PTSD in US warfighters

The greatest thing, then, is to make the nervous system our ally... - W James

As we continue to funnel our children's and grandchildren's college fund into the Middle East, with every dollar spent fighting the relic radiation of the holy war begun by Moses and Mohammed now IOU'd to Eastern Palaces (China), behavioral neuroscientists and therapists need to redress the ongoing aftermath to the personnel fighting these wars.

Nearly 1 in 5 warfighters returning from Operation Iraqi Freedom (OIF) screen positively for stress, as do 1 in 9 returning from Operation Enduring Freedom (OEF) (Hoge et al., 2004). Untreated stress impairs attention and mental flexibility (Brandes et al., 2002; Russo, Stetz, & Thomas, 2005), making it difficult to screen out irrelevant sensory cues (Neylan, et al., 1999). Stress makes people especially sensitive to new information so that it interferes with facts and procedures (Vasterling et al, 1998) and individuals suffering from PTSD are slower and less accurate in detecting targets (Veltmeyer et al., 2005). To achieve situational awareness dominance, our warfighters must stay focused and alert in the modern battle space and these requires inoculation to stress reactions and treating those already compromised by stress.

Critical incident stress debriefing (CISD) has had limited success in preventing stress reactions. Psychological debriefings produce few long-lasting effects (Kavanagh, 2006). Psychotherapy and medication fare no better in alleviating the aftermath of traumatic stress: less than half of those who enter psychotherapy improve, and antidepressant medications fare no better (Bradley et al, 2005; Hamner, Robert, & Frueh, 2004). Stress and depression are common reasons why warfighters are medically evacuated from theaters (Stetz et al., 2005).

In order to effectively treat posttraumatic stress we need to understand its neurobiology. Neuroimaging suggests that traumatic stress acts as a partial callosotomy, disconnecting left and right cortices as if by surgery (Karl et al., 2006; Teicher et al., 2002; De Bellis & Keshavan, 2003). The corpus callosum connects a billion neurons in the one hemisphere to a billion neurons in the other via 200 million axons (Aboitiz et al., 1992). Traumatic stress significantly prunes the anterior and midsection of this pathway (Zeitlin et al., 1989; Villarreal et al., 2004), resulting in a loss of connectivity which presents itself as deficits in memory, emotional regulation, and social relations as well as a decline in left hemisphere dominance (Zaidel & Iacoboni, 2003). Left hemisphere dominance is typical for members of industrial societies whereas right hemisphere dominance is typical of pre-industrial and low population density cultures (Rabe et al., 2006a; Metzger et al., 2004; Saltzman et al., 2006; Spivak et al., 1998; TenHouten, 1985; 1986). The left hemisphere provides our analytical, reductionistic competence, the right hemisphere our emotional and perceptual skills. PTSD patients often rely on more aboriginal modes of processing as evidence by impairments in visuo-executive monitoring (Clark et al., 2003), visually guided task performance (Vasterling et al., 2004; 2000), and control of aggressive

impulses (Pavic et al., 2003). Those who recover most from traumatic incidents typically exhibit EEG evidence of dominance restoration (Rabe et al., 2006b).

As we continue to deploy the same warfighters to the Iraqi and Afghan theaters, we need to rapidly identify those who suffer from posttraumatic stress and minimize its impact on performance. Electroencephalographic (EEG) operant conditioning is the culmination of 80 years of scientific inquiry into brain activity and mental function (Berger, 1929; Sterman, 1969; Sterman & Kaiser, 2001). As PTSD often presents itself as a disconnection between cerebral hemispheres, we need address the EEG rhythm relationship between cerebral hemispheres.