

## Guest Editorial

## Neurobiochemistry of Emotional Empowerment with New Normal The shift from “old normal” to “new normal”. The emergence of a “VUCA” world.

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Measles infected people for 1,500 years. The disease killed more than one million people annually during the 20<sup>th</sup> century for years before the vaccine was developed in 1954. Yet it took decades to bring the pandemic under control. Now there is evidence of reemergence of measles worldwide [1].

History is likely repeating as the world is now experiencing the epidemic of coronavirus infections. At the time of writing this article, there are nearly 40 million cases confirmed with over one million deaths across the globe.

The COVID 19 pandemic, given its central position to the global economy, has presented a new set of challenges to the humankind, making the world more “Volatile”, “Uncertain”, “Complex” and “Ambiguous” (VUCA) as compared to the old normal of the pre-pandemic era. The acronym, VUCA, describes the countless unpredictable variables and factors that affect a global shifting from the old normal to the new normal. Everything is becoming volatile while uncertainty increases to the extent to which we can no more predict the future. Complexity increases as we need to consider a large number of highly diverse factors to make a decision. The lack of clarity about how to interpret something causes the ambiguity. The ultimate result is that we are experiencing low-level stressors constantly.

### **The stress response that helps survive humankind becoming a cause of extinction under the new normal**

A combination of reactions to stress, known as the “fight-or-flight” response, evolved as a survival mechanism, have enabled humankind and other mammals to react quickly to life-threatening situations. The carefully orchestrated yet near-instantaneous sequence of biomolecule changes and physiological responses helps us to fight the threat off or flee to safety. Unfortunately, the body can also overreact to stressors that are not life-threatening, such as traffic jams, work pressure and family difficulties which are now becoming more common. The outcome is increased blood pressure, heart rate, and breathing rate. Digestion, learning and memory, repair and growth and reproductive function, which is not essential for fighting or fleeing, decrease. These changes of physiology were essential for our ancestors who were living as hunter-gatherers to react quickly to life-threatening situations. On the contrary, the chronic activation of this survival mechanism impairs health and contributes to high blood pressure, promotes the formation of artery-clogging deposits and causes brain changes that may contribute to anxiety, depression and addiction. Thus these disproportionate emotional reactions exacerbate the damage to us.

### **Molecules of emotion; the new science of psychoneuroimmunology**

Emotions, previously thought to be purely psychological, have now been linked to specific chemical processors taking place through the body, and not just only to the emotional centres of the brain such as the amygdala, hippocampus and hypothalamus but other types of centres scattered throughout the body. For example, neuropeptides, playing a vital role in neural information transmission and processing, are associated with specific emotions and behaviors. For example, oxytocin and vasopressin have specific effects on social

behaviors such as maternal behavior in the mother-child bonding process, and pair bonding in mutual interpersonal relationships. The kind of neuropeptides available to cells is constantly changing, reflecting variations in one's emotions throughout the day. The exact combination of neuropeptides released during different emotional status has not yet been identified.

Neuropeptides are biomolecules that regulate almost all life processors on a cellular level. They are “messenger molecules” and involved in sending chemical messages from the brain to receptor sites on cell membranes throughout the body. An average cell has thousands of receptor sites for neuropeptides. Because of this nature, they were termed as molecules of emotions by Dr. Candace B. Pert, a molecular biologist who played a pivotal role in the discovery of the endorphin molecule and widely regarded as the mother of a new field of science known as psychoneuroimmunology.

Internal feeling state (emotions) elicits neuropeptide responses impacting even at the cellular level of the body. For example, consider a feel-good peptide such as serotonin. When it binds to its specific receptors on the cell membrane, the neuropeptide is able to transmit a feel-good message right into the nucleus of the cell. As a result, this feel-good message influences every function the cell is responsible for. The body responds favourably to positive emotions (Eg: joy, love, hope, optimism, kindness and humour) and negatively to negative emotions such as sadness, anger, despair, loneliness, worry, depression, etc. Thus, it is postulated that if one is resentful, harbour anger and sustain negative emotions, it can have a definite negative impact on one's overall functionality even at the cellular level due to the influence of neuropeptides. What does this mean? For example, can suppressed anger or other “negative” emotions cause cancer?

Lydia Temoshok, a psycho-oncologist, has shown that cancer patients who kept emotions such as anger under the surface, remaining ignorant of their existence, had slower recovery rates than those who were more expressive [2]. David Spiegel, in 2012 has shown that being able to express emotions like anger and grief can improve survival rates in cancer patients [3].

In her groundbreaking book of *molecules of emotions* [4], Candace has attempted to formulate a theoretical model in this regard. Accordingly, emotional expression

is always tied to a specific flow of peptides in the body. The chronic suppression of emotions, such as suppressed anger disturbs the natural flow of neuropeptides. Let us consider the process of carcinogenesis. Every one of us has a number of tiny cancerous tumours growing in our bodies at every moment. The part of the immune system that is responsible for the destruction of these errant cells consists of natural killer cells whose job it is to attack these tumours, destroy them, and rid the body of any cancerous growth. In most of us, most of the time, these cells do their job well, which is a job coordinated by various brain and body peptides and their receptors. Thus these tiny tumours never grow large enough to cause us to become ill. However, in a situation where this natural flow of peptides is disrupted, the activity of the natural killer cells will be impacted.

The interesting point that we can argue and debate is “Is it possible we could learn to consciously intervene to make sure our natural killer cells keep doing their job? Or could being in touch with our emotions facilitate the flow of the peptides that direct these killer cells at any given moment?”

This is all about establishing the natural flow of neuropeptides.

### **Power of contemplative practices and its ability to establish the national flow of peptides, thereby to manage the stress response.**

Dr. Pert is of the view that all honest emotions are positive emotions. According to her, health is not just a matter of thinking “happy thoughts.” Sometimes a burst of long-suppressed anger can jump-start the immune system. How and where it is done is up to you. The key is to express it and then let it go, so that it does not fester, or build, or escalate out of control.



We, humans, create “perceptions” about life situations or events. This mental habit distances ourselves from the true nature of things. This act of judgmental thinking crates an incessant stream of thoughts, making the mind heavy which intern interrupt the natural flow of molecules of thoughts, neuropeptides.

The “heavy mind” that interrupts the natural flow of molecules of thoughts, neuropeptides.

There is a large body of evidence on how human can counter the stress response by using a combination of approaches that elicit the relaxation response. These include deep abdominal breathing, focus on a soothing word (such as peace or calm), visualization of tranquil scenes, repetitive prayer, yoga, and tai chi. Most of these techniques evolved around shifting the body out of “fight or flight” and into “rest and digest.” But the “rest ad digest” status may not the ideal scenario live as life challenges always surround us.

The concept of “restful alertness” which has a historical link to the Buddhist philosophy is now under scientific investigation as a meaningful alternative. The restful alertness is a situation during which one’s mind is alert but that both mind and body are in a deep state of rest characterized by higher alpha power in the frontal cortex and lower beta and gamma waves in the same frontal areas.

One of our recent studies on EEG patterns of forest-monastery based Buddhist monks in Sri Lanka [5] has shown promising results on this perspective. An EEG recording was performed on eighteen experienced Buddhist monks who engaged in a ‘Vipassana’ (insight) mindfulness meditation session for forty minutes. Neurovirtual Brain-Wave III EEG unit was used to record EEGs. Standardized low-resolution brain electromagnetic tomography (sLORETA) was used for analysis. The mean participant age was 41 years (SD 17.5); average meditation years was 6.4 with 3-6 hours of daily practice.

We have seen a significant increase in theta and gamma power which are known to associate with cognitive control, relaxation and heightened awareness during mindfulness meditation. We concluded that cultivation of mindfulness practice may help develop an awakened mind with attentive calmness.

The practice of Mindfulness Meditation focuses

one’s attention on one’s thoughts, actions, and present moments nonjudgmentally. It does not encourage evaluating or thinking about past actions, nor does it take one’s thoughts into the uncertain future. Mindfulness Meditation helps and trains the mind from getting distracted by outside disturbances and enables one to focus one’s thoughts and relax the mind.

There is a plethora of evidence on the benefits of mindfulness practice [6,7,8], and anyone can practice and experience by themselves.

A brief description of the technique of mindfulness practice [9].

1. Find a quiet and comfortable place. Sit in a chair or on the floor with your head, neck, and back straight but not stiff.
2. Try to put aside all thoughts of the past and the future and stay in the present.
3. Become aware of your breathing, focusing on the sensation of air moving in and out of your body as you breathe. Feel your belly rise and fall, the air enters your nostrils and leaves your mouth. Pay attention to the way each breath changes and is different.
4. Watch every thought come and go, whether it be a worry, fear, anxiety, or hope. When thoughts come up in your mind, do not ignore or suppress them but simply note them, remain calm, and use your breathing as an anchor.
5. If you find yourself getting carried away in your thoughts, observe where your mind went off to, without judging and simply return to your breathing. Remember not to be hard on yourself if this happens.
6. As time comes to a close, sit for a minute or two, becoming aware of where you are. Get up gradually.

#### Acknowledgement

The author wishes to thank Most Ven.U.Dhammajiva Mahathero, the chief meditation master of Meetirigala Nissaranavanaya Forest Monastery of Sri Lanka.

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## Cover Page

The cover image duly portrays how the Institute of Chemistry Ceylon conformed and accustomed to safety regulations, amidst Covid-19. This Global Pandemic has managed to greatly disrupt many activities and lifestyles, so much so that the entire world has been forced to adjust to its consequences. "The New Normal" is an issue dedicated towards the brilliant measures employed to adapt to the prevailing pandemic and provides ideas to be used in future, as the current situation will seemingly remain for a long time. The photograph was captured by Mr. Isuru Dhananjana, a representative of the CCS Photography Club, at the first International Conference on Frontiers in Chemical Technology, organized by the Institute in July 2020. The front cover was designed by Mr. Sahan Jayasingha, Dr. Sameera R Gunatilake and Mr. Anton Fernando. Furthermore, the editorial committee would like to acknowledge Ms. Nethma Wethalawe for proofreading the publication.