THE NEUROBIOLOGICAL CONSEQUENCES OF PSYCHOLOGICAL TORTURE

RONA M. FIELDS, PH.D.

IN 1971, FINDINGS REPORTED BY THIS AUTHOR IN A SERIES OF ARTICLES, INDICATED THAT PROLONGED STRESS THROUGH SLEEPLESSNESS, TIME DISORIENTATION, THREAT AND PHYSICAL ABUSE; SENSORY DEPRIVATION; LIMITATIONS OF OXYGEN INTAKE, HYPNOSIS, DRUGS AND OVERCROWDING "CAGE-LIKE CONFINEMENT OF AN APPARENTLY RANDOM SELECTION OF A THOUSAND CATHOLIC MEN RESULTED IN MEASURABLE ORGANIC DAMAGE . ONE HUNDRED TWENTY FIVE INDIVIDUALLY TESTED AT THAT TIME FOUND THAT TWO THIRDS TESTED MEASURABLE BRAIN DAMAGE WITHIN TWO YEARS OF THEIR RELEASE FROM THE IMPRISONMENT) [1]

DATA BASED STUDIES IN CLINICAL AND SOCIAL PSYCHOLOGY; IN SOCIOLOGY AND DEVELOPMENTAL PSYCHOLOGY REPORT ANIMAL AND HUMAN LABORATORY EXPERIMENTAL FINDINGS PREDICTING OUTCOMES SUCH AS THESE ARE DESCRIBED IN CLINICALREPORTS ON TORTURE SURVIVORS.[2] AT THE TIME OF THE STUDY OF IRISH MEN AND BOYS SUBJECTED TO DEPTH INTERROGATIOON TECHNIQUES AND DETENTION THERE WERE ONLY STUDIES ON CONCENTRATION CAMP SURVIVORS WITH WHICH TO COMPARE THESE FINDINGS. IN THOSE STUDIES, MOST NOTABLE BY EITINGER AND STROM, PERIODIC MEDICAL

EXMINATIONS HAD INCLUDED THE USE OF THE BENDER GESTALT AND SIMILAR FINDINGS ON THAT TEST AROUSED SPECULATION BUT NO CONCLUSIONS. EITINGER AND STROM UPON SEEING THE N.I. FINDINGS RECONSIDERED THE NEUROLOGICAL EFFECTS IN THEIR STUDIES THAT HAD BEEN ATTRIBUTED TO STARVATION AND PHYSICAL ABUSE . THEY GAVE THE K-Z SYNDROME A NEW DIMINSION- PSYCHOLOGICAL ABUSE.

VIKTOR FRANKL IN HIS WORK “FROM CONCENTRATION CAMP TO LOGOTHERAPY “ RECOGNIZED THE IMPACT SUCH EXPERIENCE HAD ON SURVIVAL ITSELF. ROBERT LIFTON, NOT LONG AFTERWARDS INN WRITING ON BRAINWASHING, SIMILARLY IDENTIFIED THE ROLE THAT PSYCHOLOGICAL TORTURE CAN PLAY IN PHYSICAL SEQUELAE. IN A CASE PRESENTED TO THE SUPERIOR COURT OF NEW YORK IN 1973, HE TESTIFIED THAT THE PSYCHOLOGICL CONSEQUENCES OF THE SUBJECT’S CONCENTRATION CAMP EXPERIENCES SERIOUSLY IMPAIRED HIS JUDGMENT AND BEHAVIOR.

IN A PANEL PRESENTED AT THE WESTERN PSYCHOLOGICAL ASSOCIATION ANNUAL CONVENTION IN JANUARY 1972[i] ONE PAPER PRESENTED THE USE OF THESE TECHNIQUES IN DEPTH INTERROGATIONS IN NORTHERN IRELAND AND ANOTHER PRESENTED THEIR APPLICATION AT THE MEDICAL FACILITY AT VACCAVILLE STATE PRISON ON INMATES IN A SPECIAL “BEHAVIOR THERAPY” PROGRAM. AT THE TIME THIS PANEL WAS PRESENTED, DONALD DEFREEZE WAS AN INMATE SUBJECTED TO THESE TREATMENTS. SEVERAL YEARS LATER, UNDER THE ALIAS, CINQUE, HE LED THE SYMBIONESE LIBERATION ARMY IN KIDNAPPING PATTY

HEARST AND APPLIED THE SAME TECHNIQUES TO INTIMIDATE HER INTO COLLABORATION IN THEIR VIOLENT, ANTI-SOCIAL CAMPAIGN. [3]

THE FOREIGN INTELLIGENCE ASSISTANCE PROGRAM IN COLLABORATION WITH THE CIA MANUALS CITE THE TECHNIQUES USED BY THE BRITISH SAS IN BORNEO IN A COUNTER INSURGENCY WAR. COINCIDENTALLY, SAS VETERANS TAUGHT THE DEPTH INTERROGATION TECHNIQUES USED IN NORTHERN IRELAND TO THE SPECIAL BRANCH OF HE RUC. IN NORTHERN IRELAND THESE TECHNIQUES WERE USED AGAINST ACTIVISTS IN THE NORTHERN IRELAND CIVIL RIGHTS ASSOCIATION, LABOR UNIONS AND PRESUMED MEMBERS OF THE IRA AND LATER, THE UDA.

IN LATIN AMERICA THEY WERE INVOKED AGAINST MEMBERS AND SUPPORTERS OF REFORRMIST GOVERNMENTS DEMOCRATICALLY ELECTED AND AGAINST ORGANIZATIONS SEEKING TO OVERTHROW MILITARY DICTATORSHIPS.

THE MANUALS MAKE FREQUENT REFERENCES TO THE TACTICS AND STRATEGIES OF THE SAS (BRITISH SPECIAL FORCES). THERE ARE INCOMPLETE CENSORED REFERENCES IN DECLASSIFIED MATERIAL TO JOINT OPERATIONS WITH BRITISH FORCES IN LATIN AMERICAN SECURITY FORCES TRAINING PROGRAMS. THE SAS HAS BEEN ACTIVELY INVOLVED IN NORTHERN IRELAND SINCE AT LEAST 1971. POLITICAL MURDERS HAVE BEEN ATTRIBUTED AND PROVEN THEIR CULPABILITY. AS REFERENCED IN THE LATER CENSORED AND THEN WITHDRAWN, SOCIETY ON THE RUN (RONA M FIELDS 1973, PENGUIN LTD.,) AN SAS INFORMANT DESCRIBED TRAINING THE RUC SPECIAL BRANCH IN

INTERROGATION TECHNIQUES PREVIOUSLY USED IN MALAYSIA AND BORNEO.[4] THESE ARE ACTIONS REFERENCED IN CIA AND FIAP MANUALS. THEY ARE INTENDED TO INFLICT PAIN, NOT LEAVE MARKS AND TO MAKE THEIR "SUBJECTS" YIELD INFORMATION. HOWEVER, IN SOME PLACES, AND THERE IS REASON TO BELIEVE THAT IN NORTHERN IRELAND PARTICULARLY, THESE TECHNIQUES AND THE FACT THAT TORTURE AND COERCIVE TREATMENT WERE "LEAKED" TO THE PUBLIC THE INTENT WAS TO WIDELY IMPOSE FEAR AND THREAT THEY ARE INCLUDED IN BOTH BRITAIN AND THE US UNDER "PSYOPS" OR PSYCHOLOGICAL OPERATIONS. THESE ARE TECHNIQUES FRANKLY BORROWED FROM PSYCHOLOGICAL EXPERIMENTAL STUDIES AIMED AT PRODUCING STRESS OR INDUCING "BRAINWASHING".

IN 1976, AT THE APA CONVENTION IN WASHINGTON D.C., A PANEL PRESENTED ON PSYCHOLOGICAL TORTURE INCLUDED A CHILEAN COLLEAGUE, DR. KATYA RACZYNSKI; A SOUTH AFRICAN LAWYER, JOEL CARLSON, AND A REPRESENTATIVE FROM AMNESTY INTERNATIONAL (FOR WHICH I SERVED ON THE MEDICAL COMMISSION). I HAD INVITED PETER SUEDFELD, A PSYCHOLOGIST THEN ENGAGED IN EXPERIMENTAL WORK (USING STUDENT SUBJECTS) ON SENSORY DEPRIVATION. SUEDFELD REFUSED TO PARTICIPATE.PETER SUEDFELD'S RESEARCH WAS FUNDED BY US DEPARTMENT OF DEFENSE SOURCES AND FEATURES PROMINENTLY IN THE CIA AND FIAP MANUALS. TWENTY YEARS LATER, HE WROTE A BOOK ABOUT TORTURE AND THE PSYCHOLOGICAL CONSEQUENCES ON THE VICTIMS. BUT HE NEGLECTED TO INCLUDE HIS OWN EXPERIMENTS ON

SENSORY DEPRIVATION AND SENSORY OVERSTIMULATION PERFORMED ON HIS STUDENTS AT THE UNIVERSITY OF MICHIGAN AND THE UNIVERSITY OF TORONTO!

DRS. RACZYNSKI, PROFESSOR CARLSON AND I PRESENTED CASE MATERIAL AND DATA ATTESTING TO THE USE OF PSYCHOLOGICAL RESEARCH IN THE TORTURE AND COERCION OF HELPLESS PRISONERS IN SOUTH AFRICA, CHILE, NORTHERN IRELAND AND PORTUGAL. TWENTY-FIVE YEARS SINCE, IN COMPANY WITH MY CHILEAN AND ARGENTINEAN COLLEAGUES WE CAN CONNECT THE APPLICATIONS OF PSYCHOLOGICAL AND PSYCHIATRIC RESEARCH TO THE TORTURES AND THROUGH CONTINUOUS EFFORTS AT TREATING THE VICTIMS—MOST OFTEN FOR POST TRAUMATIC STRESS DISORDER—REALIZE THE PERMANENT DAMAGING EFFECTS OF THESE EXPERIENCES ON THE BRAIN AND PHYSICAL CONDITION OF THEIR VICTIMS. AWARENESS OF AN AVERSIVE STIMULUS APPROACHING—SUCH AS A BARKING DOG, A SNAKE, A RAT OR OTHER PREDATORS CAN EVOKE A REMEMBERED PAIN SENSATION —ITSELF STRESSFUL. THIS HAS ITS COUNTERPART IN THE HIPPOCAMPUS AND IS RECOGNIZED AS THE “KINDLING EFFECT” WHICH THROUGH PERIPHERAL NERVES COMMUNICATED TO THE PAIN PROCESS I LOCATED VERY PROXIMAL.INITIALLY I AND OTHER RESEARCHERS ON TORTURE SURVIVORS AND BRAINWASHING VICTIMS HAD ASSUMED THAT THE ORGANIC CONSEQUENCES WERE LINKED TO THE SHORTAGE OF OXYGEN IN THE BLOOD SUPPLY TO THE BRAIN. HOWEVER, OVER THE YEARS AND

WITH MORE SOPHISTICATED KNOWLEDGE OF THE BRAIN ANOTHER THESIS APPEARED AT LEAST AS PROMISING.

THE INTENT OF THESE TECHNIQUES IS TO INFLICT PAIN AD FEAR. I WOULD LIKE AT THIS POINT TO SWITCH TO A DESCRIPTION OF THE NEUROPSYCHOLOGY OF PAIN, OR HOW PAIN IS EXPERIENCED IN THE BRAIN AND HOW BRAIN MECHANISMS CAN RESPOND TO SENSORY OVERSTIMULATION AND SENSORY DEPRIVATION TO CAUSE PHYSICAL DAMAGE.

PAIN IS THE MOST UNIVERSAL HUMAN EXPERIENCE AND, PERHAPS, THE LEAST UNIVERSALLY DEFINED. ONE OF THE REASONS FOR THIS AND FOR THE EXTRAORDINARY SUBJECTIVITY OF THE EXPEERENCE OF PAIN IS THAT IT IS NOT TRANSMITTED VIA A SINGLE SENSORY SEQUENCE NOR MEASURED IN INTENSITY THROUGH EITHER THE SPACE OF BRAIN ACTIVIATION NOR THE SINGLE SITE OF BRAIN ACTIVATION. FURTHERMORE, IT IS A SENSATION ABOUT WHICH A SENSE JUDGMENT MAKES THE INTERPRETATION OF PAIN.

THE APPRAISAL THAT SOMETHING IS GOOD FOR ME HERE AND NOW IS NECESSARY FOR APPROACH. ON THE CONTRARY WHEN WE APPRAISE SOMETHING AS BAD WE HAVE AN IMPULSE TO AVOID IT. APPRAISALS OF GOOD OR BAD, BENEFICIAL OR HARMFUL, COMPLETE SENSE EXPERIEMNCES ARE NECESSARY FOR NORMAL AWARENESS.SINCE SUCH APPRAISALS ARE IMMEDIATE OR UNWITTING, WE DO NOT EXPERIENCE THEM WE MERELY EXPERIENCE THE RESULTING IMPULSE TOWARD OR AWAY FROM THE OBJECTWE APPRAISAL. SENSORY APPRAISAL IS UNLEARNED, SPONTANEOUS. IN FACT, IF WE COULD NOT

MAKE SUCH APPRAISALS FROM THE BEGINNING OF LIFE HOW COULD WE LEARN TO DO SO? EVEN THE INFANT KNOWS WHAT IS GOOD FOR HIM AND HE SHOWS HIS ENJOYMENT BY STOPPING HIS CRYING AND SMILING. HE KNOWS WHAT IS BAD FOR HIM AND SHOWS HIS DISTRESS BY WAILING. SUCH INTUITIVE APPRAISALS LIKE ALL SENSORY EXPERIENCES MUST BE MEDIATED BY A PARTICULAR NEURAL SYSTEM. ARNOLD HAS CALLED IT TH E APPRAISAL SYSTEM (SEE TRANSPARENCY ON BRAIN AND APPRAISAL) [6]

PAIN CANNOT BE A SENSATION AS IS USUALLY ASSUMED BECAUSE IT CAN ACCOMPANY ANY SOMEASTHETIC SENSATION YET VARIES INDEPENDENTLY. BOTH PLEASURE AND PAIN APPEAR TO BE MEDIATED BY THE MEDIAL THLAMUS WHEN DIFFUSE AND BY THE LIMBIC SYSTEM WHEN DIFFERENTIATED AND LOCALIZED.

PAIN ACCOMPANIES TISSUE DAMAGE BUT NOT ALL TISSUE CHANGE IS FELT AS PAINFUL. A GROWING TUMOR , TUBERCULOSIS OR HARDENING OF THE ARTERIES MAY BE COMPLETELY PAINLESS. WHEN TISSUE DAMAGE BECOMES PAINFUL, THE DISEASE PROCESS HAS ATTACKED EITHER THE SENSORY PATHWAYS OR THEIR CONNECTION WITH THE MEDIAL THALAMUS. WHEN EXCITATION IN THOSE RELAYS BECEOMES EXCESSIVE THERE IS THALAMIC PAIN WHICH MAY CONTINUE EVEN AFTER THE SOMATOSENSORY NUCLEI HAVE BEEN REMOVED. SENSORY PATHWAYS PROJECT TO THE RETICULAR FORMATION IN THE LOWER BRAINSTEM AND RELAYS FROM THERE CAN REACH THE CENTRUM MEDIANUM DIRECTLY. THE DESTRUCTION OF THIS NUCLEUS ABOLISHES PAIN . IT IS EXPERIEMCED WHEN THE DESTRUCTION OF THE

---

[6]Arnold, Magda B Memory and The Brain (Erlbaum, NY 1990

SENSORY THALAMIC NUCLEUS HAS NOT BEEN SUCCESSFUL. BUT PAIN IS NOT A SIMPLE SENSATION.
A SENSORY APPRAAISAL IS DIFFERENT FROM OTHER SENSORY FUNCTIONS BECAUSE IT INDICATES NOT THE QUALITY OF THINGS AROUND US BUT THEIR EFFECT ON US. ON THE LEVEL OF SOMATOSENSORY EXPERIENCE WHAT IS BAD OR HARMFUL IS EXPERIENCED AS PAIN.
ARRNOLD (1960)[7] HYPOTHESIZED FIBERS THAT MEDIATE PAIN OR PLEASURE AND THAT THIS SYSTEM OF FIBERS, THE APPRAISAL SYSTEM CONNECTS WITH THE AREA IN THE BRAIN CALLED THE BRAIN REWARD SYSTEM. SHE CALLS THE APPRAISAL SYSTEM AN "INTERNAL SENSE" LIKE MEMORY OR IMAGINATION ASSUMING THAT SUCH FEELINGS COULD NOT BE MEDATED BY KNOWN PERIPHEERAL FIBERS.
WHEN PERIPHERAL FIBERS WERE IIDENTIFIED THAT PRODUCED PAIN ON STIMULATION PHYSIOLOGISTS DECIDED DTHAT PAIN IS A SOMATIC SENSATION LIKE TOUCH OR MUSCLE STRAIN. BUT ARNOLD CONTENDS THAT PAIN AND PLEASURE ARE DIFFERENT FROM SENSAIONS. SENSORY FUNCTIONS STAND ON THEIR OWN WHILE PLEASURE OR PAIN ARE ALWAYS REACTIONS TO SOME SENSORY EXPERIENCE. SESNORY EXPERIENCES EXCITE FIBERS OF A PERIPHERAL APPRAISAL SYSTEM THAT ACTIVATES ALL GRADATIONS OF PAIN OR PLEASURE. HENCE, ACCORDING TO ARNOLD AND OTHERS THEY ARE FEELINGS RATHER THAN SENSATIONS. WE ARE REFLECTIVELY AWARE WHEN WE MAKE A JUDGMENT OF BENEFICIAL OR HARMFUL. WE EXPERIENCE AN ACTION IMPULSE THAT FLOWS FROM IT.ON THE LEVEL OF SOMATIC SENSATIONS WE EXPERIENCE PLEASURE WITH ITS

---

[7] Arnold, Magda B Emotion and Personality. Columbia University Press (960)

READINESS TO ENJOY OR PAIN WITH AN IMPULSE TO EASE IT. ON THE LEVEL OF OBJECT RELATIONS WE ARE ATTRACTED TO ANYTING WE APPRAISE AS GOOD, REPELLED FROM ANYTHING WE HAVE APPRAISED AS BAD.
ANIMALS ALSO APPRAISE WHAT THEY ENCOUNTER AND HAVE AN IMPULSE TO APPROACH OR WITHDRAW. THIS APPLIES TO DRIVE STATES AS WELL AS TO PERFORMING A TASK. NOT ONLY OBJECTS CAN BE THUS APPRAISED BUT ALSO BODILY EXPERIENCES.
THERE ARE ONLY A FEW THINGS WE CAN IMMEDIATELY APPRAISE AS GOOD OR BAD FOR US. ALL OF THESE SENSATIONS ARE EXPERIENCED VIA THE SOMAESTHETIC SYSTEM AND AFFECT US DIRECTLY. WE REACT TO THEM WITH A RANGE OF FEELINGS FROM PLEASURE TO PAIN. A SHARP TONE OR PENETRATING ODOR IS IMMEIDTAELY FELT AS UNPLEASANT OR EVEN PAINFUL BECAUSE IT AFFECTS FIBERS OF THE APPRAISASL SYSTEM IN ADDITION TO AUDITORY OR OLFACTORY RECEPTORS. IN CONTRAST ANYTHING WE SEE OR HEAR THAT IS NOT NEAR ENOUGH TO TOUCH US WE APPRAISE AS GOOD OR BAD ONLY BECAUSE WE HAVE EXPERIENCED ITS EFFECTS IN THE PAST. WE RELIVE HE FEELINGS WE HAD ON SIMILAR OCCASSIONS. THE FACT THAT WE RELIVE RATHER THAN REMEMBER IS ACHIEVED THROUGH A DIFFERENT BRAIN CIRCUIT CALLED AFFECTIVE MEMORY. VIEWED ON A PET SCAN, THIS MAY BE RREPRESSENTED BY WHAT IS CALLED THE KINDLING EFFECT IN THE THALAMUS WHICH TRRANSMITS THROUGH THE AMYGDALA TO THE HIPPOCAMPUS AND FINALLY THROUGH THE NEURAL PATHWAYS TO THE PARIETAL LOBE WHERE SENSORY INFORMATION CONVERGES ANDBECOMES AN INTEGRATED AND COHERENT PERCEPTION. SPINDLE CELLS

IN THE FRONTAL LOBES CONTAINED IN SPECIAL CIRCUITS MAKE THE INTERPRETATION AND BROADCAST THE MESSAGES THAT BECOME EMOTIONS.

THE CHEMISTRY OF PAIN

NEUROTRANSMITTERS IN THE BRAIN BOTH FOR INHIBITORY AND STIMULATORY FUNCTIONS ARE ABUNDANT AND COMPLEX. AT FIRST GLANCE IT MIGHT SEEM UNLIKELY THAT A STRUTURE LIKE THE HIPPOCAMPUS SHOULD SERVE AS A RELAY STATION FOR SO MANY DIFFERENT PSYCHOLOGICAL ACTIVITIS: SENSORY RECALL, THE REVIVAL OF APPRAISAL (AFFECTIVE MEMORY) THE INITIATION OF DIRECTED ACTION AND THE PHYSIOLOGICAL CHHANGES THAT GO WITH IT AND FINALLY, THE REVIVAL OF MOTOR MEMORY. THE AMYGDALA MEDIATES DIFFERENT EMOTIONAL ACTIONS. THESE STRUCTURES CAN MEDIATE SO MANY AND DIFFEENT ACTIVITIES BECAUSE THEY SERVE AS RELAY STATIONS FOR SEVERAL NEURAL SYSTEMS EACH OF WHCH HAS A DIFFERENT FUNCTION. IT HAS BECOME POSSIBLE TO DIFFERENTIATE BETWEEN NEURAL SYSTEMS ACCORDING TO THE SUBSTANCES THAT SERVE AS TRANSMITTERS. IN ADDITION TO ACETYLCHOLINE WHICH HAS BEEN KNOWN AS A TRRANSMITER IN PERIPHERAL NERVES FOR QUITE SOME TIME, MANY ADDITIONAL NEUROTRANSMITTERS HAVE BEEN IDENTIFIED IN THE BRAIN. THE NEURONS SYNTHESIZE TRANSMITTER SUBSTANCES FROM A PRECURSOR THROUGH A SERIES OF ENZYME REACTIONS, STORE THEM IN VESICLES OF PRESYNOPTIC NERVEENDINGS AND RELEASE THEM INTO THE SYNAPTIC CLEFT ON ARRIVAL OF A NEURAL IMPULSE. THE RELEASED TRANSMITTER MOLECULES BRIDGE THE FLUID FILLED GAP BETWEEN THE PRESYNAPTIC AXON TERMINAL AND THE CELL MEMBRANE OF THE POSTSYNAPTIC

RECEIVING NEURONS AND ARE TAKEN UP BY PROTEIN MOLECULES PRECISELY TAILORED TO THEIR CONFIGURATION. MANY NEUROTRANSMITTERS HAVE BEEN IDENTIFIED IN THE BRAIN. SOME BRAIN NEURONS USE ACETYLCHOLINE OTHERS USE CATECHOLOMINES SUCH AS NORADREENALINE AND DOPAMINE OR INDOLEMINES (SEROTONIN) AS TRANSMITTERS. CONDUCTION OVER OTHER SYNAPSES MAY REQUIRE AMINO ACIDS SUCH AS GAMMA AMINOBUTYRIC (GABA)GLYCINE,GLUTAMIC ACID AND OTHRS. CERTAIN PEPTIDES AND SOME HORMONES AND CORTICOIDS CAN MEDIATE NERVOUS CONDUCTION. BUT THESE SUBSTANCES HAVE A DIFFERENT MODE OFACTION. NEURORANSMITTERS ALTER MEMBRANE CONDUCTANCE BUT ENGAGING SPECIALIZEED RECEPTORS AT THE SYNAPSE, THUS CHANGING THE EXCITABILITY OF A SINGLE EXCITABLE ELEMENT FOR A BRIEF PERIOD OF TIME. IN CONTRAST, PEPTIDES DIRECTLY ALTER THE COONDUCTANCE OF A MEMBRANE THAT IS ALREADY ACTIVATED BY A TRANSMITTER. THESE ARE CALLED NEUROMODULATORS. MANY DRUGS ACT AS NEUROMODULATORS BECAUSE THEY AFFECT THE POSTSYNAPTIC MEMBRANE OF NEURONS IN THE CENTRAL NERVOUS SYSTEM, SO ALTERING EITHER THE RECEPTOR AFFINITY FOR THE NEUROTRANSMITTER OR THE CONDUCTANCE ACTIVATED BY THE TRANSMITTERS. STILL ANOTHER TYPE OF TRANSMITTER HAS BEEN OBSERVED IN AXONS THAT ARE NOT IN SYNAPTIC CONTACT WITH THE NEURONS THEY INFLUENCE. THESE ARE CALLED NEUROHORMONAL TRANSMITERS. BOTH NEURADRENALINE AND SEROTONIN FIBERS IN THE CEREBELLUM HAVE A

SYNAPTIC AND NON-SYNAPTIC MODE OF TRANSMISSION. THEY ARE BOTH NEUROTRANSMITTER AND NEUROHORMONAL FUNCTIONS.
WHICH BRINGS US TO THE ISSUE OF PAIN AND ANTI-DEPRESSANTS. THE SEROTONIN SYSTEM MEDIATES THE EFFECT OF MORPHINE AND OTHER OPIUM DERIVATIVES ELECTRICAL STIMULATION OF THE PERIACQUADUCTAL GRAY AND THE MIDBRAIN RAPHE SUPPRESSES PAIN. THIS EFFECT IS REVERSED BY NALOXONE, A MORPHINE ANTAGONIST. MORPHINE NOT ONLY ABOLISHES PAIN BUT PRODUCES A KIND OF ELATION—A HIGH. AFTER PAINFUL STIMULATION INTRAVENOUS MORPHINE DEPRESSES THE FIRING OF THE FINE “C” AND “A-DELTA PAIN FIBERS OF THE SPINAL CORD. IT DOES NOT REVERSE THE DEPRESSED FIRING OF PAIN FIBERS AFTER A DIRECT ACTION OF MORPHINE ON THESE FIBERS. HOWEVER, THE SEROTONIN SYSTEM IS ALSO INVOLVED IN THE DEPRESSION OF PAIN FIBERS MICROINJECTIONS OF SEROTONIN DEPRESS THE SPINOTHALAMIC NEURONS THAT RESPOND TO VARIOUS INTENSITIES OF TOUCH. WHEN THE SPINAL LEVEL OF SEROTONIN IS LOWERED AND THE BRAINSTEM LEVEL IS MAINTAINED, MORPHINE ANALGESIA IS RESUMED. APPARENTLYY, THE BRAINSTEM RAPHE NUCLEI INHIBIT THE SPINOTHALAMIC PAIN NEURONS. ELECTRICAL STIMULATION OF THE RAPHE NUCLEI PRODUCES ANALGESIA. THEIR ABLATION PREVENTS THE ANALGESIA PRODUCED BY MORPHINE. PAINFUL STIMULI INHIBIT MOST BRAINSTEM RAPHE CELLS AND LEAVE LESS THAN A THIRD UNAFFECTED AND EXCITE LESS THAN A THIRD. CONTRARY TO EXPECTATION, THE IONTROPHETIC CORECT APPLICATION OF SEROTONIN TO THESE NUCELI DID NOT EXCITE THESE

CELLS BUT INHBITED SOME AND LEFT OTHERS UNAFFECTED. THE ANALGESIA PRODUCED BY ELECTRICAL STIMULATION PROBABLY ACTS VIA THE BRAINSTEM RAPHE NUCLEI, WHICH SEND SEROTON IN ENERGIC RELAYS TO THE SPINAL CORD.
MORPHINE REDUCES THE MEDIAL THALAMIC, LIMBIC CORTEX AND HIPPOCAMPUS. THE INCREASED FIRING OF NEURONS IN THE MEDIAL THALAMC AFTER PAINFUL STIMULI. THE MORPHNE ANTAGONIST MALOXONE PREVENTS THIS EFFECT. WHEN THE SPINAL LEVEL OF SEROTONIN IS LOWERED WHILE THE BRAINSTEM LEVEL IS MAINTAINED MORPHINE ANALGESIA US REDUCED. THE TWO MIDBRAIN RAPHE NUCLEI EXCITES THE BRAINSTEM RAPHE AND SO DOES STIMULATION OF THE PERIAQUADUCTAL GRAY.

THE CIRCUIT AFFECTED BY MORPHINE HAS AN AFFERENT AS WELL AS AN EFFERENT LINK. THE EFFERENT LINK SEEMSS TO BE PART OF THE MEDIAL APPRAISAL SYSTEM WHICH CONSISTS OF THREE DIFFERENT FIBERS THAT MEDIATE A POSITIVE APPRAISAL O TOUCH OR STROKING. THIS AFFERENT APPRAISAL SYSTEM SEEMS TO MAKE CONTACT WITH THE MIDBRAIN RAPHE, THE MEDIAL THALAMUS, LIMBIC CORTEX AND HIPPOCAMPUS. MORPHINE REDUCED THE INCREASED FIRING OF NEURONS IN THE MEDIAL THALAMUS AFTER PAINFUL STIMULI. THE CONNECTIONS OF THE RAPHE COMPLEX WITH THE LIMBIC SYSTEM AND HIPPOCAMPUS SEEMS TO MEDIATE POSITIVE APPRAISAL OF THE BODILY STATE AFTER MORPHINE INDUCING A FEELING OF WELL-BING, EASE AND RELAXATION. VIA THE HIPPOCAMPUS, FOMIX AND MIDBRAIN, FIBERS OF THE ACTION CIRCUIT SEEM TO CONNECT WITH THE PERIEACQUADUCTAL GRAY, THE

MIDBRAIN AND THE BRAINSTEM RAPHE AND THE SPINAL CORD. SINCE MICROINJECTIONS OF SEROTONIN IN THE MIDBRAIN RAPHE INHIBIT ALL CELLS AND MICROINJECTIONS IN THE BRAINSTEM RAPHE INHIBIT MOST OF THEM IT IS QUITE LIKELY THAT THE FIBERS OF THE ACTION CIRCUIT CONNECTING WITH THE RAPHE DO NOT USE SEROTONIN AS TRANSMITTER BUT RATHER, ACETYLOCHOLINE.
THESE DIFFERENCES IN THE USE OF BRAIN CHEMICALS HAVE EVERYTHING TO DO WITH THE EFFEECTIVENESS OF ANALGESICS AND DELIVERY SYSTEMS FOR SAME.
THE USE OF ANALGESICS AND ANTI-DEPRESSANTS/ANT ANXIETY DRUGS ON PERSONS IN DETENTION ON WHOM EPISODIC DEPTH INTERROGATION IS CONTINUING, CAN CONTRIBUTE TO THE LONG TERM EXACERRBATION OF THE PHYSICAL EFFECTS AND THEINEFFECTIVENESS OF PAIN KILLERS ONTHESE INDIVIDUALS. THERE IS ALSO THE BEGINNING OF USEFUL THEORY ON WHY TREATMENT WITH ANTI-DEPRESSANTS MAY BE TOTALLY INEFFECTIVE FOR CHRONIC PAIN SYNDROME PATIENTS AND ALSO SOME CLUES FOR COUNTERING LONG TERM DRUG DEPENDENCIES. IT IS OBVIOUS TO ALL WHO HAVE WORKED WITH THEM THAT ADDICTS EXPERIENCE TREMENDOUS PAIN WHEN THEY ARE WITHDRAWING. <u>THE PROLONGED ACTIVATION AND EXCITATION WITH IMMEDIATE INHIBITION OF THE PAIN CIRCUITS PRODUCES DISTORTIONS.</u>

ON THE OTHER HAND EMOTIONAL CONFLICTS AND DEPRESSION PLAY A ROLE IN THE SUBJECTIVE AWARENESS OF PAIN IN ORGANIC STATES. SIMILARLY, PAIN ON A FUNCTIONAL BASIS MAY BE GENERATED OR INTENSIFIED BY DEPRESSION. ANTIDEPRESSANTS BY ELEVATING THE

AFFECTIVE STATE MAY ALTER THE DEGREE OF PAIN. STUDIES OF PATIENTS EXPERIENCING PAIN AND DEPRESSION HAVE SUGESTED THAT WHILE ANTI-DEPRESSANTS ARE EFFECTIVE FOR THOSE WHOSE PAIN AND DEPRESSION WERE COINCIDENTAL, THOSE WHO HAD EXPERIENCED PAIN BEFORE THE ONSET OF DEPRESSIVE SYMPTOMS DID NOT LOSE THEIR PAIN ENTIRELY.

THE NORTHERN IRELAND SURVIVORS OF PSYCHOLOGICAL TORTURE, CHRONIC DEPRESSION WAS EVIDENCED IN MORE THAN TWO THIRDS OF THE CASES STUDIED. SIMILARLY, THE SOUTHA FRICAN AND CHILEAN AND ARGENTINE SURVIVORS REQUIRED MEDICAL AND PSYCHIATRIC TREATMENT FOR THESE DISORDERS AS WELL AS DEGENERATIVE DISEASES OF THE SPINAL COLUMN, JOINTS AND BRAIN SEIZURE ACTIVITY. WHEN PROLONGED SLEEPLESSNESS AND DIETARY INSUFFICIENCIES ADD TO THE PHYSICAL BREAKDOWN, THERE IS PREMATURE AGING, AND PREMATURE DEMENTIA AS WELL.
MEDICAL SCIENTISTS WHO STUDIED HOLOCAUST SURVIVORS OR CONCENTRATION CAMP SURVIVORS OVER THE LONG TERM HAD CONSIDERED THEIR DEGENERATIVE DISEASES AND PREMATURE DEATHS AS A CONSEQUENCE OF THEIR STARVATION AND PHYSICAL BRUTALIZATION. THESE NEWEST FINDINGS ON SURVIVORS OF PSYCHOLOGICAL TORTURE, SUGGEST THAT PERHAPS THE PSYCHOLOGICAL TOLL ON THE CONCENTRATION CAMP SURVIVORS CONTRIBUTED IN LARGE PART TO THEIR PHYSICAL DETERIORATION AND DISEASES.

---

[i] Ned Opton, “Behavior Modification in Vaccaville” paper, later expanded in Scheflin and Opton, op.cit.

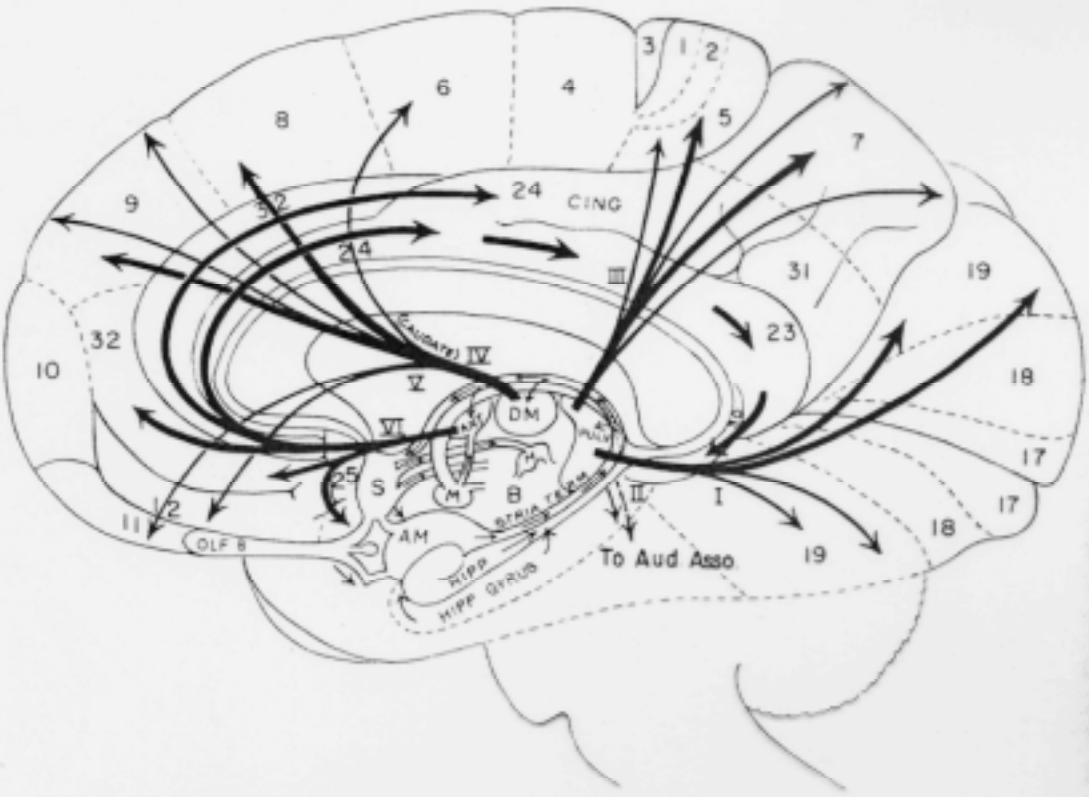

FIG. 16.4 Circuits mediating imagination and affective memory. We identify things by recalling similar objects (relays from association cortex to limbic areas, and from there via hippocampus-fornix circuit to the brain stem and back to thalamic sensory nuclei and sensory association cortex) and remember their effect on us (affective memory circuit from association cortex to limbic areas, and from there via hippocampus and postcommissural fornix to anterior thalamic nuclei and cortical limbic areas). This results in imagining possible effects of this thing on us and possible ways of coping with it (imagination circuit from cortical limbic areas via amygdala to thalamic association nuclei and cortical association areas).

I-IV imagination circuits: I visual, II auditory, III somesthetic, IV motor, V olfactory imagination. VI affective memory circuit.

AM amygdala, AT anterior thalamic nucleus, B brain stem, CING cingulate gyrus, DM dorsomedial thalamic nucleus, H habenula, HIPP hippocampus, M mamillary body, OLF olfactory bulb, PULV pulvinar, S septal area, STRIA TERM stria terminalis. (From M. B. ARNOLD, 1960)