

# **Chapter 3**

## **Neurology of Human Spirituality**

## Introduction

Spirituality is one of the most evolved of human emotions. Spiritual tendencies have been related to temporal lobe epileptic phenomena. Previous studies have demonstrated membrane  $\text{Na}^+\text{-K}^+$  ATPase inhibition and elevated levels of an endogenous inhibitor of membrane  $\text{Na}^+\text{-K}^+$  ATPase in seizure disorder. Archaeal digoxin is a steroidal glycoside and is reported to be synthesized via the isoprenoid pathway. Digoxin can modulate the neuronal membrane transport of amino acids and can regulate synaptic transmission. It was therefore considered pertinent to study the digoxin synthesis and neurotransmitter patterns in individuals who are spiritually inclined and atheistic. Since digoxin can regulate multiple neurotransmitter systems it could also play a role in the genesis of cerebral dominance. The digoxin synthesis and neurotransmitter patterns were also assessed in individuals of differing hemispheric dominance to find out the role of hemispheric dominance in spiritual behaviour.

## Results

- (1) The results showed that spiritually inclined individuals had increased HMG CoA reductase activity and serum digoxin as well as decreased RBC  $\text{Na}^+\text{-K}^+$  ATPase activity and serum magnesium levels. The results showed that spiritually non - inclined individuals had decreased HMG CoA reductase activity and serum digoxin levels with increased RBC membrane RBC  $\text{Na}^+\text{-K}^+$  ATPase activity and serum magnesium levels.
- (2) The results showed that spiritually non-inclined individuals had increased levels of tyrosine and its catabolites (dopamine, noradrenaline and morphine) and reduced levels of tryptophan and its catabolites (serotonin, quinolinic acid, strychnine and nicotine). The results showed that spiritually inclined individuals had decreased levels of tyrosine and its catabolites (dopamine,

noradrenaline and morphine) and increased levels of tryptophan and its catabolites (serotonin, quinolinic acid, strychnine and nicotine).

- (3) Serum digoxin levels were increased and RBC  $\text{Na}^+\text{-K}^+$  ATPase activity were reduced in right hemispheric dominant individuals. Serum digoxin levels were reduced and RBC  $\text{Na}^+\text{-K}^+$  ATPase was increased in left hemispheric dominant individuals. The bihemispheric dominant individuals had intermediate values. The levels of tryptophan, serotonin, quinolinic acid, nicotine and strychnine were elevated and that of tyrosine, dopamine, noradrenaline and morphine decreased in right hemispheric dominant individuals. The levels of tryptophan, serotonin, quinolinic acid, nicotine and strychnine were decreased and that of tyrosine, dopamine, noradrenaline and morphine, increased in left hemispheric dominant individuals.

## Discussion

### Archaeal Digoxin and Membrane $\text{Na}^+\text{-K}^+$ ATPase Inhibition in Relation to Spirituality

The archaeon steroidelle DXP pathway and the upregulated pentose phosphate pathway contribute to digoxin synthesis. The results showed that spiritually inclined individuals had increased digoxin synthesis and decreased membrane  $\text{Na}^+\text{-K}^+$  ATPase activity with decreased serum magnesium levels. The increased levels of digoxin could be due to its increased synthesis. Studies from our laboratory have demonstrated the synthesis of endogenous digoxin - a steroidal glycoside by the isoprenoid pathway. Digoxin can inhibit membrane  $\text{Na}^+\text{-K}^+$  ATPase activity. Membrane  $\text{Na}^+\text{-K}^+$  ATPase inhibition can lead to an increase in intracellular calcium and a reduction in intracellular magnesium. Inhibition of  $\text{Na}^+\text{-K}^+$  ATPase can also result in defective neuronal membrane repolarisation and a paroxysmal depolarization shift resulting in epileptogenesis.

Temporal lobe epileptic phenomena have been documented in spiritually inclined individuals.

Hypothalamic archaeal digoxin may play a role in the genesis of quantal perception important in spiritual experiences. Quantal perception is important in meditative states and spiritual trances where the world does not exist for the individual, who merges into the quantal state during the period of intense meditation. A quantal perception model of brain function has been postulated by several groups of workers. Though conscious perception is the dominant form of perception in the brain, external world information is also gained by quantal perception for integration into the conscious cortical perceptual data bank. The perceived element in quantal or subliminal perception could be the quanta of matter dependent electric and magnetic fields. The brain functions as a quantum computer with the quantum computer memory elements constituted of superconducting quantum interference devices (the SQUIDS) which can exist as superpositions of macroscopic states. Bose condensation, the basis of superconductivity, is achievable at room temperature in the Frohlich model in biological systems. The dielectric protein molecules and polar sphingolipids of the neuronal membrane, the nucleosomes (which are a combination of basic histones and nucleic acid) and cytoplasmic magnetite molecules, are excellent electric dipole oscillators which exist under a steep neuronal membrane voltage gradient. The individual oscillators are energised with a constant source of pumping energy from outside, by digoxin binding to membrane  $\text{Na}^+\text{-K}^+$  ATPase and producing a paroxysmal depolarisation shift in the neuronal membrane. This prevents the dipole oscillators from over-settling into thermal equilibrium with the cytoplasm and interstitial fluid which is always kept at constant temperature. This results in a neuronal quantal state. There are direct connections between the hypothalamus and cerebral cortex and digoxin may serve as a neurotransmitter for these hypothalamo-cortical synapses. Bose condensed states produced by digoxin

mediated dielectric protein molecular pumped phonon systems could be used to store information which might be encoded (all within the lowest collective frequency mode) by appropriately adjusting the amplitudes of and phase relations between the dipole oscillators. The external world sensory impressions exist in the cortical dipole oscillators as probabilistic multiple superimposed patterns the U phase of quantum mechanics. The part of the incoming quantal data maps of the external world built by quantal perception in logical sequence and corollary to the pre-existing cortical external world maps built by conscious perception was chosen. Hypothalamo-cortical connections mediated by digoxin acting on the neuronal membrane help to magnify the chosen map to 1 graviton criteria and to the threshold required for the neuronal network to fire and consciousness. It is then integrated in to the cortical conscious perceptual external world map. The comparison between quantal perceptive maps and conscious perceptual maps of the external world occurs by the quantal non-local quasicrystal tiling effect which mediates the activation and deactivation of synapses through the contraction and growth of dendritic spines. This model of quantal perception provides a mechanism for extrasensory or subliminal perception. The R part of quantal subthreshold perception is not deterministic and it introduces a completely random element into the time evolution, and in the operation of R there might be a role for free will, an important component of conscious perception. The increased digoxin levels leads to increased efficiency of quantal perception in spiritually inclined individuals.

### **Archaeal Digoxin and Regulation of Neurotransmitter Synthesis and Function in Relation to Spirituality**

The archaeon neurotransminoid shikimic acid pathway contributes to tryptophan and tyrosine synthesis and catabolism generating neurotransmitters and neuroactive alkaloids. There is an increase in tryptophan and its catabolites and a reduction in tyrosine and its catabolites in the serum of spiritually inclined

individuals. This could be due to the fact that digoxin can regulate neutral amino acid transport system with preferential promotion of tryptophan transport over tyrosine. The decrease in membrane  $\text{Na}^+\text{-K}^+$  ATPase activity in spiritually inclined individuals could be due to the fact that the hyperpolarising neurotransmitters (dopamine, morphine and noradrenaline) are reduced and the depolarising neuroactive compounds (serotonin, strychnine, nicotine and quinolinic acid) are increased. Studies from our laboratory have demonstrated the synthesis of endogenous morphine from tyrosine and endogenous strychnine and nicotine from tryptophan.

Dopamine deficiency in epilepsy and dopamine receptor blockade producing epileptogenesis has been documented in literature. This could contribute to temporal lobe epileptogenesis in spiritually inclined individuals. Dopamine and morphine have been related to bonding behaviour. The low levels of dopamine and morphine in spiritually inclined individuals lead to a detached behaviour important in spiritual evolution. The increase in serotonin levels documented here is also significant, as serotonin is a positive modulator of the excitotoxic NMDA receptor and could contribute to temporal lobe epileptogenesis. The decrease in the noradrenaline observed can also contribute to epileptogenesis, since this catecholamine has been reported to have an antiepileptic action owing to its hyperpolarising effect on neuronal membrane. Quinolinic acid, an NMDA agonist, can contribute to NMDA excitotoxicity reported in epilepsy. Strychnine by blocking glycinergic transmission contributes to the decreased inhibitory transmission important in epileptogenesis. Strychnine displaces glycine from its binding Sites and the glycine is free to bind to the strychnine insensitive site of the NMDA receptor and promote excitatory NMDA transmission. Nicotine acts as a CNS stimulant and has been reported to promote epileptogenesis. Temporal lobe epileptogenesis has already been described to be related to spiritual tendencies.

In the presence of hypomagnesemia, the magnesium block on the NMDA receptor is removed leading to NMDA excitotoxicity. The increased presynaptic neuronal calcium can produce cyclic AMP dependent phosphorylation of synapsins resulting in increased glutamate release into the synaptic junction and vesicular recycling. Increased intracellular calcium in the post synaptic neuron can also activate the NMDA signal transduction in the postsynaptic neuron. The membrane glutamate transporter (on the surface of the glial cell and presynaptic neuron) is coupled to a sodium gradient which is disrupted by the inhibition of  $\text{Na}^+\text{-K}^+$  ATPase, resulting in decreased clearance of glutamate by presynaptic and glial uptake at the end of synaptic transmission. By these mechanisms, inhibition of  $\text{Na}^+\text{-K}^+$  ATPase can promote glutamatergic transmission and excitotoxicity contributing to temporal lobe epileptogenesis and spirituality.

The schizoid neurotransmitter pattern of reduced dopamine, noradrenaline and morphine and increased serotonin, strychnine and nicotine is also seen in spiritually inclined individuals and could predispose its development. Quinolinic acid, an NMDA agonist can contribute to NMDA excitotoxicity reported in schizophrenia. Strychnine, by blocking glycinergic transmission can contribute to the decreased inhibitory transmission in schizophrenia. Recent data suggest that the initial abnormality in schizophrenia involves a hypodopaminergic state and the low dopamine levels now observed agrees with this. Nicotine by interacting with nicotine receptors can facilitate the release of dopamine, promoting the dopaminergic transmission in the brain. This can explain the increased dopaminergic transmission in the presence of decreased dopamine levels. The increased serotonergic activity and reduced noradrenergic outflow from locus coeruleus reported earlier in schizophrenia agrees with our finding of elevated serotonin and reduced noradrenaline levels in spiritually inclined individuals. A schizophreniform neurotransmitter pattern contributes to the development of human spirituality.

## Archaeal Digoxin and Hemispheric Dominance in Relation to Spirituality

The archaeon related organelle - steroidelle, neurotransminoid and vitaminocyte contribute to hemispheric dominance. The neurotransmitter patterns of reduced dopamine, morphine and noradrenaline and increased serotonin, strychnine and nicotine is associated with right hemispheric dominance. Right hemispheric dominant individuals may have an increased predilection for spiritual tendencies. The right hemisphere is the seat of altruistic and spiritual tendencies. Right hemispheric perception and memory is of the telescopic form, where you see the wood as a whole but not the discrete trees. This type of perception is important in the development of spirituality. The right hemisphere is also the site of perception of music and art, especially dancing pursuits. Music and dancing is associated with spiritual experience. Right hemispheric dominant individuals tend to be detached and unaffectionate because of the elevated digoxin synthesis and reduced levels of dopamine and morphine. Dopamine and morphine is associated with bonding behaviour. This could lead to the development of spiritual tendencies. Left hemispheric dominant individuals have reduced digoxin levels, increased levels of dopamine, noradrenaline and morphine and reduced levels of strychnine, nicotine and serotonin. Increased levels of dopamine and morphine leads to increased family bonding which is a block on the development of spirituality. The left hemispheric neurotransmitter patterns and hypodigoxinemia could be related to a lack of spiritual tendencies in atheistic individuals. Hypothalamic archaeal digoxin and hemispheric dominance may decide the predilection toward atheism and spirituality.

## References

- [1] Kurup RK, Kurup PA. *Hypothalamic Digoxin, Cerebral Dominance and Brain Function in Health and Diseases*. New York: Nova Medical Books, 2009.