generational families for genetic studies. These are from 3 different endogamous groups. It is expected that the relative genetic homogeneity within the families would assist in the identification of susceptible genes. This is being done by next generation sequencing followed by the attribution of their biological effects. Distinct patterns of inheritance are observed in each family.

While in one case the pattern is recessive, in another the pattern is dominant in nature. There is also a difference in the disease associated loci. The results so far indicate that there are multiple pathways to a similar dyslexic phenotype, which however may have subtle variations that are not always possible to distinguish by routine testing. In one instance, a novel function of a long non-coding RNA linked to inherited dyslexia has been found to be related to neural progenitor differentiation.

DEMENTIA: THE PANDEMIC THREATENS

PROF. MADHURI BEHARI

Dementia is the expected to become the global epidemic in two decades time. It is expected to be the most common cause of morbidity and cause of high global disability-adjusted life years (DALYs). As the population globally is aging, the neurodegenerative disorders esp. Alzheimer's disease (AD) a leading cause of dementia is increasing. Apart from AD other causes like diffuse vascular insufficiency also contributes to dementia. For any treatment to be effective, its identification in early stage is important.

This takes us to identifying symptoms of early dementia. In addition, there is a need to search for biomarkers, which can identify dementia in pre-symptomatic phase which can with certainty diagnose early phase of the disease. Scientists all over the world are searching for reliable biomarkers for AD.

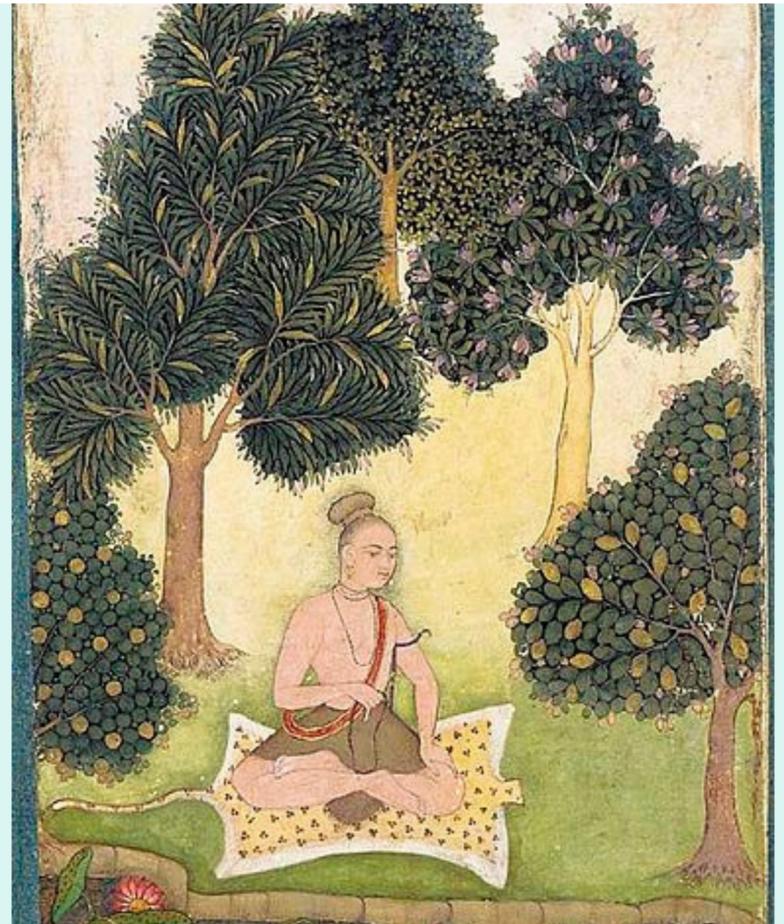
FROM AYURVEDIC FOLK MEDICINE TO PRECLINICAL NEUROTHERAPEUTIC ROLE OF A MIRACULOUS HERB, TINOSPORA CORDIFOLIA

AYURVEDA IN NEUROSCIENCE

PROF. GURCHARAN KAUR

Ayurveda, the Indian traditional system of medicine is based on the use of important medicinal plants to cure different acute or chronic diseases. Initially, the use of various herbal formulations was dependent on traditional knowledge without much scientific validation about their mechanism of action, active principles, cellular and molecular targets, biosafety and efficacy. Herbal products are also gaining acceptance worldwide as evident from various policies and laws being implemented in support of traditional medicines by World Health Organization. In Ayurveda, the age-old Indian traditional system of medicine, health is considered to be achieved as equilibrium of physical and mental wellbeing.

Rasayana herbs were mainly used for pharmacological treatment of neurological diseases and *T. cordifolia* is recognized as one of the most popular Rasayana herbs of Ayurveda. The traditional claims of therapeutic activity of this herb for treatment of fever, diabetes, anxiety, immunodeficiency, memory deficit and psychological problems have been explored by different research groups using reverse pharmacology and advance technological approaches. The ongoing research work in our lab is aimed to explore the neurotherapeutic potential of *T. cordifolia* in the light of various preclinical and clinical studies from literature.



CREDIT: [HTTPS://WWW.TRUEAYURVEDA.COM/AYURVEDA-YOGAS-LONG-LOST-COUNTERPART/#POST/0](https://www.trueayurveda.com/ayurveda-yogas-long-lost-counterpart/#POST/0)

We have used different in-vitro and in-vivo model systems to validate the traditional use of *T. cordifolia* extracts. 50% ethanolic extract (TCE) as well as whole stem powder was tested for their anxiolytic activity using acute sleep deprivation and high fat diet induced obesity rats as model systems. To investigate the neuroprotective properties of *T. cordifolia*, primary cerebellar neurons challenged with glutamate were tested for neuroregenerative potential. Further neurobehavioral parameters such as anxiety, motor co-ordination, learning and memory functions impairments were studied in rats after glutamate induced excitotoxicity and the underlying mechanism(s) of potential beneficial effects of butanol fraction of TCE (B-TCE) were explored. The data provide pre-clinical evidence of neuroprotective potential of *T. cordifolia* and encourages to carry out further studies using appropriate models of neurodegenerative diseases for neurotherapeutic approaches.

SLEEP COGNITION AND CONSCIOUSNESS

DR. ARUN SASIDHARAN

Sleep is a universal phenomenon and has fuelled imaginations across several domains. The current talk will focus on an aspect of sleep that is often discussed at length in philosophical and spiritual fields, but seldom addressed in Neuroscience beyond phenomenology - "Our brain remains aware even when we are asleep". During initial part of the talk, I will introduce the common understanding of human sleep from a Neuroscience standpoint, covering the different sleep stages, underlying brain processes and some interesting facts about sleep from other species. In the later part of the talk, I will try to draw some parallels between sleep and wake states in terms of cognitive processes, and yet involve different brain networks.

Elaborating upon some of the recent cutting-edge scientific studies conducted during sleep, I will emphasise that sleep could be viewed as a window to examine the state of mental functioning. Brain's response to strong electromagnetic 'Zaps' can be used to understand level of consciousness during different sleep stages and contrast it with that during coma and vegetative states. Content and duration of dreaming could be examined using sleeping brain patterns. Ability of sleeping brain to listen to sounds can be used to evaluate deficits in mental processing, and perhaps neural plasticity associated with long-term mental training like Meditation.

Neuromodulation techniques can be used to not only improve sleep, but also affect waking mental activities. This talk thus aims to inspire inquisitive minds to explore the vast potential of sleep studies, looking beyond conventional ideas.

BECOMING A SUPER-AGER

DR. JOHN BELLONE

"BECOMING A SUPERAGER: IMPROVING COGNITIVE FUNCTIONING THROUGH A HEALTHY LIFESTYLE"

Rates of cognitive decline and brain disorders such as Alzheimer's disease increase with advanced age, and the world's population is rapidly aging. However, not all older adults experience a decline in abilities, and we call these individuals "SuperAgers." This begs the question, "What are these individuals doing differently, and how can I become a SuperAger?" This uplifting talk will walk through several powerful, evidence-based lifestyle behaviors that people of all ages can do to reduce their chances of cognitive decline.

LEARNING AND MEMORY

PROF. SHIV KUMAR SHARMA

"MOLECULAR AND SYNAPTIC MECHANISM OF MEMORY FUNCTION"

Memory plays critical role in our proper day-to-day functioning. It also helps us plan our future. Given the importance of memory in our lives, efforts are directed towards understanding the mechanisms involved in this important cognitive function. Long-term potentiation (LTP), a kind of synaptic plasticity that shows long-lasting enhancement in synaptic strength after an experience, is considered to be the synaptic basis of memory formation. Molecular changes regulate LTP and memory.

The role of protein phosphorylation is extensively studied in LTP and memory. Acetylation is another protein modification that plays critical roles in these processes. Several studies have used histone deacetylase (HDAC) inhibitors to increase the level of acetylation, and study the effects on LTP and memory. The HDAC inhibitors affect acetylation of histones and other proteins raising the possibility that acetylation of non-histone proteins also may be involved in LTP and memory. It is well established that spaced pattern of training induces better memory than the massed pattern of training. At the synaptic level, spaced stimulation induces higher extent of synaptic potentiation than massed stimulation. Starting with a brief introduction to memory and LTP, I will discuss activity-dependent acetylation of histone and non-histone proteins. Further, I will discuss the role of acetylation in pattern-dependent LTP and memory.

UNLOCKING ADHD

DR. UPASANA GALA

CLINICAL NEUROPSYCHOLOGY

The Centers for Disease Control and Prevention (CDC) reports that 9.4% of children under the age of 17 are diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) in the US and this has increasingly become a global issue over the years. A person with ADHD has differences in brain development and brain activity that affect attention, activity, and impulse control. This talk will offer an insight into the neurophysiology and neurochemistry of the disease. We will further explore the revolutionary medication-free neurofeedback therapy as well as daily micro-hacks to help manage the disorder.



ART THERAPY: TRASH CHAOS VESSAL; CREDIT: MARY ANNE ENRIQUEZ

YOUR WONDERFUL PLASTIC BRAIN !

PROF. SUMANJAIN

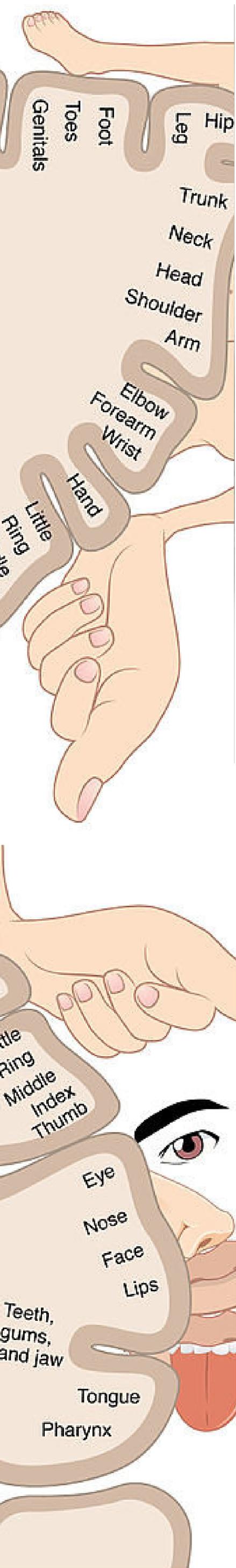
SYNAPTIC PLASTICITY AND NEURO-REGENERATION

A cardinal feature of human brain is that sensory, motor, emotional and cognitive experiences have the ability to modulate the shape and number of synapses on a neuron and lead to neural regeneration. This ability of nervous system to reorganize its connections in response to environmental perturbations or use/disuse of a body part or an insult is an adaptive phenomenon and referred to as “Neural plasticity”. It forms the basis for establishment of adult pattern of neural circuitry during development, neuronal networking during learning and memory, preservation of function during ageing and even providing compensatory mechanisms in injury. It thereby becomes pertinent to understand how the brain circuitry is developed and modulated? What are the factors that affect plasticity and what happens to this ability under diseased conditions? What are the classical and advanced treatment strategies that can promote neural plasticity and regeneration?

The Neurophysiology laboratory in department of Physiology, AIIMS Delhi has been working in the area of ‘Neural plasticity and regeneration’ for last three decades with the aim to unravel the modulatory effects of various recent non- invasive brain stimulation techniques like repetitive transcranial magnetic stimulation (rTMS) and nanomedicine on synaptic plasticity in health and disease.

We have also developed/ standardized novel therapeutic and diagnostic strategies to assess, modulate promote, neuronal regeneration and cortical excitability in neurodegenerative and neurotraumatic disorders.

In the talk, I shall be sharing some significant results of the research work done in our lab using external magnetic field stimulation and iron oxide nanoparticles on morphological and functional recovery in rat model of Parkinson’s disease and spinal cord injury. The role of rTMS in modulating cortical excitability and promoting neuroregeneration in patients with Parkinson’s disease and spinal cord injury will also be discussed.

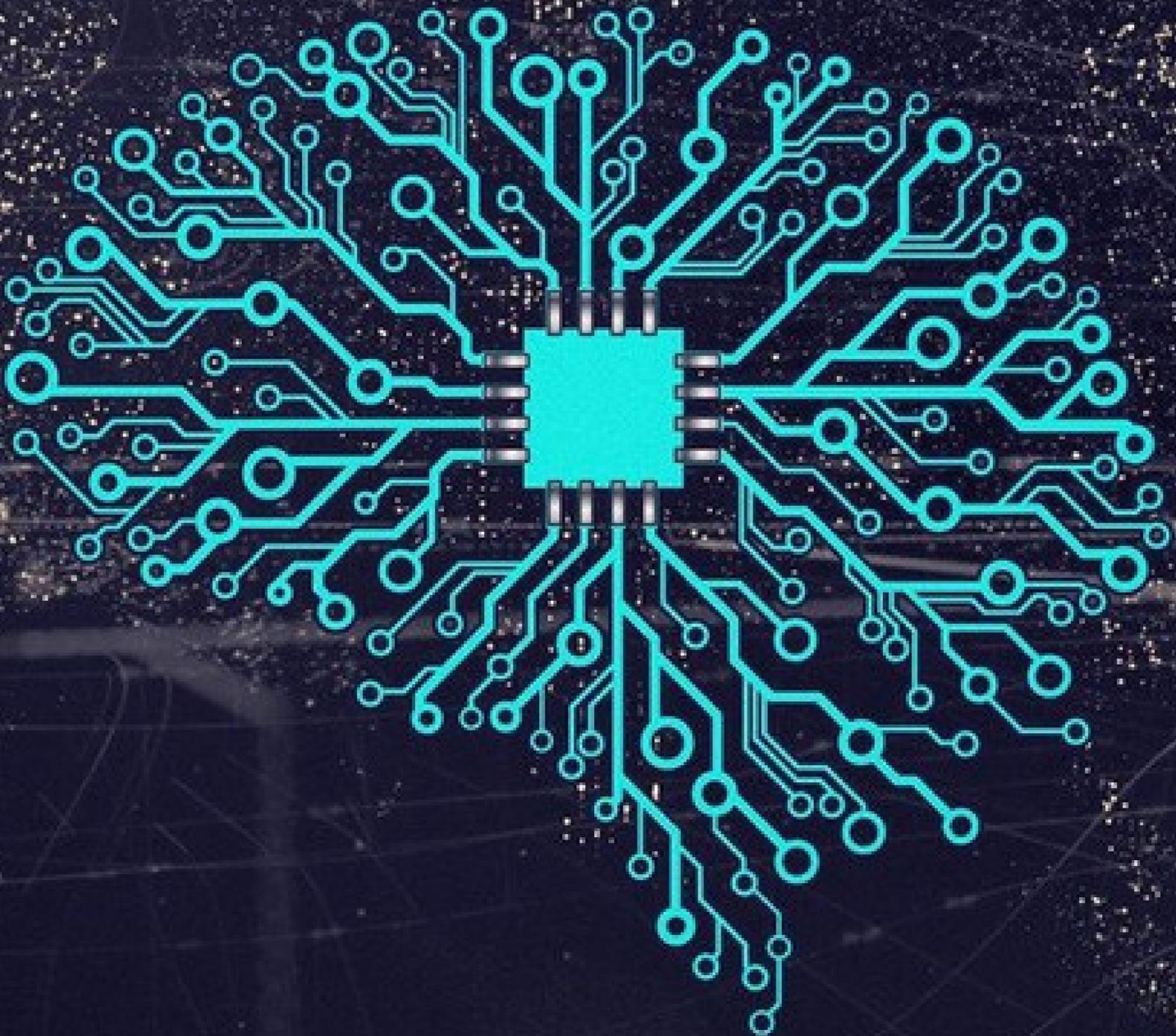


THE *Posters*

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NEURAL DISORDERS AND TREATMENT OF NEURAL DISORDERS



CREDIT: CREATIVE COMMONS, MIKE MACKENZIE

ABSTRACT

ND001

REPEATED MILD TRAUMATIC BRAIN INJURY PERTURBS THE MITOCHONDRIAL BIOGENESIS VIA NUCLEAR AND MITOCHONDRIAL DNA METHYLATION

Nagalakshmi Balasubramanian¹, Sneha Sagarkar², Amul Sakharkar^{1,}
¹Department of Biotechnology, Savitribai Phule Pune University, Pune, India
²Department of Zoology, Savitribai Phule Pune University, Pune, India*

Impairment of mitochondrial biogenesis due to traumatic brain injury (TBI) is an important risk factor for developing psychiatric illnesses. However, the information regarding the mitochondrial gene expression and underlying regulatory mechanisms in the brain is not clearly known. We examined the expression of mitochondrial transcription factor A (TFAM) and its downstream function at mitochondria in the hippocampus of the rat after repeated mild TBI (rMTBI) using the weight drop injury paradigm. Mitochondrial TFAM levels were reduced in the hippocampus at 48 h and 30 d post-rMTBI. The MeDIP-seq and MeDIP-qPCR analysis demonstrated hypermethylation at TFAM promoter in concurrence with its expression. In the mitochondria, the specific binding of TFAM to heavy strand promoters (HSP1 and HSP2) of mitochondrial DNA is methylation-dependent. We observed hypomethylation and concomitant low binding of TFAM at both the promoters. This resulted in low rRNA levels and reciprocally high mRNA levels. Low levels of rRNA presumably couldn't suffice the translation of mRNA; thus culminating into reduced proteins which are the part of electron transport chain complexes. The incomplete ETC produced due to hypermethylation at TFAM promoter and hypomethylation at HSP's caused low binding of TFAM to the mtDNA, thereby restricting the ATP production. Moreover, the restoration of hypomethylation status of mtDNA with methionine increased the TFAM binding that eventually managed to produce sufficient ETC proteins. These findings suggest that rMTBI induced altered methylation levels at TFAM promoter and HSP has a crucial role in controlling mitochondrial gene expression and ATP production in the hippocampus.

ABSTRACT

ND002

ALTERATION OF CORTICAL GYRIFICATION IN CHILDREN WITH BIPOLAR DISORDER

*Anshita Singh¹, Amit Arya², Vivek Agarwal², Uttam Kumar¹
¹ Centre of Bio-Medical Research, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Campus, Lucknow (India)
² Department of Psychiatry, King George Medical University, Lucknow (India)*

In the present study we estimated the cortical complexity in children with bipolar disorder. Bipolar disorder (BPD) is a mood shifting illness, the reason behind this is still not established. The literature has limited information regarding the neuropathogenesis of pediatric bipolar disorder, it may be due to the complexity of this disorder as well as the variation in diagnostic parameters used in routine clinics. Handful of previous studies mainly looks at the changes in gray matter and white matter using volumetric analysis. However, to quantify it in a better way we have surface parameters to explore the cortical complexity of this disorder. Thirty-eight participants were included in this study, which consisted of an equal number of children with BPD and age matched normal individuals. All BPD pediatricians were recruited from the child psychiatry department of King George Medical University. A three-dimensional T1-weighted image was collected on a 3T Siemens Magnetom Skyra. Brain Cortical surface-based analysis was conducted using computational tool box and statistical parameter mapping (SPM) software. Cortical gyrification (CG) values were measured and statistically compared with the controlled group. In contrast to healthy control, children with BPD demonstrated increased CG which is noted in left middle occipital and left lingual gyrus while decreased gyrification was found in supplementary motor area, left insula and right fusiform gyrus. Our finding shows that pediatric with BPD has structural irregularity in multiple cortical regions which further justified the nature of complexity of this disorder.

PANDAS: AUTOIMMUNITY TO BRAIN CELLS, REVIEW

Deepali Saini

Department of Zoology, Deshbandhu College, Kalkaji, New Delhi, University of Delhi

PANDAS: Pediatric Autoimmune Neuropsychiatric Disorder Associated with Streptococcal infection, is a recently described pre-adulthood disorder. It involves infection with bacterium *Streptococcus pyogenes* of group A beta-hemolytic streptococcus (GABHS). PANDAS is a pediatric disorder appearing in children of age group 3-12yr. The disorder is a part of a large group of autoimmune diseases called pediatric acute-onset neuropsychiatric syndrome (PANS) which affect the brain. PANDAS show temporal association streptococcal infection and neurological abnormalities. Affected children show abrupt onset of pediatric obsessive compulsive disorder (OCD) and neurological tic disorder following bacterial infection of *Streptococcus pyogenes*. Along with OCD and tic disorder infection is accompanied by mild symptoms and signs of acute GABHS tonsillopharyngitis (strept-throat). PANDAS involve autoimmunity to brain cells. The link of OCD and tics disorder with GABHS infection is that antibodies produced by immune cells against the bacteria start attacking basal ganglia cells of the brain due to similarity in structure of antigen on bacterial cell wall and brain cells (molecular mimicry). Basal ganglia is responsible for controlling movements and behavior; therefore- during infection the function of basal ganglia is hampered and results in abrupt appearance of OCDs and tics disorder. Mechanism of action and symptoms of PANDAS is very much similar to rheumatic fever (another autoimmune disease caused by GABHS). Diagnosis of PANDAS involves five criteria which are presence of tics and OCDs, pre-pubertal neuropsychiatric symptoms, episodic course with abrupt symptoms of exacerbation, temporal connection between onset of symptom and prior streptococcal infections and, adventitious movements. Treatment of affected children involves standard treatment for OCDs and tics.

FUNCTIONAL FOODS AND EXERCISE MAY ALLEVIATE COGNITIVE DYSFUNCTION OF A NEURODEGENERATIVE DISEASES: A HYPOTHESIS

Kaveri Chakrabarty

Assistant Professor, Department of Zoology, Hansraj College, University of Delhi

Cognition is the study of any kind of mental operation such as learning, memory, executive function, acquisition of information by which knowledge is acquired. Cognitive dysfunction of Alzheimer's disease is due to progressive loss of short-term memory followed by loss of long-term memory. Age-related loss of the dopaminergic deficit in the striatum of basal ganglia leads to Parkinson's disease with cognitive dysfunction such as mental slowness, slow slurring speech and micrographia. Senile dementia due to loss of volume of cerebral cortex and hippocampus leads to cognitive dysfunction with apraxia, aphasia and visuospatial impairment. Wernicke-Korsakoff syndrome is characterized by loss of recent memory, which is due to thiamin deficiency in chronic alcoholics. Antioxidants may minimize loss of cognitive function of Alzheimer's and Parkinson's disease. Regular exercise stimulates the secretion of brain-derived neurotrophic factor (BDNF). BDNF is essential for survival of existing neurons and accelerates the growth of new neurons. BDNF present in the hippocampus may prevent the decline of memory, and in the basal ganglia it may prevent the progression of Parkinson's disease. It has been observed that exercise alleviates decline in age-related loss of volume of cerebral cortex and decreases the incidence of Alzheimer's disease. Functional foods/Nutraceuticals are immunobiotics, probiotics, prebiotics, synbiotics, omega-3-fatty acids, foods fortified with nutrients and anti-inflammatory foods. Intervention of functional foods may prevent cognitive dysfunction of neurodegenerative diseases. Pro-inflammatory foods such as saturated fats, processed and junk food, sweets and sugar-sweetened beverages may accelerate the development of neurodegenerative diseases. In conclusion, it is hypothesized that functional foods and exercise may abrogate or mitigate cognitive dysfunction of neurodegenerative diseases. Further studies may be warranted to find out the prevalence, severity and lethality of neurodegenerative diseases before and after dietary interventions.

ABSTRACT

ND005

INTEGRATIVE GENOMIC ANALYSIS OF SCHIZOPHRENIA IN THE BASAL GANGLIA, AND THE FRONTAL LOBE

Pranshi Agrawal

Department of Zoology, Gargi College, Siri Fort Road, New Delhi, University of Delhi

Schizophrenia is a mental disorder which results in disordered thinking, hallucinations and behavior that impair daily functions which affects multiple brain regions such as basal ganglia, frontal lobe and many more. Earlier studies have shown that COMT is linked to schizophrenia. COMT when deleted results in a complex syndrome, the psychiatric manifestations of which include schizophrenia and other psychoses and so, I decided to take COMT as a reference gene for doing genomic analysis. The purpose of this study was to identify possible candidate genes for Schizophrenia by doing gene search of COMT correlates in Basal ganglia and Frontal lobe and do comparative analysis. Gene expression data of COMT gene correlates in the Basal Ganglia, and the Frontal lobe was obtained from Allen Brain Atlas. A bioinformatics approach was used to analyze gene expression profiles in order to identify candidate genes that have an effect on Schizophrenia. Bioinformatics tools used were DAVID, STRING database, Gene Ontology knowledge base. Total 16 genes found linked to schizophrenia were CBS, DDR1, GSTP1, GSTT1, GSTT2, HOMER3, HLA-A, MAP4, PHGDH, PLXNB1, PSEN1, SMPD1, SREBF1, TSPO, SOX10. More genes linked to schizophrenia were found in the Basal ganglia as compared to the Frontal lobe. Some genes linked to schizophrenia were found directly or indirectly interacting with each other whereas some were not found interacting at all. These gene interaction studies can help us to further find the other gene linked to them and may also result in some possible early detection methods of schizophrenia.

ABSTRACT

ND006

DEPLETED GREY MATTER VOLUME IN REM SLEEP BEHAVIOUR DISORDER IN PARKINSON'S - A VOXEL BASED MORPHOMETRY STUDY

*Ishi Tandon 1, Neeraj Upadhyay**

Amity University Rajasthan

**DZNE, Bonn, Germany*

Rapid Eye Movement (REM) sleep behaviour disorder (RBD) is a common risk factor and a prodromal symptom in Parkinson's. Parkinson's patients with probable RBD (RBD +) are known to have worsen disease severity as compared to patients without RBD (RBD -). The neuronal changes underlying RBD + and RBD - is not well established. Therefore, we investigated volumetric changes in grey matter in RBD +, RBD - and healthy controls by means of voxel based morphometry (VBM). The data for the current study was obtained from Parkinson's Progressive Markers Initiative (PPMI). PD group was divided into RBD + and RBD- by means of the scores obtained on REM sleep behaviour disorder questionnaire (RBDSQ). A score of ≥ 5 indicated presence of RBD. VBM results revealed reductions in grey matter volume of left precentral gyrus and right inferior frontal gyrus (pars opercularis) in RBD + as compared to RBD - and controls, respectively. Both these areas facilitate motor activity. Reduction in their GM volume indicates severity of motor dysfunction in RBD +. Future research is needed to investigate disrupted neuronal networks underlying idiopathic RBD and RBD in Parkinson's.

ABSTRACT

ND007

NEUROTROPHIC FACTOR AND ITS POSSIBLE THERAPEUTIC APPLICATION FOR NEUROLOGICAL DISORDER, REVIEW

Laksh Singh

Department of Zoology, Shivaji College, University Of Delhi

Early adverse experiences, especially the one involving disruption of the mother-infant relationship, responsible for the socio-emotional development in primates. Humans with histories of childhood maltreatment are at high risk for developing depression, anxiety, substance abuse, and behavioral disorders. With the recent trend of change in behaviour observed in case of rhesus monkeys and growing aggression either due to anthropogenic or infant maltreatment intra/interspecies. An experiment was conducted with a Rhesus monkey as an animal model of infant maltreatment to study the long-term effects of early life stress on white matter (WM) integrity during adolescence and its behavioral correlates. Taking Diffusion tensor imaging (DTI) into the account which is a noninvasive, quantitative variation of structural magnetic resonance imaging (MRI) in the recent experiment conducted between the infant maltreated and controlled rhesus monkey, few observation were recorded: In case of maltreated monkey, WM integrity is found to be reduced as compared to controlled ones and rise in plasma cortisol level during initial stage of encountering the maltreatment and this eventually leads to poor WM development and behavioral changes in adult stage. Studying the observation it was concluded that maltreated monkeys have a Lower value of FA due to poor WM integrity and this in turn is affected by various factors such as increases in myelin thickness, axonal diameter and axon neurofilaments/microtubule density. Considering the fact that Brain-Derived Neurotrophic Factor promotes not only myelination during initial development but also to injured cells. So inducing BDNF artificially or increasing the production within the body itself could possibly increase the thickness of myelin and would result in increase in regional FA which will increase WM integrity and behavioral response.

ABSTRACT

ND008

ART THERAPY AS AN INTERVENTION FOR NEUROLOGICAL DISORDERS

Shagun Talwar

Department of Psychology, D.A.V. College, Panjab University, Chandigarh

Art therapy has recently gained popularity because of its positive therapeutic effects on neurological conditions. Biochemical and structural abnormalities in the nervous system can lead to neurological disorders. Art therapy is based on the ideology that creative expression can support healing and mental well-being of individuals. In a case study, the psychological well-being scale was administered to see the effects of modified art therapy on Alzheimer's disease, improvement was seen in engagement, expression of pleasure, enhanced self-esteem expression of emotions and feelings. Another study revealed that feeling of hopelessness improved after administering clay therapy on patients under treatment in departments of neurology. Art therapy may be used for rehabilitation purposes with patients of neurology. It has also shown improvement in patients with Multiple Sclerosis, brain injury, ALS, or Parkinson's Disease. Art based interventions have been beneficial in neurological patients with impaired cognition. These Creative interventions can help in regulating the thoughts and behaviors of patients, developing emotional resilience, improve problem-solving skills, and also increasing participation in physical rehabilitation.

ABSTRACT

TND01

PREVENTION OF OPTIC NERVE ATROPHY BY TREATING EARLY GLAUCOMA USING A NANOFORMULATION WITH PROMISING THERAPEUTIC POTENTIAL

Rahul Kumar ^{1,2}, Indu Barwal ², Tanuj Dada ³, Subhash Chandra Yadav ^{2,*}
¹ Department of Zoology, Sheodeni Sao College, Kaler (Arwal), Bihar-824127
² Department of Anatomy, AIIMS, New Delhi-110029
³ Dr. Rajendra Prasad Centre for Ophthalmic Sciences, AIIMS, New Delhi-110029

Glaucoma is a progressive neurodegenerative disorder which negatively affects retinal ganglion cells and optic nerve leading to permanent blindness in later stages if left untreated. Brimonidine, an anti-glaucoma medicine, acts as an adrenergic agonist which decreases the synthesis of aqueous humour and increases the amount of drainage through Schlemm's canal and trabecular meshwork, but shows dose-dependent (0.2% solution thrice daily) toxicity. To reduce the side effects and improve the efficacy, brimonidine was nanoencapsulated on ultra-small-sized chitosan nanoparticles (nanobrimonidine) (28 ± 4 nm) with 39% encapsulation efficiency, monodispersity, freeze–thawing capability, storage stability, and 2% drug loading capacity. This nanocomplex showed burst, half, and complete release at 0.5, 45, and 100 h, respectively. Nanobrimonidine did not show any in vitro toxicity. The nanobrimonidine-treated trabeculectomy tissue of glaucoma patients showed better dilation of the trabecular meshwork under the electron microscope. This is direct evidence for better bioavailability of nanobrimonidine after topical administration. Thus, the developed nanobrimonidine has the potential to improve the efficacy, reduce dosage and frequency, and improve delivery to the anterior chamber of the eye thereby treating glaucoma in early stages and preventing optic nerve atrophy which is observed in late stages of glaucoma.

ABSTRACT

TND02

GALLIC ACID: A NATURALLY OCCURRING INHIBITOR OF METAL INDUCED AGGREGATION WITH IMPLICATION IN METAL-BASED THERAPY AGAINST NEURODEGENERATIVE DISEASES

Asra Nasir Khan, Rizwan Hasan Khan
 Interdisciplinary Biotechnology Unit, Aligarh Muslim University, Aligarh, India

Metal ions play a vital role in the aggregation of proteins by interfering with their correct folding, thereby affecting protein homeostasis and cell viability, leading to neurodegenerative diseases like Alzheimer's and Parkinson's. Till date, all advances in neurodegenerative diseases; therapeutics help symptomatically but do not prevent the root cause of the disease, i.e., the aggregation of protein involved in the diseases. Recent studies show a promising potential for metal-based therapy utilising metal chelators. In this regard, we aimed to study the behaviour of gallic acid, towards inhibition of metal-induced aggregation of a model enzyme, the human lysozyme. Using various spectroscopic and microscopic techniques we show that gallic acid inhibits metal induced aggregation. We delineate that gallic acid inhibits metal-induced aggregation by chelating the metal ions in the solvent, thereby inhibiting the aggregation of human lysozyme as demonstrated by our spectroscopic results which showed the formation of a complex between Mg ²⁺ and gallic acid. Our studies showed retention of lysosomal activity upto 63.2% in presence of gallic acid. We therefore, propose the use of gallic acid in metal-based therapy for treatment of neurodegenerative diseases especially as a therapeutic agent for the treatment of aggregated lysozyme disease, non-systemic amyloidosis.

ABSTRACT

TND03

GUT DYSBIOSIS AFTER REPEATED MILD TRAUMATIC BRAIN INJURY CAUSE ANXIETY-LIKE BEHAVIOR AND HDAC2-MEDIATED BDNF EXPRESSION IN THE AMYGDALA OF WISTAR RATS

Gouri Jadhav, Nagalakshmi Balasubramanian, Amul Sakharkar*
Department of Biotechnology, Savitribai Phule Pune University, Pune

Repeated mild traumatic brain injury (rMTBI) manifests into persistent anxiety comorbid with gut ailments. Recent evidence suggests the role of gut microbiota in the gut-brain axis; the underlying mechanisms of which are poorly understood. Here, we have probed a possible link between the gut microbial changes and expression of brain-derived neurotrophic factor (BDNF) in the amygdala, a center that regulates anxiety. We employed a closed head weight drop injury paradigm to induce rMTBI in Wistar rats and examined anxiety-like behavior, gut microbiota dysbiosis, histone deacetylases (HDAC) function, and BDNF expression at early (48 hours) and long-term (30 days) time points. rMTBI caused anxiety-like behavior and also reduced butyrate-producing bacterial communities in the jejunum. In the amygdala, the BDNF expression was decreased with a concomitant hike in HDAC2 expression at 30 days. The low BDNF levels post rMTBI could be attributed to increased HDAC2 binding and reciprocal decline in H3K9 acetylation (H3K9ac) at BDNF promoters (Ip, IVp, IXp). To further investigate the possible implication of gut microbiota, if any, in the epigenetic regulation of BDNF expression, we employed faecal microbiota transplant (FMT) into rMTBI exposed rats using the faecal matter of naïve rats. FMT decreased HDAC2 function as indicated by a reduction in the occupancy of HDAC2 and augmentation of the H3K9ac levels on BDNF promoters corresponding to the normalization of BDNF expression in the amygdala. These results suggest that the rMTBI-induced gut microbial dysbiosis may be implicated in the hypofunction of BDNF in the amygdala via HDAC2-mediated histone deacetylation leading to anxiety-like behavior.

ABSTRACT

TND04

EFFECT OF SARASWATA CHURNA ON HIPPOCAMPAL CA3 NEURONS IN PILOCARPINE INDUCED RAT MODEL OF EPILEPSY

Pugazhandhi B. 1, Sudarshan S. 2, Rajesh T. 3

1 TMA Pai, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal

2 Department of Anatomy, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal

3 Dept. of Anatomical Sciences, St Matthew's University, School of Medicine, Grand Cayman, Cayman Islands

The aim of the present study was to evaluate the neuroprotective effect of Saraswata Churna (SC) in pilocarpine induced rat model of epilepsy. Saraswata Churna, an ayurvedic preparation has been used in treating many cases of neurological disorders. In the central nervous system, the hippocampus is highly susceptible to status epilepticus and undergoes morphological changes leading to alterations in functions. Four month old adult male Wistar rats (n=24) were randomly divided into four groups (n= 6/group) as Normal Control (NC), Pilocarpine Group (PI), Phenytoin Group (PH) and Saraswata Churna (SC). The Epilepsy model was created by a single intraperitoneal injection (270mg/kgbw) of pilocarpine. At the end of 24 hours and 48 hours post first seizure occurrence, Phenytoin 30mg/kgbw (i.p.) and SC (308 mg/kgbw oral) were given to the respective groups (Phenytoin Group (PH) and Saraswata Churna group(SC)). On the 22nd day, animals were sacrificed, brains were shelled out and processed for Nissl stain. The number of neurons in the hippocampal CA3 region were quantified using a light microscope and an ocular micrometer. Values obtained were used for statistical analysis using SPSS 16.0 and data was expressed as mean and standard deviation. The SC group of animals showed significant increase (p<0.01, p<0.01) in the surviving neurons in the CA3 region of the hippocampus, when compared with PI and PH groups respectively. There was a significant decrease (p<0.001, p<0.001) in the degenerating neurons in the CA3 region of SC and PH groups in comparison with the PI group. Supplementation of SC has the potential to mitigate the structural alteration in the hippocampal region, following epilepsy induced by pilocarpine.

ABSTRACT

TND05

ANTIEPILEPTOGENIC CICUTA VIROSA PREVENTS COGNITION, MEMORY AND MOTOR COORDINATION IMPAIRMENT THROUGH DOWN-REGULATION OF OXIDATIVE STRESS LOAD AND UPREGULATION OF SIRT1/PGC1- α PATHWAY IN PTZ INDUCED KINDLING MICE MODEL OF EPILEPSY

Priya Mishra 1*, Jitendra Kumar Sinha 1, Satyendra Kumar Rajput 2
 1 Amity Institute of Neuropsychology and Neurosciences (AINN), Amity University, Uttar Pradesh, Noida
 2 Amity Institute of Indian System of Medicine (AIISM), Amity University, Uttar Pradesh, Noida

Multifactorial etiology of epileptic seizures renders the brain susceptible to progressive neurodegeneration. Conventional anti-epileptic drugs (AEDs), although efficacious in symptomatic suppression, fail to negate latent neurochemical alterations in epileptogenesis. Natural product based therapies and agents can be viable alternatives to such AEDs owing to their competent seizure management potential and lower associated adversities. Herbal remedy *Cicuta virosa* (CV) has been acknowledged for the treatment of epileptic convulsions in the material medica by James Taylor Kent, John Henry Clarke, Henry C. Allen, Cyrus Maxwell Boger and Adolf zur Lippe. We investigated the anti-epileptogenic potential of *Ciuta Virosa* homeopathic medicinal preparations (CV HMPs) at three potencies (6CH, 12CH and 30CH) in kindling model that was followed by validated behavioral and biochemical tests for the assessment of psychiatric impairment and oxidative stress load respectively. The hippocampal homogenate was further assessed through western blotting to investigate SIRT1/ PGC1- α pathway activity. The data were analyzed through one-way ANOVA ($\alpha = 0.05$) followed by Tukey's post-hoc test and represented as mean \pm standard deviation. Dose dependent delay in kindling and increment in myoclonic jerk latency by the CV HMPs pointed towards improved GABAergic tone. Reduced retention transfer latency in elevated plus maze test, decreased escape latency in morris water maze test and improved postural balance in rotarod test by the animals receiving CV HMPs showed ameliorated psychiatric and motor coordination impairment. Furthermore, the decline in brain oxidative stress and subsequent improvement in antioxidant defence mechanism, evident through decreased MDA and improved GSH and SOD levels in kindled animals, was substantiated through upregulation of SIRT1/PGC1- α pathway that potentiates mitochondrial functioning and safeguards cellular life against epileptogenesis induced neurodegeneration. Hence the drugs, besides promoting behavioral and psychiatric normalcy, facilitated for neuroprotective pathway and mechanism against chemical convulsant stimulus and are, therefore, advocated for further molecular and epigenomic studies.

ABSTRACT

TND06

TARGETING GUT MICROBIOME BY CHITOSAN ENCOMPASSED NANOGEL TO STIMULATE NEUROLOGICAL INTERACTIONS AND EMBRYO DEVELOPMENT IN ZEBRAFISH PARADIGM: A NOVEL AND POTENTIAL THERAPY FOR AUTISM SPECTRAL DISORDER

A. Anita Margret
 Department of Biotechnology and Bioinformatics, Bishop Heber College,
 Tiruchirappalli, Tamil Nadu, India

Autism spectrum disorder (ASD) is a severe neurodevelopmental disorder that impairs a child's ability to communicate and interact with others. Children with neurodevelopmental disorder, including ASD, are regularly affected by gastrointestinal problems and dysbiosis of gut microbiota. On the other hand, humans live in a co-evolutionary association with plenty of microorganisms that resident on the exposed and internal surfaces of our bodies. Pregnancy is a vulnerable period that has a high risk towards gut dysbiosis. The distorted microbiome related signaling to the brain may play a role in the possible pathogenesis that is associated with neuroinflammation which deteriorates the severity of neurological ailment. The proliferation of gut microbiota can be hindered by toxicants such as heavy metals and drugs. Methyl mercury (MeHg) a global pollutant is considered as a neurotoxin that interrupts neuroprotection and activates the peripheral immune system by stimulating inflammation through pro-inflammatory mediators. This can direct to neurological ailments such as anxiety where ASD is a behavioural mental disorder that is prevalent during prenatal development. The treatment with SSRIs (Selective serotonin reuptake inhibitors) can cause side effects that affect both mother and the baby. Conversely, among the various classes of antidepressants, SSRIs are the most commonly prescribed because of their effectiveness in treating many psychiatric disorders. Considering the above complexity the research targets maternal gut by controlling dysbiosis using prebiotics (Inulin type fructans) and SSRI loaded chitosan nanogel on MeHg (methyl mercury) incited zebrafish models. Hence both maternal and developing fetal health is protected.

ABSTRACT

TND07

REPEATED MILD TRAUMATIC BRAIN INJURY ALTER MITOFUSIN2 IN HIPPOCAMPUS VIA DNA METHYLATION

*Prakash Kulkarni, Nagalakshmi Balasubramanian, Tanushree Banerjee, Amul Sakharkar**
Department of Biotechnology, Savitribai Phule Pune University

Repeated mild traumatic brain injury (rMTBI) inflicts brain damage by secondary injuries, of which mitochondrial dysfunction is predominantly responsible for progressive neurodegeneration. Mitofusin2 (MFN2) is an outer mitochondrial membrane protein (MMP) involved in maintaining mitochondrial dynamics. The current study tests rMTBI-induced DNA methylation as a plausible epigenetic mechanism responsible for MFN2 changes in hippocampus. We have employed a closed-head weight drop paradigm to induce rMTBI in Wistar rats and examined MFN2 regulation in the hippocampus at early (48 h) and protracted (30 d) time point. Although MFN2 expression was not altered after 48 h post rMTBI, significant reduction was observed after 30 d. The methylated DNA immunoprecipitation (MeDIP)-qPCR and the MeDIP-sequencing revealed an elevated 5-methylcytosine (5mc) level at the MFN2 promoter after 30 d. The concurrent increase in DNA methyltransferase (DNMT3b) expression was observed at day 30. The treatment of 5-Azacytidine, a pan DNMT inhibitor, restored the 5mc levels at the MFN2 promoter and normalized its expression in the hippocampus. In sum, rMTBI-induced DNA methylation seems to play an important role in causing persistent deficits in MFN2 expression in hippocampus and may be suggested as one of the determinants for trauma-induced neurodegeneration.

ABSTRACT

TND08

INDIAN KITCHEN PHARMACY WITH THERAPEUTIC POTENTIAL AGAINST ALZHEIMER'S AND PARKINSON'S DISEASE

*Neha Singh, Renu Soni**
Department of Botany, Gargi College, University of Delhi

Memories are priceless in the world which we can't buy or steal from anyone's brain. When someone starts losing them, it leads to the onset of progressive neurodegenerative diseases. Neurodegenerative diseases are a group of those disorders that kill the longest-living tissues in our body i.e. neurons. Alzheimer's and Parkinson's are the most common progressive neurodegenerative disorders that affect a huge population worldwide. The exact cause of neural disorders is yet not fully understood although ageing, genetic and environmental factors and interactions among these factors are majorly responsible for these disorders. Such as, to meet the growing demands of the population, there is an immense increment in the usage of pesticides. These chemicals are used to kill the insects, responsible for the massive loss of crop yield but accumulation of these chemicals in the environment is acting as a slow killer of neurons in the brains. In India, the prevalence rate of neural disorders is comparatively low than the other European and American countries although we have a vast population together with a high rise in the rate of pollution whether its air, water, noise, or soil pollution which constitutes one of the major reasons responsible for neural disorders in humans. For curing human disease use of plants is an ancient practice. In India, we have been consuming so many kitchen relishes in our daily routine since our childhood but still, we don't appreciate the beneficial effects of those on our body specifically on our neuronal cells. The Indian traditional medicinal system evidenced that the utilization of spices and beverages provides better human health and cures various diseases. The present review listed the 8 most commonly used kitchen plant parts/fruits - ginger, garlic, turmeric, sesame, saffron, tea, coffee, and liquorice that have been shown to have an effective role in reversing the Alzheimer's and Parkinson's pathology and highlighting the importance of phytochemicals of these plants on neuroprotective function and their mode of action, along with their parts used.

ABSTRACT

TND09

BIOPHYSICAL ELUCIDATION OF AMYLOID FIBRILLATION INHIBITION AND PREVENTION OF SECONDARY NUCLEATION BY CHOLIC ACID: AN UNEXPLORED FUNCTION OF CHOLIC ACID

*Nabeela Majid 1, Mohammad Khursheed Siddiqi 1, Vladimir N. Uversky 2 and Rizwan Hasan Khan 1 **

1 Interdisciplinary Biotechnology Unit, Aligarh Muslim University Aligarh UP, India.

2 Department of Molecular Medicine, USF Health Byrd Alzheimer's Research Institute, Morsani College of Medicine, University of South Florida, Tampa, Florida 33612, United States.

Protein misfolding and its deviant self-assembly to converge into amyloid fibrils is associated with the perturbation of cellular functions and thus with debilitating neurodegenerative diseases including Alzheimer's disease, Parkinson's disease, etc. A great deal of research has already been carried out to discover a potential amyloid inhibitor that can slow down, prevent, or remodel toxic amyloids. In the present study with the help of a combination of biophysical, imaging, and computational techniques, we investigated the mechanism of interaction of cholic acid (CA), a primary bile acid, with human insulin and A β -42 and found CA to be effective in inhibiting amyloid formation. From ThT data, we inferred that CA encumbers amyloid fibrillation up to 90% chiefly by targeting elongation of fibrils with an insignificant effect on lag time, while in the case of A β -42, CA stabilizes the peptide in its native state preventing its fibrillation. Strikingly upon adding initially at the secondary nucleation stage, CA also detained the progression/growth of insulin fibrils. CA is unable to prevent the conformational changes completely during fibrillation but tends to resist and maintain an α helical structure up to a significant extent at a primary nucleation stage while reducing the β sheet rich content at the secondary nucleation stage. Moreover, CA treated samples exhibited reduced cytotoxicity and different morphology. Furthermore, the results obtained after molecular docking indicated that CA is interacting with insulin via hydrogen bonds. For future research, this study can be considered as preliminary research for the development of CA, a metabolite of our body, as a potential therapeutic agent against Alzheimer's disease without even stimulating the immunological responses.

ABSTRACT

TND10

ART THERAPY MEETS THE NEUROSCIENCE OF AUTISM

Saanjh Arora

M.A., Department of Psychology, P.G.G.C.G. College, Panjab University, Chandigarh

Autism, or autism spectrum disorder (ASD), refers to a broad range of conditions characterized by challenges with social skills, behavioral patterns, and communication. Developmental delays are common among Indian children under 10. About 1 in 100 children in India under the age of 10 have autism, and nearly 1 in 8 have at least one neurodevelopmental condition. Children and adolescents diagnosed with ASD face core difficulties in social understanding and communication. There is no single cause for autism spectrum disorder. In this review, we aim to study the role of art therapy in relation to autism spectrum disorder among children. Art therapy helps in the development of coping strategies, improvement in communication, better expressions, and recognition. People with autism are often highly visual thinkers and can express their feelings and ideas through images or actions. This research provides a general overview of how important is the Art therapy for treating Autism Spectrum Disorder. New treatments are emerging to treat Autism Spectrum Disorder, amongst which behaviour therapy is the most effective. Whereas, art therapy is highly beneficial mainly for social communication, flexibility, attention ability, and behavior patterns.

ABSTRACT

TND11

CURRENT THERAPEUTIC APPROACH FOR TARGETED GENE THERAPY DELIVERY THROUGH EXOSOMAL PACKAGED CARGO

*Shriya Agarwal 1, Vinayak Agarwal 2, Pranav Pancham 2, Siddhi Bhardwaj 2, Manisha Singh 2**
1 Department of Molecular Sciences, Macquarie University, Sydney, Australia.
2 Manisha Singh, Department of Biotechnology, Jaypee Institute of Information Technology, IIIT, Noida, U.P, India*

The therapeutic use of gene information has been authorised and approved in many critical disease conditions like – cancers, cystic fibrosis, haemophilia, Duchenne muscular dystrophy, Huntington’s disease, genetic amyotrophic lateral sclerosis, Rett syndrome and spinal muscular atrophy is an emerging approach of treatment which involves delivery of genetic materials like DNA, RNAi, shRNA etc. and for recovery of regular gene expression. Owing to their higher capabilities in dealing with short sequences of nucleic acid (mRNA, miRNA), proteins, recombinant proteins, exosomes, the most popular form of EVs are viewed as a reliable biological therapeutic conveyer. In recent times, several approaches for targeted gene therapy (GT) have been studied, however emergence of extracellular vesicles (EVs) as shuttle carrying genetic information between cells have gained a lot of interest in scientific communities. They have natural access through every biological membrane and can be employed for site-specific and efficient drug delivery without eliciting any immune responses hence, qualifying as an ideal delivery vehicle. Also, there are many research studies conducted in the last few decades on using exosomal mediated gene therapy into developing an effective therapy with refinement of isolation, purification, loading, delivery and targeting protocols. This work discusses several facets which contribute in developing an efficient therapeutic regime for gene therapy, highlighting limitations and drawbacks associated with current GT and suggested therapeutic regimes.

ABSTRACT

TND12

ACTIVE AND PASSIVE IMMUNOTHERAPEUTIC APPROACHES TO COMBAT NEURODEGENERATIVE DISORDERS ASSOCIATED DEMENTIA

*Pranav Pancham 1, Shriya Agarwal 2, Vinayak Agarwal 1, Siddhi Bhardwaj 1, Manisha Singh 1**
1 Department of Biotechnology, Jaypee Institute of Information Technology (JIIT) Noida, U.P.*
2 Department of Molecular Sciences, Macquarie University, Sydney, Australia.

Dementia is outlined as progressive loss of intellectual activity and enhanced cognitive decline, significantly eroding out the quality and functioning of life creating biological stress on individuals and institutions of their existence. Dementia syndrome marks the significant cognitive decline with neuronal dysfunction and is a major cause of disability and dependency among older people worldwide. In 2020, WHO estimated a total of 50 million population being affected every year globally and an additional 10 million cases every year are being added, predicting a compelling threat to society. It commonly involves the neuronal accumulation of functional proteins leading to protein toxicity, transmission interruptions, cognitive dysfunction and eventually neuronal death. Currently, novel techniques and treatment methods using different protocols for early theranostics and prognosis of this age-related disorder have been analyzed to develop an efficient and reproducible combinatorial and biologically viable options to counter dementia pathogenesis. However, extensive use of disease modifying treatments isn’t effective against the accumulated toxic proteins and functional protein aggregates. Therefore, here comes a need for an intervention which can specifically target these protein aggregates and eliminate them from the body without causing harm. Subsequently, next generation immunotherapeutic approaches have gained much importance amongst the researchers with promising leads to control and avert the dementing process in future, while specifically targeting functional protein aggregates and senile plaques, thus curbing protein accumulation which leads to neurotoxicity in neurodegenerative disorders (NDDs). Therefore, such interventions need to be explored as they report positive and possible immunologically applicable options to improve further cognitive decline in dementia.

ABSTRACT

TND13

DEVELOPMENT OF APOCYNIN LOADED POLYMERIC NANOPARTICLES (APO - NPS) TO TARGET OXIDATIVE STRESS AS ROS MODULATOR FOR NEURODEGENERATIVE DISORDERS

Manisha Singh, Vandana Tyagi, Shriya Agarwal, Vinayak Agarwal, Pranav Pancham
Department of Biotechnology, Jaypee Institute of Information Technology (JIIT) Noida, U.P., India.*

Apocynin (APO) is a known multi enzymatic complex compound, employed as a viable NADPH oxidase (NOX) inhibitor, extensively used in both traditional and modern-day therapeutic strategies to combat neuronal disorders. However, its therapeutic efficacy is limited by its lower solubility, higher affinity for protein binding and lesser bioavailability, thus, a suitable nano-carrier system to overcome such limitations was always required. The aim of the present study was to fabricate APO loaded polymeric nanoparticles to enhance its therapeutic efficacy and sustainability in the biological system. When the APO loaded NPs were statistically optimized and subjected for particle size analysis, they exhibited particle size of 103.6 ± 6.8 nm with polydispersibility index of 0.126 and zeta potential of -13.7 ± 0.43 mV. Their size range was further confirmed by TEM with sizes less than 100 nm. The FTIR scan of APO NPs showed no bond formation amongst polymers and APO on the surface of the developed NPs. Furthermore, the antioxidant (AO) abilities quantified by DPPH, Nitric oxide and Hydrogen peroxide scavenging assays exhibited comparatively higher AO potential of APO-NPs than APO and significantly comparable with the standard. The in-vitro release profile displayed a linear diffusion pattern of zero order kinetics and lower cytotoxicity with $89.66 \pm 2.3\%$ cell viability after 24 hours on the PC12 cell line. The stability of APO NPs checked after six months showed minimal AO decline in comparison to APO only, indicating that designed nano formulation may provide enhanced therapeutic efficacy for modulating NOX mediated ROS generation.

ABSTRACT

TND14

IN-SILICO VALIDATION AND DEVELOPMENT OF CHLOROGENIC ACID (CGA) LOADED POLYMERIC NANOPARTICLE FOR TARGETING NEURODEGENERATIVE DISORDERS

Vinayak Agarwal 1, Shriya Agarwal 2, Pranav Pancham 1, Siddhi Bhardwaj 1, Manisha Singh 1
1* Department of Biotechnology, Jaypee Institute of Information Technology (JIIT) Noida, U.P., India.
2 Department of Molecular Sciences, Macquarie University, Sydney, Australia.*

Recent decades witnessed a significant growth in terms of phytochemicals based therapeutics, extensively explored for almost all types of existing disorders. They have also been widely investigated in Neurodegenerative disorders (NDDs) and Chlorogenic acid (CGA), a polyphenolic compound having potential anti-inflammatory and anti-oxidative properties, emerged as a promising compound in ameliorating NDDs. Owing to its poor stability, bioavailability and release kinetics, CGA needed a suitable nanocarrier based pharmaceutical design for targeting NDDs. The current study is aimed at the in-silico validation of CGA as an effective therapeutic agent targeting various NDDs followed by the fabrication of polymeric nanoparticles-based carrier systems to overcome its pharmacological limitations and improve its stability. A successful in-silico validation using molecular docking techniques along with synthesis of CGA loaded polymeric nanoparticles (CGA-NPs) by ionic gelation method was performed. The statistical optimisation of the developed CGA-NPs was done by Box Behnken method and then the optimized formulation of CGA-NPs was characterised using particle size analysis (PSA), Transmission electron microscopy (TEM), Fourier Transform Infrared spectroscopy (FTIR) along with in-vitro release kinetics analysis. The results obtained exhibited average particle size of 101.9 ± 1.5 nm, Polydispersibility (PDI) score of 0.065 and a ZP of -17.4 mV. On a similar note, TEM results showed a size range of CGA-NPs between 90-110 nm with a spherical shape of NPs. Also, the data from in-vitro release kinetics showed a sustained release of CGA from the NPs following the First order kinetics suggesting the appropriate designing of nano formulation.

ABSTRACT

TND15

POSSIBLE ROLE OF STATINS IN REVERSING THE COGNITIVE AND NEUROVASCULAR DYSFUNCTION IN DEMENTIA

Pranav Pancham 1, Shriya Agarwal 2, Vinayak Agarwal 1, Siddhi Bhardwaj 1, Manisha Singh 1,
1* Department of Biotechnology, Jaypee Institute of Information Technology (JIIT) Noida, U.P., India.
2 Department of Molecular Sciences, Macquarie University, Sydney, Australia.*

Statins are an important class of drugs to treat dyslipidemia. They inhibit the rate limiting enzyme, 3- β -hydroxy 3 β -methylglutaryl Coenzyme A reductase (HMGR) of mevalonate (MVL) pathway. The pathway plays an important role in multiple cellular processes by forming various sterol isoprenoids. Statins have a lot of pleiotropic effects and aid in improving the vascular flow, reducing the inflammation by decreasing the production of reactive oxygen species. Statins are known to decrease the risk of dementia and improve cognitive function. Statins are known to inhibit the prevalence of Alzheimer's disease (AD) by inhibiting α - and β -secretase. The chapter highlights some of the developments of the statins in brain diseases. Several researches show the effectiveness of statin in preventing the pathological condition. However, other studies failed to show the neuroprotective effect. There is a need for additional research on humans with dementia to test the efficacy and efficiency of statins in curbing the neurological ailments. They have been viewed as a potential therapeutic alternative in the treatment of not only AD but several other associated neurodegenerative pathologies. Besides this, statin has also been reported to exhibit strong suppression towards anti-inflammation and oxidative stress in a distinct physiopathological environment. However, seeing in retrospect, it's the HMGR inhibition by statin which results in decreased prenylation which further leads the way towards NOX activity suppression and ultimately reducing pro-inflammatory cytokines production. Despite statins influence in modulating neurodegenerative pathologies, it's also been associated with being an effective neurogenesis inducer in adults. Statin belongs to a class of drugs which tends to prompt differentiation as well as proliferation of neuronal precursor cells by utilizing Wnt, Akt and RhoA pathways. Therefore, employment of statin as a therapeutic modulator in such NDD becomes much more imminent.

ABSTRACT

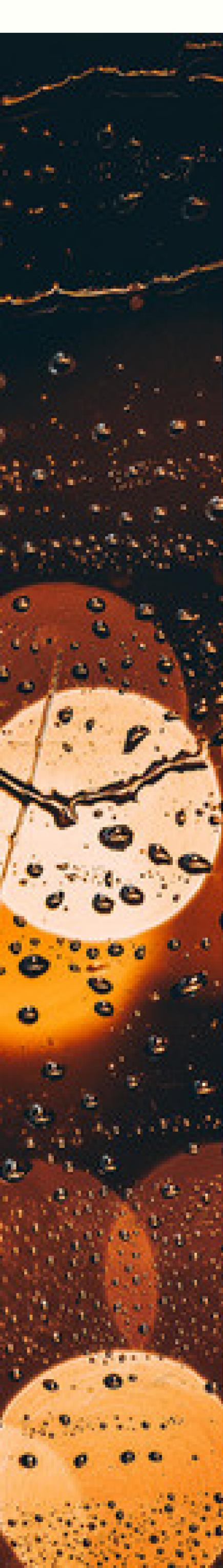
TND16

DIETARY SUPPLEMENTATION OF FENUGREEK SEED EXTRACT AND CHOLINE DOCOSAHEXAENOIC ACID ON OXIDATIVE STRESS AND NEURODEGENERATION IN OVARIECTOMIZED RATS WITH BILATERAL COMMON CAROTID ARTERY OCCLUSION

Anjaneyulu K 1, Kumar M R Bhat 2, Kiranmai S Rai 3, Nagamma T 4
1 Dept. of Anatomy, Manipal TATA Medical College, Jamshedpur, Manipal Academy of Higher Education, Manipal
2 Dept. of Anatomy, Ras Al Khaimah College of Medical Sciences, RAK Medical & Health Science University, Ras Al Khaimah, UAE.
3 Dept. of Physiology, Melaka Manipal Medical College, Manipal Academy of Higher Education,
4 Dept. of Biochemistry, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal.*

As impairment of memory and ischemic brain injury is more common in female of menopausal age, the current study aims to evaluate the protective role of fenugreek seed extract and choline Docosahexaenoic acid (DHA) on cognitive behavior, oxidative stress and neurodegeneration in ovariectomized-cerebral ischemic rats. Cerebral ischemia was induced by bilateral common carotid artery occlusion (BCCAO) surgery to ovariectomized adult female Wistar rats. Fenugreek, choline-DHA and combination of fenugreek with choline-DHA was supplemented for 30 days after ovariectomy and continued for 14 more days after BCCAO surgery. Effect of this supplementation on learning and memory, brain oxidative stress and neurodegeneration in the CA1, CA3 hippocampal subregions were analyzed. Ovariectomized-cerebral ischemic rats demonstrated learning and memory impairment when subjected to passive avoidance tasks. Further, these rats also had increased brain oxidative stress, and neurodegeneration in CA1, CA3 sub-regions of the hippocampus. Conversely, combined supplementation of fenugreek with choline-DHA to ovariectomized-cerebral ischemic rats exhibited a significant improvement in their learning and memory abilities, with reduced oxidative stress and neurodegeneration in CA1 and CA3 sub-regions of hippocampus.

NEUROPSYCHOLOGY



ABSTRACT

NP001

ENTRAINMENT OF SLEEP SLOW WAVES TO IMPROVE COGNITION: AN ELECTROPHYSIOLOGICAL STUDY

*Anam Aseem 1 *, Neera Chaudhry 2 , Mohammed Ejaz Hussain 3*

1 Sleep Research Group, Neurophysiology Lab, Centre for Physiotherapy and Rehabilitation Sciences, Jamia Millia Islamia

2 Professor & Head of Department of Neurology, Vardhman Mahavir Medical College and Safdarjung Hospital

3 Professor & Dean, Faculty of Allied Health Sciences, Shree Guru Gobind Singh, Tricentenary University, Gurugram

Sleep disturbance (SD) is a common finding among collegiate students and is often linked with cognitive alterations. Lack of slow-wave sleep (SWS) is the most argued reason for SD associated cognitive alteration. Researches claim that SWS reorganizes cortical circuitry and supports cognition. Therefore, we utilised cranial electrostimulation (CES), a form of non-invasive brain wave entrainment to achieve neuro-modulation. We hypothesized that CES will stimulate the brain and entrain endogenous waves to slower frequencies improving sleep, and thereby enhancing cognition. To evaluate the impact of cranial electrostimulation on slow wave sleep and cognition in collegiates. After obtaining ethical clearance and written consent from participants, 28 students with Pittsburgh sleep quality index (PSQI) score > 5 were randomly assigned into two groups: CES and control. Participants in the CES group underwent 12 weeks of micro-current intervention (intensity: 100 μ A and frequency: 0.5 Hz) for 3 days/week and each session lasting for 60 minutes, via clip electrodes attached to earlobes. Pre- and post-intervention measures were performed using electrophysiological measures for sleep and cognition. Regarding sleep architecture, sleep latency (SL), total sleep time (TST), percentage of N1, N2, N3, NREM (non-rapid eye movement), REM (rapid eye movement) and sleep efficiency (SE%) were calculated on polysomnography (PSG). Additionally, cognition was also evaluated using event related potential P300 and its amplitude and latency were quantified. A 2X2 mixed model ANOVA statistics was applied to observe any difference between pre and post measures for PSG and P300 variables. Significant differences were found for N1% and N3% such that N1% reduced and N3% improved with CES, however, no other PSG variable demonstrated statistically significant difference. Moreover, P300 amplitude and latency significantly increased and decreased respectively post 12 weeks CES. Cranial electrostimulation for 12 weeks enhances slow wave sleep and cognition in collegiates.

ABSTRACT

NP002

THE ROLE OF REPEATED SUGGESTIONS IN THE 'MISINFORMATION EFFECT'

*Phogat Poonam, Pachuau, Julia, Sondhi, Akriti
Gargi College, University of Delhi, New Delhi*

The accuracy of the memory of an eyewitness is a highly debated topic in forensic psychology. Pioneering studies by Loftus in the 1970s revealed that eyewitnesses reported profound errors when exposed to post event misinformation – an effect referred to as the ‘suggestibility effect’ or the ‘misinformation effect’. Since her pioneering studies in the field, many factors have been implicated in the ‘suggestibility effect’. Criminal cases in the Indian courts drag in for years where repeated suggestions are given under highly pressurized conditions. Repeated suggestions may be an important factor that may influence eyewitness suggestibility. The present experimental research attempts to investigate the influence of repeated suggestions on eyewitness suggestibility using a 'between group' design. The research is based on the Standard Loftus Paradigm. In the present experiment, followed a pre-post experimental–control group design having ten participants each. The independent variable was the ‘misinformation’ and dependent variable was the memory recall. The experiment consisted of ten participants, who were individually, first exposed to a movie clip showing an event involving a theft of a brief duration. After the movie clip, participants were required to first recall whatever they could about the event shown in the movie. The independent variable was then introduced and participants were then misled about certain aspects of the event in the movie clip. This was followed by a brief filler activity, subsequent to which participants were given a recognition test to assess the levels of suggestibility. The next day they were again given misleading suggestions and recognition was assessed in the same way. The control group was given the same questions but instead of misleading questions, control questions were asked. The data obtained was quantitatively and qualitatively analysed. The results show drastic impact of suggestion on nature and accuracy of recall. The study has important implications for our legal system where repeated recounting of the event by eyewitnesses is common-place. It also questions how reliable the eyewitness memory then becomes.

ABSTRACT

NP003

THE EFFECTIVENESS OF MINDFULNESS MEDITATION FOR ADOLESCENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER

Sakshi Sharma
Department of Psychology, DAV College Chandigarh

Mindfulness Meditation is described as paying attention in a particular way, on purpose, in the present moment non-judgmentally. Attention deficit hyperactivity disorder is among the most common neurobehaviour disorders presenting for treatment in children and adolescents. ADHD is often associated with co-occurring disorders including disruptive, mood, anxiety, stress, impulsivity. This poses one of the massive threats to the health and well-being of young people. Adolescents are especially vulnerable to the negative effects of stress due to developmental factors. Adolescents with ADHD may find it difficult to focus and prioritize, leading to missed deadlines and forgotten meetings or social plans. Mindfulness has received more clinical interest and is helpful for individuals with ADHD. Mindfulness meditation has been proposed to improve attention, reduce stress, and improve mood. People with ADHD who practice mindfulness meditation exercise often find that it improves their focus. By remaining in the present moment and training in letting go of distractors, they realise that they have agency over how they react to these distractors. It has also been shown that mindfulness for ADHD significantly improves the span of concentration and focus. Mindfulness meditation develops the individual's inner skills and improves ability to control attention by strengthening the ability to self-observe. It makes a person more aware of their emotional state, so they won't react impulsively and it also makes them calm down before taking any action or making poor decision impulsively.

ABSTRACT

NP004

CREATIVITY AND DYSLEXIA

Bhavniika Teji
Department of Psychology, PGGCG-11, Punjab University, Chandigarh, India

Dyslexia, a neurological condition affecting, mainly children, between 7-10% of the population, is a learning disability present at birth which impacts a person's ability to learn how to read and write without affecting general intelligence. They face many cognitive and developmental symptoms and are often poorly served but can do wonders if they receive the intervention needed to help them achieve their full potential. As per research, all dyslexics exhibit certain talents like utilizing the brain's ability to alter and create perceptions, being more curious than average, highly aware of the environment, intuitive and insightful. Many dyslexics gravitate closer to arts and prove to be very creative. Many visionaries who gave birth to ideas that have impacted history in remarkable ways were dyslexic. Those progressive thinkers aren't restrained to one vicinity of pursuit, however have contributed to the arena in all areas- inventors, scientists, filmmakers, actors, entertainers, athletes, artists, designers, architects, lawmakers, etc. George Washington, Albert Einstein, Leonardo Da Vinci, Pablo Picasso are a handful examples of the inspiring people with dyslexia. One thing that all of them have in common is they knew how to turn their disability to strength. The Yale Center for Dyslexia and Creativity reviews excessive creativity in youngsters and adults with dyslexia is simply a result of the determination and time dyslexics spend exploring new techniques of learning. As per researches this disorder can never completely outgrow. However, if diagnosed earlier and provided with proper treatment, encouragement can improve future success by appropriate treatment.

ABSTRACT

NP005

ROLE OF DANCE MOVEMENT THERAPY IN IMPROVING THE HEALTH AND WELL- BEING OF ELDER CITIZENS WITH DEMENTIA

Amardeep Kaur
Department of psychology, DAV College, Chandigarh

Dementia is one of the major causes of disability and dependency among older people worldwide. Dementia has a physical, psychological, social, and economic impact, not only on people with dementia but also on their families and society at large. Dementia is a syndrome that is found in elder people in which there is deterioration in memory, thinking, language skills, problem solving, self-management, behaviour, and the ability to perform everyday activities. The increasing number of people being diagnosed with dementia presents a need to find more evidence-based therapies that help maintain the health and well-being of the people. In regard to individuals living with dementia, dance movement therapy has been effective in stimulating social interaction, enhancing mood, reducing anxiety and depressive symptoms, increasing self awareness, and self- expression. Dance movement therapy is the psychotherapeutic use of movement to further the emotional, cognitive, physical, social, and spiritual integration of the individual. Dance movement therapy operates on the assumption that our life experiences are held in the body and through the use of movement, memories, and emotions can be recalled and re-experienced despite a cognitive, psychological, or physical impairment. The present study aims to understand the effects of dance movement therapy for elder citizens with dementia. Dance movement therapy allows those with dementia to move as a means to communicate, which helps them develop a physical vocabulary.

ABSTRACT

NP006

THE POWERFUL INFLUENCE OF POETICS AND LITERARY READING ON NEUROCOGNITION

Khushee
Department of Psychology, DAV College, Chandigarh

Neurocognition concerns the neural pathways and networks of the brain that help in functioning of the cognition. It seeks to understand the relation of the brain and behaviour. The brain controls our ability to breathe, move, think and to feel. It is the most complex organ of the human body that helps in experiencing and perceiving the world around. But, while reading a book or a verse of poetry, while watching a movie of a certain genre or the times spent wallowing in any work of art, a person will often find themselves being completely 'immersed' and 'engrossed' into it. They cease to be aware of the world around them and become a part of an imaginary concoction that makes them elicit raw and innate emotions. Words like 'empathy', 'devastation', 'beauty' demarcate feelings and produce novel and subjective expressions every time. Something which is completely unnatural and external becomes the stimulus that controls the cognition, thus generating responses in the form of emotions. The present study aims to study how poetics and literature possess the power to control emotions, impacting the neurocognition. It also attempts to highlight the areas of the brain affected while being 'absorbed' in a literary work, using the neurocognitive poetic model of literary reading given by Arthur M. Jacobs.

ABSTRACT

NP007

THE NEUROSCIENTIFIC SIGNIFICANCE OF AEROBIC EXERCISE ON THE RATE OF LEARNING

Smriti Saini

Department of Psychology, D.A.V. College, Chandigarh, India

Aerobic Exercise is a type of physical activity that is performed at mild to moderate intensity for a prolonged period of time. Over the years, Neuroscientists have highlighted the profound effects of aerobic exercise on cognitive abilities and mental health. Learning is one such cognitive functions that is pertinent to the intellectual growth of a person and the survival of human species at large. The current research aims to study the neuroscientific significance of aerobic exercise on the rate of learning. Aerobic exercise sparks the synthesis of BDNF (brain derived neurotrophic factor) in the hippocampus, an area of the brain related to memory and learning. BDNF is a protein that plays an important role in the maintenance of cell circuitry i.e. growth and survival of the neurons. It takes center stage in the process of neurogenesis and aids synaptic plasticity through long-term potentiation. Hippocampus is also an area of the brain that is extremely vulnerable to neurodegenerative diseases as they induce damage to neurons, thus, affecting learning. The brain's capacity to learn & retain information could be enhanced by plugging newly formed cells into a pre-existing neural network, by a process known as Environmental Enrichment. Conversely, environmental deprivation can lead to brain shrinkage as the disuse of cells causes them to wear-off. In conclusion, Aerobic exercise is instrumental in effective learning and can boost various brain functions.

ABSTRACT

NP008

NEUROCHEMICALS- DOSE & ITS RELATION TO HAPPINESS.

Gayatri Ahuja

Department of psychology, Himaylan Garwhal University, India.

Happiness is the peaceful state of mind. The feeling of happiness is not the result of single neurochemical in the brain. Happiness is dependent on the different neurochemicals. The neurochemical comprising of dopamine, oxytocin, serotonin, and endorphins- (DOSE). DOSE is offering agents secreted in humans. Activation of dopamine and serotonin increased and production of oxytocin occur when a person gets attracted to another person. The first leading neurochemical that is found in human body is Dopamine. This is a (good & bad) habit former, Incredible tool when used appropriately. Oxytocin often referred to as a “hugging drug”, also the feeling behind love. Serotonin on the other hand is the neurotic hormone that gives feeling of happiness, also serotonin is another social chemical and leadership hormone. Serotonin neurochemical is a key to our feeling of happiness. The primary job of Endorphins is to block pain. This paper specifically examines neurochemicals in relation to Happiness. Each neurochemical has independent function. Higher happiness level in turn results in higher productivity. People with clinical depression often have low level of serotonin in their body. Dopamine and serotonin are the most widely recognized, of all the neurotransmitters.

ABSTRACT

NP009

RAJYOGA MEDITATION INDUCES GRAY MATTER VOLUME CHANGES IN REGIONS THAT PROCESS REWARD AND HAPPINESS

*Ramesh Babu MG 1 , Rajagopal Kadavigere 2 , Prakashini Koteshwara 2 , Brijesh Sathian 3 , and Kiranmai S Rai 1**
 1 Department of Physiology, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal
 2 Department of Radiodiagnosis and Imaging, Kasturba Medical College, Manipal Academy of
 Higher Education, Manipal, Karnataka, 576014, India.
 3 Deputy Chair for Research, Geriatrics and Long Term Care Department, Rumailah Hospital, Doha, Qatar.

Studies provide evidence that practicing meditation enhances neural plasticity in reward processing areas of the brain. No studies till date provide evidence of such changes in Rajyoga meditation (RM) practitioners. The present study aimed to identify grey matter volume (GMV) changes in reward processing areas of the brain and its association with happiness scores in RM practitioners compared to non-meditators. Structural MRI of selected participants matched for age, gender and handedness (n=40/group) were analyzed using voxel-based morphometric method and Oxford Happiness Questionnaire (OHQ) scores were correlated. Significant increase in OHQ happiness scores were observed in RM practitioners compared to non-meditators. Whereas, a trend towards significance was observed in more experienced RM practitioners, on correlating OHQ scores with hours of meditation experience (mean \pm SD, 8022.24 \pm 8767.24). Additionally, in RM practitioners, higher GMV were observed in reward processing centres - right superior frontal gyrus, left inferior orbitofrontal cortex (OFC) and bilateral precuneus. Multiple regression analysis showed significant association between OHQ scores of RM practitioners and reward processing areas right superior frontal gyrus, left middle OFC, right insula and left anterior cingulate cortex. Further, with increasing hours of RM practice, a significant positive association was observed in GMV of bilateral ventral pallidum. These findings indicate that RM practice enhances GMV in reward processing regions associated with happiness.

ABSTRACT

NP010

HYPOTHESIS: STUDENTS RETAINING CAPACITY IN ONLINE CLASSES IS LESS THAN IN CLASSROOM TEACHING

Yashika Thakran
 Gargi College, University of Delhi

COVID-19 pandemic has affected almost every sector in the world. One of them is education. Schools and colleges are taking classes online. The aim of this study will be whether these classes are even effective. What problems students are facing in understanding? How much are they retaining? The effectiveness of online classes and retaining capacity varies amongst age groups. A web based survey comprising MCQs will be given to students of different age groups and a test based evaluation will be done. This will tell us whether they have actually retained information taught or not. The result from research will be useful for betterment of online education worldwide. We will get to know students' preferences accordingly and will let us make appropriate changes in the current way of teaching virtually.

ABSTRACT

NP011

AN EXPLORATORY STUDY OF HINDI LANGUAGE ACQUISITION

Khushi Bhardwaj
Psychology (Honors), Carleton University, Canada

Language is an intensely complex set of symbols that can be arranged in certain ways to communicate information. Children, who are barely able to function independently, can grasp language much more rapidly than adults. We all know how to use language as it is considered an implicit knowledge—often based on what sounds right. This has led researchers to view language acquisition as a phenomenon that is different from other forms of learning. This claim is supported by the Critical Period Theory, which adds a genetic component to language by stating that there is a sensitive period for language learning. However, the study of language acquisition remains largely dominated by the English language. This study aims to study the acquisition of Hindi in native Hindi speakers. The present literature points to the differences between Hindi and English. More words are required to express the same idea in Hindi than in English. As language acquisition is often measured in terms of Mean Length Utterances (MLUs) or the number of words or morphemes, such a difference is considered crucial. This also has implications for cognitive growth. The primary method used in the limited number of exploratory language acquisition studies are longitudinal studies which observe the structure of learning through recordings of children taken in their natural environment. Several patterns such as the average MLUs at ages, the trajectory of learning a word to effectively use it and the common corrections that are required will help in understanding the very basics of Hindi language acquisition. Present themes and understanding of language acquisition will then be used to understand what the findings mean in the context of pre-existing research. The study of Hindi language acquisition will open an avenue of research in the field. This research can inform studies relating to cognitive development, pedagogy, and cross-cultural neuropsychology.

ABSTRACT

NP012

ANALYSING THE KNOWLEDGE AND ATTITUDES ON MENTAL HEALTH IN THE YOUTH AND TO SENSITIZE AND SPREAD AWARENESS AMONG THEM

*Nikita Kochhar, Shrashti Shrivastava, Charu Aggarwal, Suyash Labh, Dr. Divya Bajaj**
Department of Zoology, Hindu College, University of Delhi

Adolescence is a stage of great turmoil and growth characterised by the transition from being dependent on caregivers to being independent, autonomous young adults. The associated stigma and non-accepting attitudes toward mental illness and low mental health literacy have been identified as roadblocks to seek and comply with treatment among adolescents experiencing episodes of mental health problems. A Quantitative Survey approach was used to record and analyse the understanding of mental health and the attitude of adolescents towards it. A multi-approach youth awareness program will be employed that helps us reach out and connect with the masses. One of the components of this program was the social media platform with an aim to spread awareness and sensitize the students with an aim to promote mental health literacy. Out of the 260 people surveyed, Females were the predominant to participate in the survey making 64% of the total percentage. A good amount of people i.e. more than 90% considered mental health as important as physical health. Performance in exams and relationship issues were identified as the main contributors to the increased level of stress or anxiety in the youth. Nearly 70% of the total volunteers were concerned about the issues but only 34% had the information or knowledge to deal with it. Individuals clearly experience certain forms of mental health related issues at some point but the stigma around help seeking and having an unashamed conversation about it, is lacking. These findings reinforce the importance of awareness/education about mental health in the masses.

ABSTRACT

NP013

EFFECTIVENESS OF EXERCISE AND MEDITATION BASED INTERVENTION FOR INTERNET ADDICTION

Afreen Zehra
Department of Psychology, Gargi College

Research consistently demonstrates that long-term addiction is characterized by neuropsychological impairments and neurobiological abnormalities in various regions of the brain. According to the American Psychological Association, Internet Addiction is characterized by excessive or obsessive online and offline use of gadgets that leads to distress and impairment. This study traced the internet usage of a sample of 136 young adults (Age Range: 19- 25 years), 32.35% males, and 66.17% females, using the Internet Addiction Test. It also drew the correlation between their Internet Addiction and Sleep quality, assessed using the Sleep Condition Indicator. A 'One-group pre-test post-test' design was employed to discern the effectiveness of an Intervention Program based on Exercise and Meditation. Participants with Severe and Moderate internet addiction underwent the intervention program over the course of a week, where they followed a set of aerobic exercises, and guided mindfulness meditation course, daily. The results indicate that 25% of the samples had Moderate Internet Addiction and 11.764% had Severe Internet Addiction. The correlation between Internet Addiction and Sleep Quality was a moderate -0.66. The results also imply the effectiveness of the intervention program. There was a noteworthy decrease of 9.618% in an average of IAT score for the sample with Severe Internet Addiction and 15.043% in average IAT score for the sample with Moderate Internet Addiction. There was also a substantial improvement in the SCI scores after the intervention, with 49.739% increment in the average score of the sample with Severe Internet Addiction and 31.206% increment in the average score of the sample with Moderate Internet addiction. The study concludes that Exercise and Meditation based intervention programs can be effective for Internet Addiction. Further research on the topic is also urged upon.

ABSTRACT

NP014

SUDOKU PUZZLE DIFFERENTIALLY ACTIVATES PREFRONTAL CORTEX: FNIRS STUDY

*Patil Ashlesh 1, K K Deepak 2, Kochhar Kanwal Preet 2**
1 Department of Physiology, All India Institute of Medical Sciences, Nagpur, India.
2 Department of Physiology, All India Institute of Medical Sciences, New Delhi, India.

Solving puzzles like Sudoku can be a promising tool for neurorehabilitation and Cognitive Remediation therapy in neuropsychiatric disorders. Sudoku involves executive cognitive functions like problem solving and decision making. Most of the executive functions involve the Prefrontal cortex (PFC). However, the activity of PFC during 9x9 Sudoku has not been studied. The objective of this study was to explore the role of PFC while solving Sudoku. Sudoku task was uniquely divided into two steps to separate the rules in the puzzle. PFC activity was recorded during rest and during the task using 16 optodes fNIRS (functional near infrared spectroscopy) system. Concentrations of oxyhemoglobin and deoxyhemoglobin were calculated from raw intensities using Modified Beer Lambert Law. Statistical analysis was also done using mass-univariate approach based on the General Linear Model in NIRS-SPM. Noise free recording from 28 right-handed participants (8 females, 23.04 ± 2.60 years) revealed increased activity in all 16 optode locations during step 1 (3 x 3 subgrids) and step 2 (easy level 9x9 Sudoku) as compared to rest ($p < 0.05$). In addition, there was a significant activation seen during step 2 as compared to step 1 in medial PFC regions corresponding to optodes 7, 8, 9, 10. Both the medial and lateral regions of PFC are activated during Sudoku tasks. However, the medial regions of PFC play a differential role, especially when we consider searching & selecting the heuristic rules. Thus, Sudoku may be used for cognitive remediation training in neuropsychiatric disorders involving PFC.

ABSTRACT

NP015

MUSIC THERAPY AS AN INTERVENTION FOR IMPROVED COGNITION

Ramya Dwivedi
Department of Psychology, IILM University, Gurgaon, Haryana

The relationship of music with Psychology has been an area of interest to many researchers. Music, considered a product of the mind, has the potential to modulate behavior which is also a manifestation of mind. The effects of music induce tranquility and peace within. The classical evolution of music as a therapy-based intervention was understood during World War I and World War II when both amateurish and professional musicians went to the hospitals to play music for thousands of experts from the war who were suffering from emotional and physical wounds. Using music as a mode of treatment led to notable effects that music had on these patients. This made doctors and other paramedical staff believe that music has a significant healing effect on emotional psychological and physical injuries of the victims. A number of research studies till date reveal the therapeutic effect of music on an individual's overall health including emotional, physical, social, psychological and behavioral domains. Music therapy includes an entire process consisting of a client with his/her environment, music and the therapist. A number of cognitive domains like autobiographical and episodic memories, psychomotor speed, executive functions and neuropsychiatric symptoms (to an extent) can be improved/ reduced with the help of music therapy interventions. With the increase in the life expectancy rate of individuals worldwide, quality of life somewhere has also deteriorated leading to a number of issues in the form of cognitive complaints, coping mechanism, adaptations etc. Music therapy can be introduced as a psychosocial intervention for improved cognition. The present paper is an effort in this direction to elaborate upon the different techniques used under music therapy interventions against cognitive decline.

ABSTRACT

NP016

THE NEUROPSYCHOLOGICAL IMPACT OF LOCKDOWN

*Ms. Ashman Kaur Kohli, Ms. Parminder Kaur Narang **
Department of Zoology, SGTB Khalsa College, University of Delhi

The advent of SARS-CoronaVirus-2, has infringed upon all aspects of life, be it, physical, mental and even emotional being. Mental health is a crucial aspect that needs to be addressed, as irrespective of the age group, all individuals have begun to show signs of the impact. Hence, a survey was conducted on the most vulnerable age groups, to analyze the mental stress they are facing in these unprecedented times. It involved real time data collection of three age groups involving unostentatious and simple questions concerning their everyday activities and then analyzing their psychological and neurological impacts. The constructive analysis of the survey revealed an increase in the sleeping duration of the subjects during the month of June, when lockdown was at its peak, thus indicating a rapid change in their circadian rhythm in turn affecting the neurotransmitter Serotonin cumulating the mental stress levels. This was also coupled with distorted eating patterns comparing the month of March and June, when 35.1% subjects claimed to have had a change in the eating patterns on a daily basis. A majority of 46.8% have claimed to have put on weight during lockdown. This has two maxims attached to it, the primary being the highly alleviated physical activity, which was the findings of our survey when a whopping majority of 70% of the subjects claimed to have had no physical activity per se, and the secondary maxim is distorted eating patterns. The third major finding was the amount of trauma linked to the disease that any spherical object with spikes was thought upon to be similar to the structure of coronavirus. These images are impinged on the tender minds which will last a lifetime. It is important to analyze these trends as alarming and calls for a more detailed study on an urgent basis.

ABSTRACT

NP017

NEURAL CIRCUITRY DYNAMICS DURING COVERT LEARNING, OVERT ACTION AND VISUAL IMAGINATION IN CHILDREN

Yamini Kathuria
Department of Psychology, Mata Sundri College for Women, University of Delhi

The aim of this exploratory study is to understand the neural circuitry dynamics during covert processes such as real time observation, imagination/visualization & overt motor action in children of age 8-10 years. Simple act of watching, observing & then executing it, is a milestone of human development, that's when covert learning occurs. Another aspect is the underlying hidden mechanism of how a human in the absence of real visual stimulus imagines vividly & rehearsals it mentally. Therefore, imagining is a key cognitive function achieved during childhood. According to Kosslyn et al. (2001) mental imagery occurs when perceptual information is accessed from memory, giving rise to the experience of 'seeing with the mind's eye', 'hearing with the mind's ear' & so on. Recent advances in cognitive neuroscience, including functional brain-imaging techniques, have shown that mental imagery makes use of much the same neural substrates as perception in the same sensory modality. The less studied aspect is how the same visualization process is similar or different to the visual motor experience caused by real stimulus. Prior studies have been conducted on other primates like monkeys using brain machine interface (Vyas et al., 2018). However, the results are not directly analogous to that of human cognitive capacity to imagine. Therefore, to get the insights of human imagination in the context of early childhood, this study aims to assess that. Children are perfect subjects for this study since it helps us to identify how in childhood this cognitive neural dynamics of imagination takes place and relates with overt action and covert learning. By using Functional near-infrared spectroscopy (fNIRS), the aim would be to explore the difference & similarities in the activation of brain regions while a child observes an action and encodes it simultaneously, executes the action and then finally imagines it.

ABSTRACT

NP018

A REVIEW ON THE STUDY ON THE ROLE OF ARTIFICIAL PROVISIONING IN NEUROCHEMICAL STIMULATOR INDUCED BEHAVIOURAL CHANGE IN MACACA MULATTA

Muskaan Verma
Department of Zoology, Shivaji College, University of Delhi

Aggression in Rhesus Monkey is a leading source of trauma which can potentially influence the animal's well-being and their brain cell development for evolutionary purposes. Although aggression between macaques seems to be a part of daily-life social interactions, artificial feeding by humans might affect their brain development and instigate aggressive behaviour in them and their future progeny. Artificial Feeding by humans may cause some biological risk associated with increased aggression and subsequently may affect their future generations at molecular and environmental level. The 2 neurotransmitters- Serotonin and Dopamine play a very crucial role in the regulation of aggression. Serotonin hypofunction leads to impulsive aggression and in severe cases, it may even cause death of brain cells. Similarly, when dopamine intake increases, it leads to the degeneration of the brain cells and during poor impulse control, it leads to abnormal activity which may cause damage to the well-being of the primates at the environmental level by behaving aggressively and abnormally and at the molecular level by causing brain cell damage, which can cause biological risk to the future generation. Future studies should focus more on dealing with the biological risk associated with artificial feeding done by humans. Instead of this type of feeding, natural types of feeding should be encouraged, so that the brain cell damage risk to the primates decreases and the brain development of the future generation remains normal, so that they don't indulge in the abnormal activities which may cause damage to their well-being. This aggressive behaviour should be analyzed at biological, psychological, and social levels of organization. Serotonin and Dopamine levels affect psychological characteristics and social interactions that have an impact on violent behaviour as well as on their mental well-being.



NEUROBIOLOGY AND HEALTH SCIENCE

ABSTRACT

NB001

PRENATAL INFLAMMATION INDUCED ALTERATIONS IN THE HIPPOCAMPAL NEURONAL DENDRITIC MORPHOLOGY: MITIGATED BY POSTNATAL EXERCISE AND ENVIRONMENTAL ENRICHMENT IN JUVENILE WISTAR RATS

Rajesh. T 1, Ramesh Rao.T 2, Kiranmai. S. Rai 3

1 Dept. of Anatomical Sciences, St Matthew's University, School of Medicine, Grand Cayman, Cayman Islands

2 Dept. of Preclinical Sciences, Faculty of Medical Sciences, The University of The West Indies, Trinidad

3 Dept. of Physiology, Melaka Manipal Medical College- Manipal Academy of Higher Education, Manipal

Prenatal inflammation is a major public health concern and is a potential risk factor for neurodevelopmental brain injury leading to chronic neuropsychiatric illness in the offspring. The present study aimed to elucidate the effects of treadmill running exercise and environmental enrichment during juvenile age in mitigating the inflammation during gestation induced alterations in the hippocampal CA3 neuronal dendritic arborization. Pregnant Wistar dams were injected intraperitoneally either 0.5ml of saline (control group) or lipopolysaccharide (LPS group) (0.5mg/kg), from gestation day 14 till delivery, on alternate days. After parturition, pups were divided into following groups [n=6 per group]: (1) Control, (2) LPS, (3) LPS-exercise, (4) LPS-environmental enrichment and (5) LPS-exercise-environmental enrichment. Animals of group 3, 4 and 5 were subjected either to treadmill running exercise (15min/day) or environmental enrichment (4h/day) or both, respectively, on postnatal days (PND) 15 to 30. Animals were sacrificed on PND 30, brains were shelled out and impregnated with Golgi-cox stain. Dendritic arborization of Golgi-cox stained hippocampal CA3 neurons were traced by camera lucida and analysed by Sholl's method. Young rats of LPS group exposed to prenatal inflammation showed a significant reduction in dendritic branching points and intersections at basal as well as apical regions of hippocampal CA3 neurons, at various radii levels of Sholl's grid. The young rats of LPS-exercise-environmental enrichment group showed a significant increase in dendritic arborization of CA3 hippocampal neurons, compared with LPS, LPS-exercise, and LPS-environmental enrichment groups. Environmental enrichment combined with physical exercise during critical growth spurt period effectively rescues the prenatal inflammation induced alterations in the dendritic arborization of hippocampal CA3 neurons of juvenile rats.

ABSTRACT

NB002

EFFECT OF *Clitoria ternatea* AQUEOUS ROOT EXTRACT AND CHOLINE WITH DHA SUPPLEMENTATION ON BRAIN OXIDATIVE STRESS IN PERINATAL MATERNAL SEPARATED RATS AT DIFFERENT TIME POINT OF AGING A COMPARATIVE STUDY

*Prathibha Maria D Almeida 1, Kiranmai S Rai 1, Shobha U Kamath 1**

1. Dept. of Physiology, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, India

1 Dept. of Biochemistry, Kasturba Medical College, Manipal Academy of higher Education, Manipal, Karnataka, India*

Perinatal maternal separation stress (PMSS) induces brain lipid peroxidation and reduces endogenous antioxidants. The present study was designed to assess the effect of supplementation of *Clitoria ternatea* (Linn) aqueous root extract (CTR) and Choline with Docosahexaenoic acid (DHA) during 30 days of PMSS period on brain tissue MDA and protein thiol levels at different time points of aging. Groups: Normal control [NC], PMSS, PMSS + Choline +DHA, PMSS + CTR (n = 6/group). PMSS was given for a period of 6 h/day for 30 days. PMSS + supplemented groups were appropriately supplemented during the same period. Rats were sacrificed at 1, 2, 3, 7 and 12 –months of age. Brain tissue was processed for MDA and protein thiol levels. Brain MDA levels were significantly increased in PMSS rats at 1, 2, and 3-month age ($p < 0.001$; $p < 0.01$), Choline+DHA and CTR supplementation attenuated MDA levels at 1,2,3 and 12-month -age ($p < 0.01$; $p < 0.01$, $p < 0.05$; $p < 0.001$) compared to age-matched PMSS rats. Choline + DHA supplemented groups had better attenuation in MDA levels at 1 and 2 month-age whereas CTR was better at 3 and 12- months of age. Protein thiol levels in PMSS rats were reduced in all age groups compared to age-matched NC. A significant increase in brain protein thiol levels was observed in both supplemented groups at 2, 7 ($p < 0.01$) and 12-month age ($p < 0.01$, $p < 0.05$) when compared to age-matched PMSS rats with higher significance in Choline + DHA supplemented groups at 2, 7 and 12 month-age compared to CTR supplemented groups. CTR Supplementation during 30 day PMSS period has shown persistent attenuation in brain MDA levels through ageing whereas Choline + DHA has shown long lasting increased brain protein thiol levels which persisted through ageing.

ABSTRACT

NB003

EVALUATION OF ANXIOLYTIC ACTIVITY OF ULTRA-DILUTED ACONITE AND IGNATIA ON STRESS INDUCED WISTAR RATS

*Nandini Bhat 1, Pugazhandhi Bakthavatchalam 2, Prasanna LC 1,
1 Department of Anatomy, Kasturba Medical College, Manipal, Manipal Academy of Higher Education
2 Department of Anatomy, Melaka Manipal Medical College, Manipal Academy of Higher Education*

Anxiety Disorders are major mental health issues, affecting millions of people globally. There is an overall increase in the prescription of anti-anxiety drugs over the years. Each of the drug groups prescribed have serious adverse effects. Homeopathy is an alternative system of medicine which is gaining popularity for treatment of chronic diseases. Aconite and Ignatia are ultra diluted homeopathic medicines which are used clinically for treatment of anxiety with good results. To test the efficacy of Aconite 12C and Ignatia 12C on stress induced Wistar rats. 36 Female Wistar rats were divided into 6 groups (n=6). A-Control, B-Anxiety, C-Anxiety + Placebo, D-Anxiety +diazepam, E-Anxiety+ Aconite 12C, F-Anxiety +Ignatia 12C. Chronic unpredictable stress was induced for 5 weeks. Aconite 12C was administered to group E and Ignatia 12C was administered to group F daily by oral gavage from second week. Body weight was measured every week. Following this, a behavioral assessment was done using Light and dark tests. The latency, number of crossings and time spent in the dark compartment was measured. The appropriate statistical analysis was done. It was observed that the latency in Aconite and Ignatia treated groups was decreased compared to other groups. However, crossings and time spent in the dark though less with comparison to the other groups was not statistically significant. This study displays that ultra-diluted homeopathic Aconite 12C and Ignatia 12C did not have substantial anxiolytic effect in Wistar rats which were subjected to chronic unpredictable stress.

ABSTRACT

NB004

NEUROBIOLOGY OF CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER

*Mehak Doda
Department of Psychology, MCM DAV College, Chandigarh*

Attention Deficit Hyperactivity Disorder, a debilitating genetic condition affecting many children, is characterized by the symptoms of age-appropriate attention, locomotor hyperactivity and impulsivity. Children with ADHD refuse to follow directions from parents or teachers, have difficulty in executive functioning, interception, and learning difficulties, and may have emotional outbursts when asked to do things they find difficult or challenging. The neurobiology of learning and memory of children with ADHD is because of the deficits in subcortical regions and impaired neurotransmitter activity in four functional regions of the brain. The neurobiological analysis of the cognitive process in children is due to the immaturity of the regulatory system that has a specified effect on the organizations of the child's activity. As per research, ADHD children gravitate closer to be more creative, intelligent, problem solving, energetic, and are more intuitive. Many progressive thinkers who were diagnosed with ADHD like Paris Hilton, Michael Phelps, etc, have made an impact in this era and were not restrained to a singular pursuit of the vicinity, rather than making the mark in the world history in different areas. These visionaries have one thing in common, that they keep going no matter what, turning their disability into a strength. Since ADHD is genetic, this disorder can never completely outgrow. Multifarious mitigation can be induced by the parents in behavior management and social skills training to reduce disruptive behavior in children with ADHD.

ABSTRACT

NB005

STRESS INDUCED MORPHOLOGICAL CHANGES IN THE NEURONS OF THE CORTICOID COMPLEX IN 15 & 30 DAYS OLD CHICK, GALLUS DOMESTICUS

Adarsh Kumar, Hemlata, Kavita, Ram Chandra Maurya
 Department of Zoology (DST-FIST SPONSORED), S.S.J. Campus, Kumaun University, Nainital

Corticoid complex occupies the dorsolateral surface of the telencephalic pallium in aves. It is divided into an intermediate corticoid area (CI) and a dorsolateral corticoid area (CDL). Most of the studies in different birds have shown the presence of local circuit neurons and projection neurons. The present study is based on neurohistological techniques; Nissl-staining, Golgi-impregnation method for the morphological evaluation of the neurons of the corticoid complex in 15 & 30 days old chick, *Gallus domesticus* in normal and after single acute stress of 24 hour food deprivation. The neurons of the corticoid complex are classified into four main groups: (a) Dominant projection neurons comprising multipolar and pyramidal neurons, (b) Stellate neurons, (c) Granular neurons and (d) Less developed monopolar and bipolar neurons. The present study shows that in the case of CI region, under stress condition, the numbers of multipolar and pyramidal neurons have decreased, while number of stellate and granular neurons have been increased in both 15 and 30 days old chicks. In the CDL region, due to stress, the multipolar neurons show significant decrease as compared to other neurons in both 15 and 30 days old chick. The corticoid complex is mostly dominated by multipolar projection neurons. The present study depicts that the projection neurons mainly multipolar neurons decrease in number under stress condition in CDL and CI region of both 15 and 30 days old chick. Whereas, the other types of neurons show insignificant increase in their number due to stress conditions. The experimental procedures were carried out according to the guidelines of the Animal Ethics Committee of the Kumaun University, Nainital.

ABSTRACT

NB006

ROLE OF DNA DEMETHYLATION IN HIPPOCAMPUS AND VTA IN REWARD MEMORY CONSOLIDATION: BDNF AS CANDIDATE

Madhura Sapre, Sneha Sagarkar, Amul Sakharkar*
 Department of Zoology, Savitribai Phule Pune University, Pune

Reward is a fundamental cognitive brain function that increases the chances of growth and reproduction, hence supports the survival of the species. The reward circuitry is a vital part of learning and memory-guided decision processes. Evidence demonstrates that the hippocampus and ventral tegmental area play a crucial role in various cognitive tasks like memory, associative learning and reward recognition. Epigenetic regulation of memory-related genes such as BDNF contribute in the formation, maintenance and retrieval of memories. Here, we examine the expression of BDNF exons and its regulation through DNA methylation. We are considering the role of methylation modifiers such as GADD45a, GADD45b and Tet1 on regulation of BDNF expression in food reward memory formation and consolidation/retrieval. We conditioned the Wistar rats to a sweet pellet in one of the Y maze arms, which were observed to induce changes in DNA methylation. The mRNA levels of factors involved in DNA demethylation such as Gadd45a and Tet1 along with BDNF exons IV and IX were significantly increased in the hippocampus of conditioned rats compared to non-conditioned rats. Similarly, there is a significant increase in mRNA levels of GADD45b, BDNF IV and Tet1 with decrease in BDNF IX levels in the VTA of conditioned rats. The total BDNF and Tet1 protein levels were also significantly increased in the hippocampus of conditioned rats. Further, DNA hydroxymethylation at the promoter of the BDNF exon IV and exon IX of conditioned rats was significantly increased with reciprocal decrease in the DNA methylation levels. These results suggest that DNA demethylation plays an important role in reward memory consolidation/retrieval via regulation of BDNF expression in hippocampus.

ELUCIDATING ROLE OF OLFML3 FUNCTIONS IN MICROGLIA

Prince Singh 1, Ojal Saharan 2, Shashank Kumar Maurya 1*

1* Department of Zoology, Ramjas College, University of Delhi, Delhi

2 Department of Biomedical Science, Bhaskaracharya College, University of Delhi, Delhi

Olfactomedin-like 3 (Olfml3) belongs to a family of olfactomedin domain-containing proteins with distinct roles in embryonic patterning, cell-cycle regulation, tumorigenesis, and modulating critical signalling circuits such as Notch or Wnt pathways. Olfactomedin domains are of prime importance because they facilitate protein-protein interactions, intercellular interactions and cell adhesion. Although the biological functions of olfactomedin domain-containing proteins remain for the most part elusive, a growing body of evidence indicates that these proteins may play very important roles in normal development and pathology. Recent literature suggests expression of Olfml3 is confined to microglia in the brains of humans and mice. Olfml3 has been shown to cause the induction of microglia specific genes such as Tmem119, Hexb, Fcrls, and Tgfb1. Olfml3 is shown as a direct target gene of TGF β 1/Smad2 and its expression gets induced by TGF β signalling. However, the role and importance of microglia-derived Olfml3 is still elusive. The interacting partners of Olfml3 in microglia and its impact on status of microglia activation, microglia phenotypes, neuroinflammation, neurodegeneration is also lacking. Therefore, it is presumed that Olfml3 must be having a number of interacting proteins in microglia via its olfactomedin domain. Being a microglia-specific protein in the brain and a direct target of TGF β 1/Smad2, Olfml3 may have a neuroprotective role in regulation of microglia functions in the brain under pathological conditions. Various methodologies like fluorescence-activated cell sorting, Co-Immunoprecipitation, CRISPR-CAS9 mediated Olfml3 silencing, qPCR, western blotting, Immunofluorochemistry will be used to test the proposed hypothesis in ageing mice model. The proposed study will for the first time insight into the role of Olfml3 in microglia with major emphasis on possible involvement in neuroprotection or neurodegeneration.

ABSTRACT

HS001

TRANSFORMING PROBIOTICS AS FOOD TO MODULATE GUT BIOME AND STIMULATING EARLY DEVELOPMENTAL PATTERN ON ZEBRAFISH MODELS

*J.Dhanasri , A.Anita Margaret
Department of Biotechnology , Bishop Heber College, Tiruchirappalli, Tamil Nadu, India*

Unravelling the efficacy of gut biome has a major impact on health and an unbalanced microbiome composition is linked to many common illnesses such as gut dysbiosis, mental deformities and immunological imbalance. An optimistic influence on the gut biome can be made by taking probiotics. This study paves a twofold strategy to transform probiotics as food and analyse its therapeutic efficiency on zebrafish models. Combination of probiotics in food products can enhance the chances of a positive health effect and this study has experimented on producing fermented foods that naturally have probiotics. Subsequently, this study evaluates the potential of probiotics in Zebrafish models. The embryo developmental assay endorsed the optimistic effect of probiotics on the larval growth. The incited probiotics has attested its prophecy as a natural nurturing agent that induces development. This study furnishes a prelude to elevate probiotic food as efficient supplements in early developmental research.

ABSTRACT

HS002

PREVALENCE OF MENTAL HEALTH PROBLEMS IN ADOLESCENTS

*Gayathri Byloppilly
Shyama Prasad Mukherji College , University of Delhi*

Adolescence is a critical phase of life in which a myriad of emotions flow and at this pivotal point, mental health plays an important role in molding physical, psychological, social development of an individual. According to the National Mental Health Survey 2016 report, prevalence of mental disorders among the adolescent population in India is 7.3% and nearly equal in both the genders. The study highlights the prevalence and significance of mental health of adolescents as their behavioural problems are a growing public health concern and one's mental health plays a major role in growth and development of an individual. This paper is conducted by meta analysis of various studies, observation and by the method of literature reviews following a variety of recently published articles, researches, Government reports, policies which have elicited a number of common challenges, issues, problems and barriers, faced by this tender population. This paper also highlights some very simple and unique strategies, methods, techniques to provide sustainable solutions to curtail the mental health issues faced by adolescents.

ABSTRACT

HS003

RECURRENT ABDOMINAL PAIN IN ADOLESCENTS: SOMATIC SYMPTOMS AND PSYCHOSOCIAL STRESS

Ghanishta Tuli
Department of Psychology, MCM DAV College, Chandigarh

Abdominal pain is common in adolescence. It is one of the most common reasons for children paying visits to the hospitals. They often seek care for a variety of illnesses. If left untreated, there might be a huge risk of developing chronic symptoms leading to co-morbid mental disorders in future. Many children with abdominal pain complain of somatic symptoms like headache and fatigue which has no relation with gastrointestinal problems. In such a scenario, medical evaluation can be very difficult and might lead to extensive tests and procedures to reduce the symptoms. Studies show that children and adults with multiple somatic symptoms exhibit a relationship with psychiatric disorders specifically depression. These somatic symptoms might be an indication of mental illness. Though no extensive quantitative research has been conducted on this line of subject, the present paper is intended to provide literature signposts on Recurrent Abdominal Pain in adolescents. This review examines the current state of research on the prevalence of depressive symptoms in children and its possible association with family dynamics, social support and self efficacy. It also examines how psychological therapies help in treating children with abdominal pains.

ABSTRACT

HS004

IMPACT OF ONLINE GAMES ON THE MENTAL HEALTH AND WELL BEING OF STUDENTS

Apeksha Ojha
Shyama Prasad Mukherjee College, University of Delhi

The number of online platforms for gaming is increasing exponentially each day and so are its users. With the proliferation of online games, there has been increasing concern over the imprudent use of gaming and the ramifications on psychological well being. In a survey conducted by NortonLifeLock, 80% people in the country revealed that online games have taken toll on their physical and mental well being, while 76% was prone to heightened depression and anxiety levels. This study highlights and understands the impact of online gaming platforms on the mental health of students. This paper is conducted through meta analysis, systematic literature review to study the major impact of online gaming platforms on mental health of students. The study also highlights the predominance of mental disorders due to excessive exposure to online games, the effect on academic performances and interpersonal relationships of the students. It also encompasses certain effective solutions and strategies that would be helpful to curb the excessive usage of online games by students.

ABSTRACT

HS005

PROFILING DIETARY EFFECTS ON DROSOPHILA MELANOGASTER DEVELOPMENT AND BEHAVIOUR

Akasmika Priyadarsani, Srijan Singh, Sakshi Saini, Sumedha, Nandini, Yasha Yadav
 Department of Zoology, Miranda House, University of Delhi, Delhi

Over the past decades, obesity has become a global epidemic. Its prevalence has nearly tripled from 1975. Nearly 10.5% of the world population is suffering from chronic undernourishment. It's essential to understand the role of genetic and/or environmental factors (like diet) affecting these health problems. For this purpose, we used *Drosophila melanogaster* as model organism because it has tissues, organs and systems analogues to humans. So, it's an excellent tool to disentangle pathways and factors affecting these diseases. The project aims to profile the effect of diet on development and behaviour of the wild and mutant type fruit fly. It also aims to understand the effect of starvation on coordinated motor functions of mutant type fruit flies. The *Drosophila* culture was maintained in two different diets- normal diet (control) and high sugar diet (HSD). Different assays were performed to study development and behaviour of these flies. The morphological assay suggests that HSD causes increased triglyceride accumulation and thus, obesity in wild type third instar larvae as they were 30% thicker than control larvae. In mutant type flies, it suppresses feeding, causes insulin resistance, and larvae start breaking down the stored fat leading to weight loss which is consistent with observation that larvae were 35% thinner than control. In locomotor assay, wild type and mutant type larvae travelled 39% and 57% less distance respectively than the control suggesting that HSD causes neurodegeneration in wild type and reduced ATP synthesis in mutant type. The climbing assay indicates neurodegeneration in wild type flies as less number of flies crosses the 15cm mark. In mutant type, it suggests disruption of IIS (Insulin/IGF signalling pathway) leading to improved climbing abilities as more flies cross the 15 cm mark. Starvation leads to low glucose availability for the brain thus, confusion and impaired motor abilities as less flies cross the 15cm mark.

ABSTRACT

HS006

CHIA SEED OIL ATTENUATES DOXORUBICIN-INDUCED CARDIOTOXICITY IN A RAT MODEL

Akheruz Zaman Ahmed 1, Prakashchandra Shetty 1, Shakta Mani Satyam 2*
 1 Department of Anatomy, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal
 2 Department of Pharmacology, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal

Doxorubicin-induced cardiotoxicity is the leading cause of morbidity and mortality among cancer survivors. The present study was aimed to investigate the cardioprotective potential of chia seed oil; an active polyphenolic nutraceutical against doxorubicin-induced cardiotoxicity in Wistar rats. Twenty-four female Wistar rats (150-200 g) were divided into four groups (n = 6) which consists of normal control (group I), doxorubicin control (group II), test-A (group III) and test-B (group IV). Group III and group IV animals were prophylactically treated with two different doses of test drug i.e. chia seed oil (2.5 ml/kg/day & 5 ml/kg/day) orally for seven days. Doxorubicin (25 mg/kg; single dose) was administered through intraperitoneal route to group II, III, and IV animals on the seventh day to induce cardiotoxicity. All the experimental animals were sacrificed after 48 hours of doxorubicin administration. CK, CK-MB, AST and lipid profile were used as biochemical markers of doxorubicin-induced cardiotoxicity. Following gross examination of isolated hearts, histopathological evaluation was done using light microscopy. A significant increase of CK-MB (p<0.01), CK (p<0.001) and AST (p<0.001) in DOX control group were observed in comparison with normal control. Chia seed oil significantly decreased CK-MB (p<0.01) and CK (p<0.001) in Test-A (2.5 ml/kg) and CK-MB (p<0.01), CK (p<0.001) and AST (p<0.01) in test-B (5 ml/kg). Both the groups of chia seed oil (2.5 ml/kg and 5 ml/kg) significantly improved DOX-induced dyslipidemia. DOX treated control group's cardiomyocytes had presented inter muscular edema, myofibrillar loss, infiltration with inflammatory cells, vacuolization & cardiomyocytes degeneration. All these pathological changes were mitigated by test-A (2.5 ml/kg) and test-B (5 ml/kg). The present study revealed that chia seed oil exerts cardioprotection against doxorubicin-induced cardiotoxicity in female Wistar rats.

ABSTRACT

HS007

UNDERSTANDING MENTAL HEALTH: A HYPOTHESIS

Shazia Shifa
Gargi College, University of Delhi

Health science is the discipline of applied science that studies all the aspects of human and animal health. It basically relies on the two applications: To study, research and obtain knowledge & To improve the functioning and understanding of the disease. Mental health is the level of psychological well-being or absence of mental illness. It is the state of someone who is “functioning at a satisfactory level of emotional and behavioural adjustment”. Social health can be defined as the ability of an individual to interact and form meaningful relationships with others. It also relates to how comfortably we adapt ourselves in the social environment. Physical health is the state of the human body where bodily functions and processes work at their peak level without the emergence of any disease. Branches concepts of mental health includes disease, diagnosis, doctor hospital, medication, nurse, operation, surgeon etc. Diagnostic methods includes: Physical examination- this is further sub-divided into: Auscultation- listening to the internal sounds of the body such as heartbeat, using a stethoscope. Percussion-is the method of tapping body parts with fingers, hand or small devices. Medical imaging-this includes X-ray, CT Scan, Pet Scan, Ultrasound etc. The e-poster for this abstract includes the different aspects of mental health, subsequently covering the mental illness and its causes, symptoms and diagnosis. All these details have been mostly taken up through the original literature along with their full citations and acknowledgements. Apart from this the poster contains a research idea of my own with its original hypothesis and future directions.

ABSTRACT

HS008

A STUDY ON THE VARIANTS OF PHRENIC NERVE ROOTS WITH HISTOLOGICAL CORRELATION

Lydia Shobha Andrade, Judith Jaison, Lokadolalu Chandracharya Prasanna*
Department of Anatomy, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka

Phrenic nerve primarily supplies the diaphragm and hence is important for breathing. As per the standard text books, its root value is C3, C4 and C5. However, a few studies have shown that it is primarily formed by the C4 with contributions from C3 and C5. Therefore, this study aimed at identifying the roots of the phrenic nerve and subject it to histological procedure to identify the maximum contribution in its formation. 20 formalin-fixed adult cadavers of both sexes were used for the study. The necks were dissected bilaterally and the roots of the phrenic nerve were identified, colored and photographed. The transverse section of the phrenic nerve immediately after its formation was taken and subjected for the histological procedures. The sections were stained with osmic acid and photographs were taken. 20% necks showed that the phrenic nerve has root value C3, C4, C5 and 55% necks had root value C4, C5. The histological sections confirmed that C4 gives a major contribution to phrenic nerve. The results of the present study are in support of the fact that C4 gives major contribution for the phrenic nerve. This fact helps the surgeons in finding out the exact cause of paralysis of the diaphragm and also help in sectioning the phrenic nerve for the nerve graft in the repair of posterior cricoarytenoid muscle.

ABSTRACT

HS009

CG DINUCLEOTIDE AND THEIR ROLE IN PATHOGENICITY OF CORONAVIRUSES

*Amit Bhatt, Shiva Satija, Kanishka Kumar, Twinkle Yadav, Vaibhav Sharma, Rajshree Laishram, Muskan Prajapati, Vipasha Soni, Shubhi Aggarwal, Mansi Verma**
 Department of Zoology, Sri Venkateswara College, University of Delhi

Coronaviruses have drawn massive attention of the global scientific community due to the recent outbreak of SARS CoV-2. The coronaviruses are 26–32 kb long ss (+) riboviruses, deriving their name from their crown like outer covering. These viruses belong to the four genera of the Coronaviridae family viz. Alphacoronavirus, Betacoronavirus, Gammacoronavirus and Deltacoronavirus. Most humans-infecting coronaviruses like SARS, MERS and SARS CoV-2 are members of Betacoronavirus, some Alphacoronavirus like HCoV-NL63 and HCoV-229E also infect humans. While other coronaviruses usually lethally infect mammals and birds of economic significance. Dinucleotide composition in riboviruses; especially the pathogenic ones exhibits CG dinucleotide under representation and suppression, and coronaviruses are no exception to it. There is strong evidence that suggests the influence of the host on CG dinucleotide expression. These viruses tactfully mimic the CpG composition of their host to escape the host's defence. Interestingly, SARS CoV-2 genome shows increased CG dinucleotide frequency at certain sites that resemble CpG islands. These CG dinucleotides are located near the promoter regions and their methylation leads to epigenetic downregulation. The focus of our study is to analyse all the Coronavirus sequences available in the public databases for the position of CG dinucleotides, explore their roles in regulation of pathogenicity, and discuss the potential strategies to combat the pandemic.

ABSTRACT

HS010

RESOLVING THE CLASSIFICATION SYSTEM OF PHYLUM PROTEOBACTERIA: A PHYLOGENETIC ANALYSIS

Akshita Khosla, Vaibhav Sharma, Rishabh Yadav, Amit Bhatt, Akshanshi Gulani, Arsha Liz M Jos, Nirmegh Basu, Sanidhya Lakhera, Amit Vashishtha, Mansi Verma
 Department of Zoology, Sri Venkateswara College, University of Delhi

Proteobacteria are one of the largest and phenotypically most diverse divisions among prokaryotes, responsible for microbiotic alterations in metabolic conditions such as diabetes, non-alcoholic steatohepatitis, gut inflammation, and asthma. It should be highlighted that one thing common in all these diseases is inflammation, which thus represents a core aspect of Proteobacteria-related diseases. While the excess of Proteobacteria is known to cause a host of problems, small quantities of Proteobacteria are necessary for the maturation of intestinal microbiota. The wide reaching impact of this phylum demands an urgent need for a clear and scientifically sound classification system to streamline their study. The goal of our study was to carefully reevaluate the current system of classification and suggest changes wherein necessary. In the present study, Phylogenetic trees of 84 Proteobacteria were constructed using single gene based phylogeny involving 16S rRNA genes and protein sequences of conserved genes, whole genome based phylogenetic tree using CVtree3.0, Amino Acid Identity matrix tree, and Concatenated tree with 85 housekeeping genes. After constructing phylogenetic trees for Proteobacteria using methods additional to 16S rRNA we found a close relationship between *Desulfurella acetivorans* and the Epsilonproteobacteria and several other discrepancies were found. This multi-pronged approach to phylogeny helped this study in unearthing discrepancies which otherwise may have been masked.



PANEL OF JUDGES



DR. ARUN SASIDHARAN
SCIENTIST C (NEUROSCIENCE) CENTRE
FOR CONSCIOUSNESS STUDIES,
NEUROPHYSIOLOGY, NIMHANS,
BANGALORE



PROF. SUMAN JAIN
PROFESSOR,
NEUROPHYSIOLOGY LABORATORY,
DEPARTMENT OF PHYSIOLOGY,
AIIMS, NEW DELHI



DR. NEERA PANT
DEPARTMENT OF PSYCHOLOGY
GARGI COLLEGE,
UNIVERSITY OF DELHI



DR ELAVARASI
ASSISTANT PROFESSOR
DEPARTMENT OF NEUROLOGY
AIIMS, NEW DELHI

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