

Psycho-Neurobiology of Healing: East and West

April 2nd, 2001
Professorial Rounds

By
Shree S. Vinekar, M.D.

Before I begin, let me clarify that I am a substitute teacher for the professorial rounds today; that too, appointed at a very short notice. Substitute teachers in this position usually have no embarrassment in announcing that they have not prepared this lesson for the students as well as they would have liked. With that privilege granted to the substitute teachers I want to announce that today's topic was initially presented at the monthly meeting of the Oklahoma Society for Psychoanalytic Studies in February of the year 2000. This presentation is essentially unrevised or not substantially refined since nearly one and a half years ago. You may already know the facts and theories presented today. However, it might be desirable to have some familiarity with the basic theoretical concepts of psychoanalysis and dynamic psychotherapy, neuroscience, and the Eastern meditation techniques. Also, it might be helpful to be familiar with the Eastern concepts pertaining to the "altered states of consciousness". These are essential prerequisites for comprehending this presentation.

To my knowledge, in contrast to phenomenal advances in the fields of human pathology and pathophysiology, there is no single integrated discipline that truly looks at how the human body or mind heals itself. Healing, attaining remissions, or recovering from disorders or states of psychophysiological imbalance, etc., do take place spontaneously. That is also true for psychoneurobiological maturation and psychological growth of the human being. For example, the environmental enrichment, developmentally favorable life events, identification with healthy or highly accomplished significant persons in one's life, both formal and informal educational experiences, other lessons learned in life, and internal psychological maturational processes like gaining wisdom or insight, etc., all contribute to positive mental health. Given these, a human being can actualize his/her potential by virtue of his/her genetic endowment in many cultures. Albeit there is no specific discipline of medicine, psychiatry, or psychoanalysis that makes this psychoneurobiological healing or maturation its principal subject matter for study. Coming to think of it, after learning the process of wound healing in surgery, a medical student is not specifically introduced to how healing occurs. We all take healing for granted. So, there must be a good reason why the great minds in medicine and psychiatry have not focused their attention on this topic. In that sense, it is not yet a separate discipline to be studied in the current state of the art/science of medicine.

I am not a neuroscientist, psychoanalyst, Zen Buddhist, or a Yoga scholar. Efforts here are only a preliminary dive into the subject matter. It is more an exploration rather than a scientific exposition. As you will see, the appreciation of the psychoneurobiological processes within the brain and their relationship to psychotherapy and Yoga are discoveries of the last decade. In comparison, the explorations of the psychophysiological underpinnings for the effectiveness of the yogic techniques are 60 years or so old, but the newer investigational methods are not used in great measure to explore these Eastern healing arts. Therefore, what is to be presented is not like a well-finished edifice, but an effort to build hypotheses with a few bricks. To be frank, there is not enough straw, so to speak, to even make the bricks. This, however, is not a new interest of this presenter who published an overview article on “The Neurophysiological Basis of the Yogas” in the **Journal of the Indian Medical Profession** in 1968 in a section titled “Integrated Medicine,” (before starting his psychiatric residency.) The study of the mind and consciousness defines the frontiers of biology. The inquiries into the healing processes, psychological maturation and growth, and integration of personality offer somewhat more exciting challenges than the mere focus on psychopathology. These are the uncharted seas for psychiatry and the behavioral sciences. The lack of abounding hard scientific evidence is obvious to those who know this field. Therefore, it is good to recognize the limitations of psychoneurobiology in exploring the scope of positive psychology and positive psychiatry.

Neurobiology has very little to say about how the simplest of mental activities are carried out. We have very little knowledge in neurobiology to understand clinical or everyday phenomena of sleep, dreams, wakefulness, let alone symbols and their meanings. A curious little boy tears apart a drum to see where the sound comes from and is disappointed not to find it inside the drum. The neuroscientists like this little boy have not been able to locate a single “idea” in the brain.

We often carried a fantasy of discovering a high-tech procedure that will make the psychiatrists rich. It was named “cephaloscopy”. This weekend Dr. Sarnoff, a child psychoanalyst from New York, corroborated that he too had a similar fantasy of devising a “cerebroscope”. All these ideas are mentioned in the prelude to this presentation so you will place it in a proper perspective. Though this presentation will refer to many so-called new scientific findings, this field remains “a speculative theoretical neurophysiology”. That was what was available then, in 1968, and it is of the same theoretical nature at present, but it is no doubt much more advanced now. However, some of the recent findings outlined here suggest that psychotherapy is also effective by changing the structure and function of the brain. More encouraging is the connotation of these findings, and that is of profound significance to psychiatrists and psychotherapists. It is the thesis of this presentation that psychotherapy and Yoga not only change the software of the brain that is an analogue of a computer software, but they also change its hardware, meaning the structure of the brain.

Herzog, et. al., studied PET-scans of meditating yogis. They demonstrated changed patterns in cerebral regional glucose metabolism during Yoga meditation. Other neurobiological findings presented will clearly point out that we cannot continue to behave as though mind and brain are separate in our psychotherapeutic work. Likewise, the changes presumed to have been mediated by the yogic techniques, whether meditation or other techniques, need to be viewed as implicating the brain functions.

Let us briefly look at what recent data we now have pertaining to these matters.

Gene expression is not entirely a biological process. Environmental events such as what we call the precipitating events (“triggers”) as also “learning” produce alteration in gene expressions. Psychotherapy produces changes in gene expression by altering the strength of synaptic connections. Psychotherapy produces structural changes that alter the anatomical pattern of interconnections between nerve cells of the brain. The ability of the gene to direct the manufacturing of specific proteins in any given cell is regulated partly in response to the environmental factors.

For example, the most powerful predictor of a major depressive episode is a “recent stressor”. As every psychoanalyst knows, the “meaning” of the stressor for that specific individual is an important factor as well. The neurotransmitter and neuroreceptor changes brought about in the emerging pathology are very complex. How psychotropic medications effect changes in behavior, emotions, and cognition is still a mystery. Even so, most of us who attend the industry-driven lectures and seminars believe that we have understood these mechanisms. We believe these refer to correcting the specific depletions and excesses in the available neurotransmitters in the synapses.

When we understand the mechanism of the up-regulation and down-regulation of the receptor sensitivities, we go home feeling even better. The synergistic model presented by Aman U. Khan, M.D. scratches the surface of this healing mechanism. He postulates primary, secondary, and tertiary effects. To give some examples, several neuropeptides, somatostatin, opioid peptides, vasopressin, neurotensin, neuropeptide Y, substance P, and cholecystokinin and hormones have been shown to play a major role in the pathophysiology of depression and schizophrenia. The secondary effects of SSRIs may produce an increase in dopamine, a decrease in acetylcholine and glutamate, and a slight increase in GABA. All four neuromodulating and regulatory neurotransmitters, namely serotonin, dopamine, acetylcholine, and norepinephrine act on one another to maintain a dynamic equilibrium. They also act on GABA and glutamate. Neuropeptides in turn modulate the neurotransmitters. They also act alone as neurotransmitters. Hormones produced by the peripheral target endocrine glands bind to certain receptors on the neurons in the CNS when they cross the blood-brain barrier. They have profound effects on brain development, behavior, and physiologic function. Tertiary effects of psychotropics are the actual desirable and sometimes undesirable chemical changes in the limbic system, cerebral cortex, reticular activating system, and other brain structures. The complete elucidation of the circuitous route from primary action to tertiary action to behavioral outcome is not yet possible. One of the reasons is that the technology to carry out quantitative analysis of receptors in the living human brain is still in its infancy.

If that is the case for the “state of the art” psychoneurobiology of psychotropic drugs despite millions of dollars going into such research, we must be content with some theorizing. We must recognize that non-pharmacological treatment methods used in different cultures, including psychotherapy, have a track record of bringing about positive changes in human personality. With what glimpses we have into the CNS effects of these we must proceed to explore these further if funding is available. Afterall, these interventions are by far non-invasive and probably less dangerous in good hands than the psychopharmacological agents even in the most expert hands.

It has been demonstrated that when a patient with Borderline Personality Disorder and Mild Depression was treated with once-weekly psychodynamic therapy, her monoamine uptake

became normal, without the use of medications, correlating with her clinical improvement. Such improvement was not seen in the control subject. Traumatic stress induces changes in neuromodulation and physiological reactivity is a well-known fact. The new findings indicate that early childhood trauma can alter the mid-brain, limbic lobe, and brainstem structures. The development of the cerebral cortex is retarded by experiences of neglect and deprivation early in life. This deficit renders the child less effective in modulating the limbic, brainstem, and mid-brain responses to fear and danger. More striking and frightening findings are that adults with PTSD who had experienced childhood physical and sexual abuse had dramatically reduced left hippocampal volume compared to matched controls. In combat veterans, likewise, duration of combat inversely correlated with the smaller size of hippocampi. The corollary of such findings is obvious. Providing a non-traumatic, developmentally supportive holding environment, that is not over-stimulating but enriching, will facilitate normal brain development and normalize the excessive fear response to perceived danger. The child psychiatrists will now recognize that the traumatic experiences during childhood, during the unstable period of brain development, produce not just psychological regressions, but true physiological regression to an earlier stage of brain function. In addition, these experiences interfere with the development of the brain structures. It is imperative that timely psychosocial and even socio-political or legal interventions to prevent such abuse and neglect should be readily available. It is also possible to remediate the effects of trauma with psychosocial modalities that will have direct healing effect on the structure and function of the brain.

The cerebral metabolic rates are increased in the head of the right caudate nucleus in patients with OCD. These are studied as regional glucose metabolism rate in the brain with the PET technology. Interestingly, behavior therapy as well as Prozac, both produce similar decreases in such metabolic rates in the head of the right caudate nucleus as the above symptoms of OCD improve. Dynamic psychotherapy normalizes serotonin metabolism. Lactate induction of panic attacks can be effectively reversed through successful cognitive therapy. Patients with major depression who responded to cognitive behavioral therapy showed a striking decrease in the levels of thyroxin, in contrast to levels of non-responders who showed increase in T 4. Sleep architecture in depressed patients could be changed with cognitive therapy identical to those produced by antidepressant medications. David Spiegel demonstrated that supportive expressive group therapy in breast cancer patients led to an average of eighteen months of longer life span compared to their controls. Even patients with malignant melanoma in support groups had more favorable death rates and longer remissions than the controls. Absence of close personal relationships is demonstrated to be a high-risk factor in an individual with myocardial infarction increasing the mortality risk by 30%. Psychotherapy is increasingly being viewed as a new attachment relationship that has the potential to restructure the attachment related implicit memory. The implicit memory is further understood as procedural memory in terms of how to relate, and associative memory pertaining to the habitual connections between words. These can be painstakingly modified in psychoanalysis by new interactive relationships that can be internalized by the patient. These processes I just described have led to many new lines of investigations in neurobiology to understand the mechanisms of action of psychotherapy.

The recent PET studies have shown that as people are exposed to reminders of their trauma, there is a unilateral increase in activity in the areas of the right hemisphere in emotional arousal. There is also increased activity in the right visual association cortex. There is concomitant diminution of activity in Broca's area in the left hemisphere. This definitely suggests decreased

capacity to put the traumatic experience into communicable language. A highly defended analysand may show decreased activity in the frontal lobes until the interpretative techniques lead to removal of the defense.

Such glimpses into the brain functioning clarify the relationship between trauma, dissociation, somatization, and affective dysregulation. That brings us now to view the preverbal period of development as assuming a more and more significant role in understanding not only where the action occurs in psychoanalysis, but also in yogic techniques. This is not to diminish the importance of the role of Oedipus complex or other pre-Oedipal conflicts or deficits during development.

Amongst the mechanisms that are taken advantage of for bringing about healing, the first: psychotherapy helps us to gain self-awareness about the story our cortical synthesizer contains. Some of the more difficult chapters of this story are stored in locked memory banks that need the skill of the therapist to unlock. The second mechanism is the change in the usual operating modes in our relationships by recognizing those modes in relationship to the therapist as well as other important relationships in our life, past and present. By examining, restructuring, and practicing these newer patterns, our cortical synthesizer makes our relationships stronger and more flexible as well. The third mechanism works by allowing the encoded patterns of relationships stored in the procedural memories to come alive in full force through the relationships with transferences focused on the therapist. This difficult process of rewiring the brain's representations and of recognizing the internalized old object-relationships gives way to a new and different relational object, (initially in the therapist) more accepting and nonjudgmental than the one the individual has experienced in daily, worldly life. A fourth mechanism of change in psychotherapy arises from opportunities to practice what is learned in psychotherapy, repeatedly, in similar situations outside the psychotherapy session. Finally, psychotherapy works because it involves experiencing intense and often painful affects as they arise, while exploring the past and the present in the context of our earlier patterns in relationship to ourselves and others.

The healing mechanisms in Yoga are different on the surface. Meditation is a temporary suspension of mobility and speech. The attention or cathexis is directed towards fantasies, daydreams, preconscious mental processes, internalized objects, and body perceptions. The individual becomes more aware of the instinctual tendencies and his/her animalistic desires such as anger and passion. S/he learns to observe these and not to act upon them. In contrast to psychoanalysis, the goal is not to verbalize or express, but to reach a state of "witnessing" leading ultimately to so-called "No Thought." Indeed, it is not easy to achieve such a state of consciousness. The natural peace and harmony experienced might be related to the ability to use, temporary but regulated, deep regression in the service of the ego to master the cumulative trauma. These experiences are at a silent and nonverbal level. The idea is that silence (as in "*Vipasana*" Buddhist method) also masters the cumulative trauma just as the technique of verbalization and ventilation (catharsis, abreaction, etc.) through free association in psychoanalysis, and re-experiencing the repressed affects.

The similarities between psychoanalysis and Yoga may be put simply, "Consciousness is our mode of access to our world, and it is also our mode of relating with the world." Yoga psychology declares its goal as the regulation and control of five types of contents of consciousness. Both Yoga and psychoanalysis recognize the presence of the Unconscious. Yoga

psychology recognizes the consciousness as incorporating all the objects perceived or experienced, literally taking their “shapes” and characteristics and internalizing them. That is the only world, even though infinitely modified internally, that truly exists for any individual. Both disciplines attempt to loosen the maladaptive strongholds of these internalized objects and identities. Psychoanalysis may use different terminology and certainly has scientifically documented methodology which you know to accomplish its goals. In Yoga, the observing ego is presumed to be able to observe itself. The impression the “observing ego leaves on the observing ego” diminishes gradually the force of the traumatic memories impacting the observing ego. Thus, the impacts of traumatic memories gradually begin to lose their hold in the way they force their way into the consciousness or enactments. The ego then becomes freer not only to observe, but also to execute its functions autonomously without constrictions. Yoga makes a conscious effort to mitigate intensity of drives and realign identities. The various identities an individual has are in conflict or may be ego-dystonic to the individual. It appears the methodologies of both Yoga and psychoanalysis converge when they lead to successful results. This process common to both approaches may be viewed as realignments of the internalized objects, affective reaction patterns, improved objective reality testing and thus enhance the executive functions of the ego.

Joseph Sandler and Peter Fonagy, both professors of psychoanalysis at the University College of London, are emphasizing the “revision” of the early-acquired procedural memory as against “retrieval”, per se. They suggest that mere retrieval of memories is not useful and may even be traumatic rather than therapeutic by virtue of being simply cathartic. They feel that therapeutic change lies in the revision of the early-acquired procedural memory. They state that the therapeutic focus is not the remembering of an event but rather a change of feeling or understanding in relation to the childhood experience.

Coming back to psychoneurobiology at this level of our understanding, we must surmise that the healing processes in the brain may be viewed as at least three interdependent processes. **The first** pertains to the balancing of the four neuroregulatory mechanisms. These are the Norepinephrine, Dopamine, Serotonin, and Acetylcholine (Glutamate and GABA) systems known to biological psychiatrists. **The second** is that of increasing the neuroplasticity of the brain, meaning increasing the connections between the networks in the cortex and the subcortical structures and between the two hemispheres. Not only is there evidence of increased dendritic connections with enriched environment and with psychotherapy, but there is also a suggestion that even new neurons may be manufactured on an assembly belt from the periventricular area to the cortex. Active new learning of this kind may increase myelination of the corpus callosum which bridges between the hemispheres. **The third** healing process pertains to the realignment of relationships and affect regulation. The relationship with the world is modified as the relationship with the therapist modifies the procedural memories of earlier patterns of relationships. As the relationship with the world changes, there are changes in the brain. These changes may be mediated through deeper subcortical structures like amygdale, hippocampus, caudate nuclei, and the limbic brain. These three psychoneurobiological healing processes may be common to psychoanalysis and Yoga alike.

The biological interventions on the other hand are unlikely to address these complex issues of rewiring, reconnecting, and restructuring beyond the attempt at fine tuning of the neuroregulatory mechanisms. Psychoanalysis, therefore, presents a great potential for human advancement, as a scientific method to improve neuroplasticity and relationship with the world

while simultaneously attaining balancing of the neuroregulatory mechanisms. I may venture to say that yogic techniques may also be working through the same healing processes via a different approach; these neurobiological effects of both techniques of the East and West remain an uncharted sea, yet to be explored. At present, these exciting psychoneurobiological discoveries most definitely need to be viewed as “encouraging findings” that immensely enhance the importance and value of Freud’s gift to mankind, and possibly those of Patanjali and Buddha. The insights gained with these two approaches are of a different nature. Unfortunately, the Eastern techniques are viewed as unscientific, magico-religious, purely physical or limited to mindfulness exercises only, rather than techniques amenable to rigorous scientific exploration.

We can hope that we will gain more insight into the healing processes transpiring in the mind and the brain, their impact on the autonomic nervous system, endocrine system, immune system, genes, and telomeres, etc., and learn more about how psychological growth, self-actualization and maturation can be facilitated as the advances in the field of psycho-neurobiology and neuroscience take place. Psychoanalysis and Yoga will have a special pride of place in the future explorations in this domain.

Thank you.