CLINICAL HYPNOSIS DAY MAY 23

The Neuroscience of Hypnosis

Scientific evidence for the validity of hypnosis has been developing rapidly over the past several decades. It is now generally accepted that the capacity for hypnosis varies among individuals and is normally distributed within the population at large. In fact, in longitudinal studies over a 25 year period, the capacity for hypnosis has been found to be even more stable than IQ (Piccione, Hilgard, & Zimbardo,1989).

In recent years, with the advent of reliable methods for mapping and imaging the brain, neuroscientists have been able to search more effectively for a neural substrate for hypnosis. While the evidence for a specific "brain signature" of the hypnotic state remains elusive, there is mounting evidence that hypnosis is both a psychological and a neurophysiological phenomenon.

Electroencephalograph (EEG) studies have shown that for high hypnotizable subjects, a hypnotic induction procedure produces reliable alterations in brain activity that are associated with responsivity to suggestions. In trance, high hypnotizable subjects, compared to low hypnotizables, show increased slow-wave theta band brainwave activity (4-9.7 HZ) and decreased high beta wave activity (13-19.9 HZ). This change provides evidence that hypnosis produces both an observable alteration in the electrical activity of the brain, as well as an alteration in the subjective experience of hypnosis (Jamieson, & Burgess, 2014).

Positron emission topography (PET) studies have found that, in hypnosis, when high hypnotizable subjects were shown black and white patterns and given suggestions to see them in color, they ,in fact, report being able to add color to the images. And, the high hypnotizable subjects experience of adding color were reliably associated with changes in brain activity in areas of the brain that process information about (and underlie the experience of) color. Further, their reports of adding color to the black and white patterns were felt to be authentic, i.e., they did not appear to be made up, or simply imagined. (Kosslyn, Thompson, Costantini-Ferrando, Alpert, Spiegel, 2000).

Functional magnetic resonance imaging (fMRI) studies have shown that, in trance, context-specific suggestions can differentially modulate activity in specific brain sites. For example, suggestions to down regulate the intensity of pain signals have been found to produce a corresponding reduction in activity in the area of the brain that registers pain intensity, the somatosensory cortex. On the other hand, hypnotic suggestions designed to reduce the affect component of pain, that is, the degree to which pain causes emotional suffering, have been found to decrease activity in a separate area of the brain, the anterior cingulate cortex (Rainville, Carrier, Hofbauer,

Bushnell, Duncan, 1999).

FMRI studies have also shown that hypnosis can enhance the mind's ability to influence bodily functions including: modulating blood flow; gastric secretions; blood pressure; and respiration.

Even when not hypnotized, individuals high in hypnotic capacity show greater functional connectivity between brain sites that modulate their executive functions and parts of the brain that control what is happening in the body-- the insula in the salience network.

References

Hoeft, F., Gabrieli, J.D., Whitfield-Gabrieli,S., Hass, B.W., Bammer,R., Menon, V., Siegel, D. 2012. Functional brain basis of hypnotizability. Arch Gen Psychiatry, 69, 1067-72

Jamieson, G.A.,& Burgess, A.P. 2014. Hypnotic induction is followed by state-like changes in the organization of EEG functional connectivity in the theta and beta frequency bands in high-hypnotically susceptible individuals. Frontiers in Human Neuroscience,8, 528, doi:103389/fnum.2014,00538

Kosslyn SM, Thompson W.L, Costantini-Ferrando MF, Alpert N.M, Spiegel D. 2000. Hypnotic visual illusion alters color processing in the brain. Am J Psychiatry. 157(8): 1279-84

Piccione, E., Hilgard, E., & Zimbardo, P., 1989, On the degree of stability of measured hypnotizability over a 25-year period. J Pers Soc Psych 56 (2): 289-295 1989

Rainville, P., Carrier, B., Hofbauer, R.K., Bushnell, M.C,& Duncan, G.H., 1999. Dissociation of sensory and affect dimensions of pain using hypnotic modulation. Pain,82, 159-71.