The Psychosocial Genomics of Therapeutic Hypnosis and Psychotherapy

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Psychosocial genomics is the newly emerging study of how our psychological and social environment interacts with gene expression in everyday life as well as the creative dynamics of human experience in the cultural arts, sciences, and healing. The theory, research, and clinical applications of psychosocial genomics to therapeutic hypnosis, psychotherapy, and the holistic healing arts are outlined. The key concept of psychosocial genomics is that many forms of psychobiological arousal during waking, sleeping, and dreaming can evoke immediate-early genes (IEGs), behavioral state-related gene expression (BSGE), and activity-dependent gene expression (ADGE) to optimize the synthesis of proteins to facilitate neurogenesis, problem solving, and healing in the 4-stage creative cycle. A summary of the 4-stage creative cycle replaying natural Darwinian variation and conscious selection for problem solving and symptom resolution is illustrated with a videotape of a demonstration of therapeutic hypnosis.
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INTRODUCTION

Classical Mendelian genetics focuses on genes as the units of biological heredity that are transmitted from one generation to another through some form of reproduction. Today we know, in addition, that many classes of these genes are expressed (activated, turned on or off), from moment to moment in everyday life, to carry out the important functions of homeostasis, adaptation, learning, and healing. Psychosocial genomics is a newly emerging field that studies how psychological and social signals can evoke gene expression in the normal adaptive processes of everyday life as well as creative dynamics in the cultural arts, sciences, and psychotherapeutic practices (1). The infinite variety of human experiencing in creatively oriented therapeutic hypnosis, psychotherapy, and the healing arts will always defy simple summary. In this paper, however, we offer a practical outline to help therapists conceptualize the deep psychobiology of therapeutic hypnosis on all levels from gene expression and neurogenesis to the psychosocial dynamics of problem solving and healing.

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Stage One: Preparation: Immediate-Early Gene Expression in Hypnotic Induction

Theory and Research. Many psychobiologi-

cal states of arousal in everyday life as illustrated in Figure 1 are associated with the initiation of immediate-early gene expression (1,2). The most fundamental experimental evidence that immediate-early gene (IEG) expression is associated with behavioral states of arousal, waking, sleeping, and dreaming (REM sleep) in the ultradian time frames (90-20 minutes) comes from the observation of limbic-hypothalamic-pituitary oscillations during the normal circadian replay of the sleep-wake cycle (3,4). Figure 1 emphasizes how many processes of psychobiological arousal—such as pain, stress, novelty, the basic rest-activity cycle (BRAC), dreaming (REM sleep), and creative moments—can initiate (1) immediate-early gene expression (IEGs) that, in turn, lead to (2) the expression of specific target genes which (3) code for new protein synthesis that is the molecular basis of (4) state-dependent memory, learning and behavior (SDMLB). As reviewed previously (5,6), there are many immediate-early genes such as c-fos and c-jun that are turned on within a minute or two by any strong psychobiological stimulus to activate target genes associated with the sleep-wake cycle (6-8). These include target genes associated with maternal behavior (9), the construction and reconstruction of memory and learning (10), stress and emotions (11), sleep and dreams (12,13), pain and reward (14), psychosomatic disorders (15), addictions (16), psychosis (17), and many of the target genes whose transcription and translation into proteins generate the neurotransmitters and messenger molecules (eg. hormones, cytokines) of mindbody regulation and healing (1,18,19).

Therapeutic Practice. The author has proposed how immediate-early gene expression begins with the varying degrees of emotional arousal that usually takes place in the typical history taking at the beginning of any psychotherapeutic process (19). More than mere words and talk are involved in any form of therapeutic hypnosis or psychotherapy from the deep perspective of psychosocial genomics. The typical tears and distress in an initial interview,

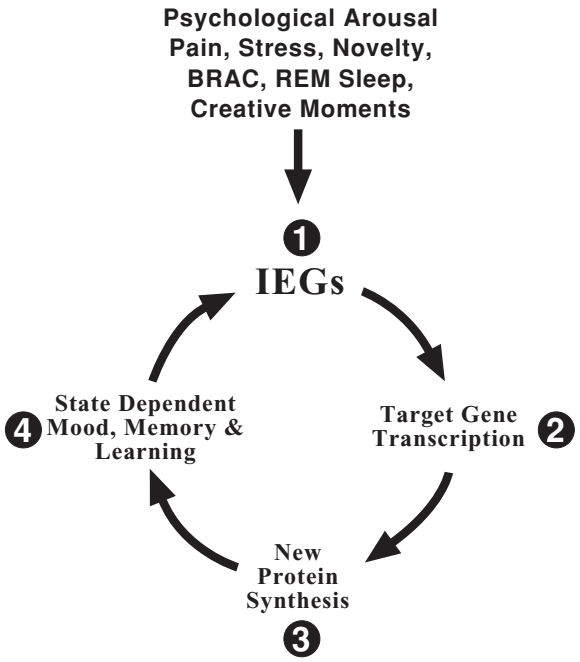

Figure 1. A psychogenomic view of the essential dynamics of therapeutic hypnosis, psychotherapy, and the holistic healing arts. Mindbody communication via psychobiological arousal can initiate (1) immediate-early gene expression (IEGs) that, in turn, leads to (2) the expression of specific target genes, which (3) code for new protein synthesis that is the molecular basis of (4) state-dependent memory, learning, behavior (SDMLB) that is replayed on conscious and unconscious levels in the creation and recreation of human consciousness and experience.

for example, indicate that patients are already accessing and replaying state-dependent memory and the emotional dynamics that signals how they are embarking on a potentially healing adventure. The patient's task in this initial stage is to simply receive with courage and compassion the state-dependent memories, emotions, and experiences associated with their problems. The therapist's task at this point is to recognize and facilitate the natural ultradian creative cycle of gene expression, neurogenesis, and healing has already begun. Implicit processing heuristics (that is, open ended therapeutic suggestions that enable patients to create their own response rather than authoritarian suggestion that attempts to direct the patient in an exact manner as in programming a computer) may be employed to optimize the entire psychogenomic process (1). The psychotherapeu-

tic process may begin with a symptom scaling of the patient's currently experienced symptom, emotions, or attitudes. A subjective scale from one to ten scale (where ten being the worst the problem was ever experienced, five about average, and zero a completely satisfactory state) may be used to assess the patient's experiential state before, during, and after psychotherapeutic process to assess and validate it.

Figure 2 illustrates the first stage of the creative cycle in a demonstration of therapeutic hypnosis at an Ericksonian Congress (20) with a young woman volunteer who has severe rheumatoid arthritis in her hands. The therapist models a delicately balanced and symmetrical hand position a few inches above the lap to initiate an activity-dependent approach to the induction of therapeutic hypnosis and the creative cycle (1,2). The thought bubble notes the psychogenomic concerns of the therapist during this first stage. The therapist is interested in knowing what stage of the basic rest activity cycle (BRAC) the patient may be experiencing initially in order to facilitate further progress in whatever direction is appropriate (21). He wonders whether CYP17—the "social gene" associated with the synthesis of arousal and sexual hormones—is becoming engaged as a natural manifestation of the psychotherapeutic transference. The psychosocial genomics of CYP17 gene expression is well described by Ridley (22):

"The brain, the body and the genome are locked, all three, in a dance. The genome is as much under the control of the other two as they are controlled by it. That is partly why genetic determinism is a myth. The switching on and off of human genes can be influenced by conscious or unconscious external action [p.148] ... genes need to be switched on, and external events—or free-willed behavior—can switch on genes [p.153]…Social influences upon behavior work through the switching on and off of genes [p.172]…The psychological precedes the physical. The mind drives the body, which drives the genome" [p.157].

Figure 2. Stage One: The therapist models a delicately balanced and symmetrical hand position a few inches above the lap to initiate a hand levitation approach to the induction of therapeutic hypnosis. The therapist wonders what stage of the basic rest-activity cycle (BRAC) the patient may be experiencing, whether CYP17 — the social gene — is becoming engaged as a natural manifestation of the psychotherapeutic transference, and to what extent immediate-early genes (IEGs) such as c-fos and c-jun — associated with a creative state of psychobiological arousal, problem solving, and healing — are becoming engaged.

The therapist wonders to what extent immediate-early genes (IEGs) such as c-fos and c-jun—associated with a creative state of psychobiological arousal, problem solving, and healing—will become engaged to evoke the target genes that will be essential to optimize protein synthesis and therapeutic transformations in state dependent memory, learning, and behavior that will be reviewed and replayed in stage 2.

Stage Two: Incubation: Behavior State-Related Gene Expression in Hypnosis.

Theory and Research. Important advances in research on gene expression and the molecular

biology of waking, sleeping, and dreaming have profound implications for a new view of the deep psychobiological dynamics of therapeutic hypnosis (5,6). Behavioral state-related gene expression (BSGE) refers to research documenting how a wide range of behavioral states, such as sleeping, rest, dreaming, consciousness, vigilance, stress, emotional arousal, and depression is associated with different patterns of gene expression (7,23,24). This wide range of states associated with behavioral state-related gene expression resolves one of the apparent mysteries of historical hypnosis: How can the so-called "miraculous healing" of therapeutic hypnosis can be facilitated with apparently opposite states such as rest and relaxation versus activity and excitation (25-27)? Our answer is that behavioral state-related gene expression modulates the entire range of psychobiological states ranging from rest to high activity (4,28). This leads us to predict that behavioral state-related gene expression will be important in future experimental research defining the psychosocial genomics of the "hypnotic state" (1,6,8). Behavioral state-related gene expression is a fundamental link between psychology and biology and it is of essence in the relationships between unconsciousness and consciousness.

Therapeutic Practice. Figure 3 illustrates how the patient experiences a mild state of confusion in stage two of the creative cycle as the therapist points out evidence of psychobiological arousal and (by implication, behavioral state-related gene expression) in the very fine vibration she begins to experience involuntarily in her hands and fingers. She is surprised by these movements and she spontaneously comments that her "right hand is doing some stuff" (unusual sensations and involuntary movements that were not suggested by the therapist). Unexpectedly her hands also become hot. These are typical manifestations of psychobiological arousal in stage two of the creative cycle that we hope to channel into a therapeutic process of salient self-engagement and healing (18,19).

Figure 3. Stage Two: The patient experiences psychobiological arousal (associated with behavioral state-related gene expression (BSGE). She evidences surprise and confusion about her unusual sensations and involuntary movements that were not suggested by the therapist. The therapist wonders how to facilitate the psychogenomics of immunological variables such as interleukin-1, 2, and IL-1ß associated with Cox2 that has been implicated in rheumatoid arthritis which is the patient's presenting symptom.

The therapist now wonders about how to engage the psychogenomic dynamics of immunological variables such as interleukin-1 & 2 that are messenger molecules of the immune system that could facilitate healing. He also wonders about the activity of IL-1ß that is associated with Cox2, which has been implicated in rheumatoid arthritis (the patient's presenting symptom). While there are clinical tests for gene expression leading to the formation of these molecules that would be important to measure in any real therapeutics at the molecular level, they are not yet available to clinicians engaged in therapeutic hypnosis (8). This is unfortunate, indeed! It means that at the present time therapists and patients are, for the most part, blind to the results of their thera-

peutic work on the genomic level as it is taking place in real time. Until we develop practical approaches to assessing gene expression, protein synthesis, neurogenesis, and healing during the hypnotherapeutic process, we will remain limited to the phenotypic level of observations on cognitive-behavioral levels somewhat as follows.

The second stage of the creative cycle may be experienced on the phenotypic level by patients as periods of incubation, meditation, or inner search for the source of their problem. They typically encounter depression, anger, tears, and the valley of shadow and doubt ("the dark night of the soul," "the storm before the light") that is portrayed in poetry, song, and dance in the rituals of all cultures during important psychosocial transitions. These rituals—including those of therapeutic hypnosis, psychotherapy, and virtually all the healing arts—initiate behavioral state-related gene expression, neurogenesis, and the possibility of problem solving and healing. As patients review the origin and history of their problems the natural dynamics of Darwinian variation are experienced on deep psychobiological levels: as they attempt to recall the details of their traumatic experiences they are, without quite realizing it, replaying their past with new Darwinian variations. As Heraclitus said, "you cannot step into the same river twice." The patient's main task in this second stage is to simply receive and appreciate what come up spontaneously regarding their problems in the manner of Freud's technique of free association. The therapist's tasks during this second stage are (1) to offer open-ended therapeutic questions that may function as implicit processing heuristics (that is, socratic questions) to access and replay the state-dependent memory and behavior encoding the patient's symptoms and (2) to support the patient through the sometimes painful arousal of their natural ultradian cycle of creativity as they make a courageous effort to recall the problems of the past. Less is often more at this stage of respectful listening rather than giving advice.

What is actually happening on the level of gene expression during the recall and replay of problematic past experience during this second stage of the creative cycle? Recent research by Nader et al. (29,30) illustrates how recall and the reconstructive aspect of memory can engage the dynamics of psychosocial genomics in a manner that supports the growth paradigm of psychotherapy (1,6,8,31,32,33). Nader et al. demonstrated how fear memories that are stored in the amygdala of the brain could be disrupted and made to disappear when they are reactivated under special experimental conditions. Their research illustrates how consolidated fear memories return to a liable state during recall so that gene expression and protein synthesis cycle are reactivated to resynthesize the memory in a new way! When the rat brain is infused with anisomycin (an inhibitor of protein synthesis) shortly after the reactivation of a long consolidated memory (from one to 14 days after conditioning), the memory is extinguished. The same treatment of the brain with anisomycin but without reactivating the consolidated memory leaves the memory intact. This means that the gene expression and protein synthesis cycle is reactivated when important emotional memories are recalled and replayed. Nader et al. (29) describe their research in this way. "Our data show that consolidated fear memories, when reactivated, return to a liable state that requires de novo protein synthesis [via gene expression] for reconsolidation. These findings are not predicted by traditional theories of memory consolidation." (pp.723). While Nader et al.'s research is conducted on an animal model at the present time, it does imply that similar molecular mechanisms of creativity and the transformation of consciousness take place in humans (that psychotherapists attempt to describe when they say, "every recall is a reframe.") That is, every recall of a memory automatically replays, re-synthesizes, and changes it in some way.

Further support for this recall-replay-resyn-

thesize principle comes from more recent research on the molecular-genetic dynamics of novel learning and memory versus relearning with familiar cues. Berman & Dudai describe their research in this way (34).

Experimental extinction is the decline in the frequency or intensity of a conditioned response following the withdrawal of reinforcement. It does not reflect forgetting due to the obliteration of the original engram, but rather "relearning," in which the new association of the conditioned stimulus with the absence of the original reinforcer comes to control behavior . . . This is in accordance with the suggestion that the cortex contains molecular "novelty" switches, which are turned on only on the first highly salient [numinous] encounter with the stimulus . . . This means, among other things, that the cortex honors at the molecular level the distinction between learning anew and learning the new. (pp. 2417–2419, italics added).

We propose that the research of Nader et al. (29,30) and Berman & Dudai (34) describes essential mechanisms of psychosocial genomics in therapeutic hypnosis, the cognitive-behavioral psychotherapies, and the holistic healing arts in general: The recall and replaying of traumatic and problematic memories opens the possibility of reconstructing and resynthesizing them on the levels of gene expression, protein synthesis, neurogenesis, and healing (1,35).

The skeptic could well challenge this view by asking: Why don't patients with post-traumatic stress syndromes cure themselves when they involuntarily replay their traumatic and painful memories in everyday life? Aye, this is a fundamental tragedy of the human condition. Most people do not know how to utilize the recall and replay of traumatic memories during stage two of the creative cycle to move on to stage three wherein they can experience new insights and a satisfactory resolution of their problems. Rather, when they experience the spontaneous recall of traumatic memories during the normal states of arousal in everyday life, they quickly try to suppress their painful memories. This self-suppression blocks their incipient creative process; patients now feel stuck and do not know how to help themselves. They believe they have a problem they do not know how to deal with. They do not realize that the apparently autonomous upwelling of traumatic memories actually means they are already engaged in stage two of the creative cycle. That's precisely why they need a psychotherapist to support them going through their "dark night of the soul." The therapist encourages the patient's spontaneous anamnesis by encouraging them to have the courage to allow the painful memories to continue for "just a little while longer" in the safety of the therapeutic situation. This replay of memory continues until the entirely natural process of Darwinian variation iterates new possibilities that move the patient's implicate associative dynamics closer and closer to appropriate options for problem solving and healing. Healing finally takes place when patient's consciousness discovers interesting options and possibilites that reframe their past with new insights that generate the therapeutic reconstruction of memory, meaning, and personal identity in stage 3 of the creative cycle.

Stage Three: Illumination: Activity-dependent Gene Expression and Conscious Selection of the Novel and Numinous.

Theory and Research. The basic working assumption of neuroscience is that the psychological experiences of mind, memory, emotions, learning, and behavior are encoded in the neural networks of the brain (36-38). A generation of research by the Nobel Laureate Eric Kandel (39), and others, has found that messenger molecules can facilitate the molecular-genetic basis of memory, learning, and behavior within neurons of the brain. Laboratory researchers identified three factors relating psychological experience to neurogenesis and brain growth: 1. novelty (10,40); 2. environmental enrichment (38,41); 3. physical exercise (37). It has been found, for example, that activity-dependent gene expression in response to novelty and

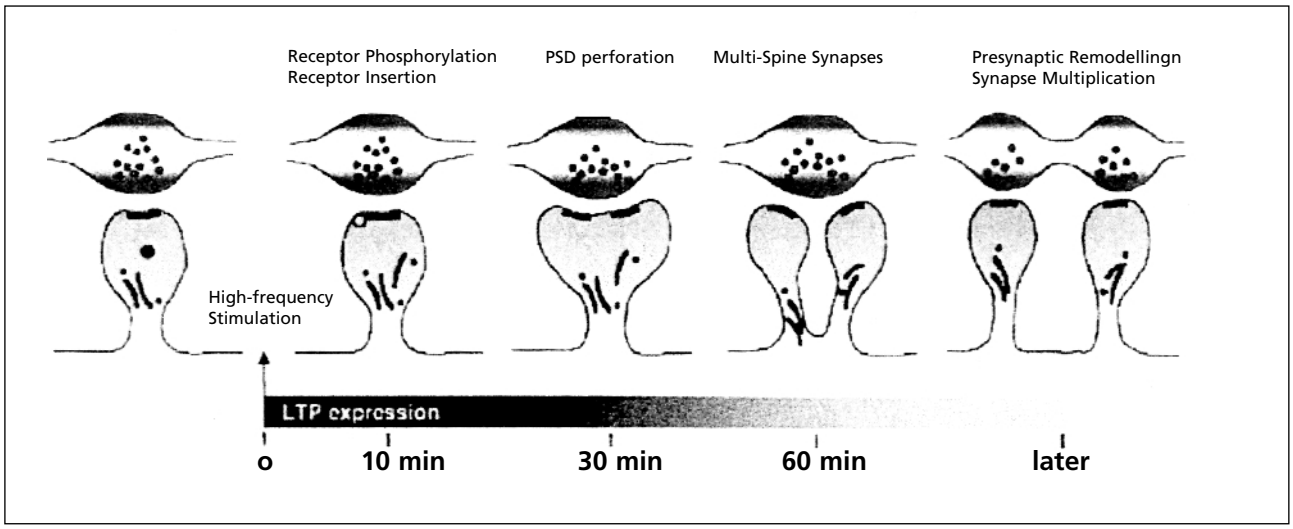

Figure 4. The ultradian (time) dynamics of activity-dependent memory, learning, and behavior change as proposed by Lüscher et al., (42). Within the first 10 minutes there are measurable changes in gene expression and the activation (phosphorylation) and growth of receptors that are involved in synaptic communication via neurotransmitters. Within 30 minutes the size of the synaptic spine increases and receptors move to the postsynaptic membrane; this leads to an increase in the size of the postsynapse. Within an hour, some postsynapses divide in two. This leads, in turn, to further growth in presynaptic multiplication and remodeling that eventually create new neural networks encoding memory, learning, and behavior change that is of essence for psychotherapy and many activity-dependent processes of gene expression, protein synthesis, and neurogenesis during creative human experiences in the arts and sciences.

exercise can double the number of neurons and connections between them generated in the hippocampus leading to the construction of new memory, learning, and behavior (36). In a series of remarkable drawings Lüscher et al. (42) have shown how the number of synapses can double during the growth process over a period of 60 minutes as illustrations in Figure 4. This is precisely the time frame of therapeutic hypnosis and most forms of psychotherapy.

In a series of pioneering papers, Kandel (39,43-45) proposed how these molecular-genetic mechanisms could account for many of the classical phenomena of memory and learning as well as clinical phenomena of psychopathology such as chronic anxiety, neurosis, and schizophrenia. Kandel's theoretical and experimental work is the clearest expression of the possibilities of activity-dependent gene expression as the molecular basis of psychosomatic medicine, psychotherapy, and the healing arts. The role of activity-dependent gene expression and neurogenesis in the way we express ourselves with language (using measures of "idea density" and grammatical complexity) from an early age is evident in the quality of human experience as well as organic brain dysfunctions such as Alzheimer's disease. A major finding of Snowdon's (46) research in his study of nuns suffering from Alzheimer's disease is that exercising whatever mental capacity one has with positively stimulating intellectual activities and emotions offers some protection against age-related mental decline.

Therapeutic Practice. At its best, the patient's experience in stage 3 may described as the famous cry of "Ah-ha" or "Eureka" that is celebrated in ancient and modern literature when the creative process is described in the arts and sciences (47-49). People are usually surprised when they receive a creative intuition. Many people automatically dismiss their own originality as worthless since it has never been reinforced in their early life experience. The patient's task is to consciously recognize the potential value of the new that appears in stage 3. Likewise, the therapist's task in is to help the patient recognize and appreciate the value of the novel and the numinous that usually emerges spontaneously and unheralded after

Figure 5. Stage 3 of the creative cycle wherein the patient experiences the playful activity-dependent exercise of shadow boxing as a creative breakout of her typically restrained hand and finger movements associated with her rheumatoid arthritis. Future research will be needed to determine if activity-dependent gene expression (ADGE) — such as the CREB genes associated with new memory and learning — as well as the ODC and BDNF genes associated with physical growth and neurogenesis are actually being engaged during such creative moments.

the period of inner struggle in stage 2. Often the patient may have already thought of the options that come up for problem solving at this stage but dismissed them since they were never validated. Figure 5 illustrates just such a creative moment between patient and therapist in stage 3 of the creative cycle. After the patient reviewed the history of her rheumatoid arthritis in stage 2 she gained new insights during stage 3 regarding the emotional dynamics of her suppressive life experiences with her employer and boyfriend. The reactive anger she experienced was channeled into playful shadow boxing that was supported by the therapist. This playful shadow boxing could be interpreted as an activity-dependent exercise that could generate activity-dependent gene expression, protein synthesis, and healing. During this playful shadow boxing of stage 3 the patient experienced a creative breakout of her typically restrained hand and finger movements associated with her rheumatoid arthritis. She did report some pain associated with her newly flexible hand and finger movement, but she was obviously exhilarated that she now could move them well enough to make a clenched fist.

The therapist wonders at this high point if activity-dependent gene expression (ADGE)—via the CREB complex associated with new memory and learning—as well as the ODC gene (associated with physical growth) and the BDNF (brain derived neurotropic factor) gene associated with neurogenesis and physical growth are actually being engaged (1,9). Further research assessing the molecular dynamics of the gene expression-protein synthesis cycle during therapeutic hypnosis and psychotherapy as described by the methodology of genomic neuroscience will be needed to know for sure (50).

Stage Four: Verification: Consolidating Target Gene Expression, Neurogenesis, Problem Solving, and Healing

Theory and Research. The recall of a memory in everyday life invariably involves a mingling of the old representations of the past with the new perceptions of the present. This mingling of past and present in everyday recall results in new associations that lead to a natural Darwinian process of variation and conscious selection in the change and transformations of memory over time. Current research documents how the classical process of Pavlovian stimulus-response conditioning requires the activation of a conditioned response before it can be extinguished (51). As note above, this process of reactivating a memory in order to extinguish, reframe, or resynthesize it has profoundly important implications for the practice of psychotherapy and, by extension, many of the therapeutic arts.

The problem in stage 4 of the creative cycle, however, is that the new therapeutic insights

and symptom resolutions experienced in stage 3 are themselves fragile. Sometimes they are initially experienced only momentarily in the therapeutic situation and are immediately lost when patients walk out the door and move back into their usual everyday life situations that tend to re-evoke their old traumas, symptoms, and problems. How do we consolidate the nascent therapeutic process so that it is not immediately lost?

Erickson dealt with this problem by using posthypnotic suggestions to support therapeutic advances (52) and posthypnotic amnesia to protect the fragile new memory reconstructions from the negativity of the patient's own psychodynamics as well as that of their psychosocial milieu (53). Current neuroscience research indicates how the consolidation process can be facilitated with multiple rounds of recall and replay of past life experiences for the reconstruction of memory.

Research by Shimizu et al. (54), for example, clarifies how a particular region of the hippocampus called "CA1" is crucial for converting new memories into long-term memories. This psychobiological process may continue for weeks after the initial learning and memory event. They found that multiple rounds of recall and replay of past life experiences are required for the reconstruction, resynthesis, and reconsolidation of memory.

Our results indicate that memory consolidation may require multiple rounds of site-specific synaptic modifications, possibly to reinforce plastic changes initiated during learning, thereby making memory traces stronger and more stable. Recent studies report that the learning-induced correlation states among CA1 neurons are reactivated spontaneously in a post-learning period. Such a co-activation of these neurons might suggest the existence of the natural condition within the hippocampus by which recurrent synaptic strengthening can occur during memory consolidation. We hypothesize that such a synaptic re-entry reinforcement (SRR) process can also be applied to explain how the hippocampus transfers newly created memories to the cortex for permanent storage. As the hippocampus undergoes reactivation during consolidation, it may also act as a coincidence regenerator for activating neurons in the cortical area such as the association cortex. This would allow cortical neurons previously corresponding to the different sensory modalities to be reactivated together, leading to the strengthening of the connections between them through SRR. Indeed, such a coordinated reactivation of hippocampal-cortical neurons after learning has been observed recently . . . Once these cortical connections are fully consolidated and stabilized, the hippocampus itself becomes dispensable for the retrieval of the 'old memory' . . .Therefore, we postulate that the hippocampus, by serving as a coincidence regenerator, may induce the reinforcement of synaptic connection within the cortex during memory consolidation as the cellular means to convert short-term memories into long-term memories. (pp. 1172-1173, italics added)

This outlines a neuroscience approach to dealing with many of the mysteries of how to consolidate the new insight, problem solving, and symptom resolution that are usually experienced as taking place spontaneously in stage 3 of the creative process.

Therapeutic Practice. As indicated, the main task of patient and therapist in stage 4 is to consolidate the therapeutic work of stage 3. The first step in this consolidation process can be facilitated by the therapist offering a posthypnotic suggestion when it is apparent that patients have navigated stage 3 well and are beginning to make spontaneous shifts in breathing, facial gestures, body position, and minimal movements that indicate they are already experiencing a natural ending to their therapeutic trance. A posthypnotic suggestion that supports the patient's behavior at this point together with a continuation and consolidation of the therapeutic work during their natural ultradian rhythms of homeostasis and adaptation in everyday life runs somewhat as follows. *"When your unconscious mind knows it can continue this healing work all by itself [pause] whenever it's entirely appropriate [pause], and when your*

conscious mind knows it can cooperate by helping you recognize those moments throughout the day when it is right to take a rest [pause], will you find yourself awakening feeling refreshed, alert, and as aware as you need to be of the meaning of your experience here today?"

With this implicit processing heuristic in the form of an open ended question, awakening from therapeutic trance is made contingent on the healing process continuing on an inner, implicate, unconscious level. Simultaneously, the conscious mind is focused on cooperating by learning recognizing those ultradian mind-body cues that can be used to break the stress cycle to facilitate our natural "ultradian healing response" (1,2,13). The dynamics of many variations of this type of posthypnotic implicit processing heuristic with a variety of problems and symptoms in clinical practice have been described in detail (1,55,56). From our current perspective of psychosocial genomics, it becomes apparent how accessing and utilizing the patient's natural ultradian rhythms of adaptation and healing in everyday life in this manner may be facilitating the molecular mechanisms of activity-dependent and behavior state-related gene expression, protein synthesis, neurogenesis, and healing.

Figure 6. Stage 4 of the creative cycle when the patient received a standing ovation from the audience. The therapist speculates that the zif-268 gene will certainly be expressed in her REM dream states tonight to encode her new therapeutic experiences with this unusually strong show of psychosocial support.

After the patient has awakened, the process of consolidating therapeutic progress can be facilitated by reviewing and discussing insights and symptom resolution with a sense of wonder and appreciation—a positive reinforcement of the new! Sometimes the patient will affirm the therapeutic change by considering how they now can voluntarily change their thinking, feeling, and behavior to maintain their progress in everyday life. If not, the therapist can facilitate the process of consolidation by offering implicit processing heuristics such as these.

"Having had this wonderful experience here today – how will your behavior change in everyday life?

What do you suppose you can do differently now to support the progress you have made today?

What will you be saying to yourself and others in your everyday life to continue this therapeutic work you have begun here today?"

In constructing a response to such questions the patient will, in effect, give themselves a cognitive-behavioral prescription whereby they utilize their own resources in their own way to synthesize a psychosocial genomic bridge between their new therapeutic progress and the real everyday circumstances of their present and future life. As illustrated in Figure 6 the patient experiences a satisfying self-empowerment with the support of a standing ovation from the therapeutic community in the audience. The therapist hopes this encounter with the experiential theater of demonstration thera-

py will be sufficiently numinous to activate zif-268 gene expression in her REM dreaming tonight to optimize the therapeutic reorganization and reconstruction of her mind and memories in keeping with the psychobiological dynamics of current neuroscience research. Recent research (12) has documented how a day rich in memorable experiences leads to creative replays of gene expression, protein synthesis, and neurogenesis (literally brain growth) during dreaming (REM sleep).

Most people are not aware of how they need to facilitate and consolidate gene expression, neurogenesis, problem solving, and healing in everyday life as well as psychotherapy. This fourth stage of the creative process requires cooperation between the implicit, unconscious dynamics of target gene expression (the specific genes engaged in memory, learning, and healing) and the explicit, conscious dynamics of ratifying the reality of the new. Patients participate in this cooperative process but they do not direct it. This is the greatest source of misunderstanding made about the creative process by both patients and therapists: patients and therapists are co-creators, not directors of the natural dynamics of gene expression, neurogenesis, and healing. The patient's co-creative task is to recognize and value the new that arises in stage 3 and then plan in stage 4 how the new can be practiced in real life. The therapist's co-creative task in stage 4 is to (1) facilitate the patient's creative experiences to validate the value of their psychotherapeutic process and (2) help reframe and resynthesize symptoms into signals and psychological problems into inner resources (1,2,18). Symptom scaling may be used to validate the therapeutic experience and what may need to be done in future sessions.

SUMMARY

The leading edge of neuroscience is tracing the pathways of mindbody communication, neurogenesis, and healing on all levels from the psychosocial to the cellular-genetic in a manner that makes a genuine science and practice of therapeutic hypnosis, psychotherapy, and the healing arts possible. Many of the problems and paradoxes of historical hypnosis can be resolved by a deeper understanding of the new psychobiological parameters of mindbody communication and healing in the emerging field of psychosocial genomics. We propose that the psychosocial genomics of therapeutic hypnosis and psychotherapy can be modeled as a 4-stage creative cycle that facilitates the replay and resynthesis of problematic memory, learning, and behavior in an adaptive manner. While most current research on the genomic neuroscience of memory and learning is still being conducted with animal models in the laboratory, it is likely that new methods of assessing gene expression, neurogenesis, and healing on the molecular level will become available to guide clinical practice in the future.

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