

Table 1. Findings from neuroimaging studies that used activation paradigms to study the effects of psychodynamic psychotherapy

First author (year) [ref]	Clinical condition (n)	Neuroimaging method and activation paradigm	Baseline differences relative to healthy controls	Post-treatment changes relative to baseline
Buchheim (2012) [14]	Depression (16) HC (17)	fMRI (metabolic activity) Emotional stimuli: attachment-related scenes	Patients showed overactivation in regions of amygdala/hippocampus, dorsal prefrontal areas, and ventral cingulate region (BA 25)	Patients showed a) reduced activation towards normalization in same regions b) less activation than controls in subgenual cingulate
Beutel (2010) [15]	Panic Disorder (9) HC (18)	fMRI Emotional paradigm: words with negative, neutral and positive valence	Patients showed a) increased limbic activity to words with negative valence b) decreased ventrolateral PFC activity to words with negative valence	Patients displayed no difference from controls in these regions
de Greck (2011) [21]	Somatoform Disorder (15) HC (20)	fMRI Cognitive reward paradigms: anticipation of reward versus anticipation of no reward	Controls had increased activity with anticipation of reward in bilateral ventral striatum, frontal cingulate cortex, thalamus, and left posterior midbrain Patients showed no differentiation in metabolic activity between paradigms	Patients showed enhancement in neuronal differentiation (toward normalization) between paradigms
de Greck (2013) [22]	Somatoform Disorder (15) HC (15)	fMRI Emotional empathy paradigm: emotional face stimuli versus control stimuli (unrecognizable contents)	Patients showed less activity than controls during the empathy paradigm with the emotions of anger and joy relative to the control paradigm in several regions including parahippocampul gyrus, amygdala, superior temporal gyrus, posterior insular and	Patients showed normalization of brain activity in almost all regions affected at baseline during empathy paradigm with the emotion of anger versus control paradigm
Lai (2007) [16]	Borderline Personality Disorder (2) HC (5)	SPET (regional perfusion rates) a) baseline: quiet and stress conditions b) post-treatment: stress condition	Quiet condition: a) Patients showed hyperperfusion rates in frontal and limbic areas Stress condition (5 min duration video stimulus with psychologically violent scenes): a) Patients showed hyperperfusion rates in limbic, temporal, parietal and occipital areas b) HC had no changes in brain perfusion rates	Stress condition: Patients' perfusion rates were now similar to baseline quiet condition (indicating lower perceived psychological stress)

Table 2. Findings from neuroimaging studies of synaptic neurotransmission before and after psychodynamic psychotherapy

First author (year) [ref]	Clinical condition (n)	Neuroimaging (measure)	Baseline differences relative to healthy controls	Post-treatment changes relative to baseline
Hirvonen (2011) [12]	Depression: - treated with PDT (8) - or with Fluoxetine (14) No HC	PET (D2/3 binding)	N/A	PDT Group: No changes in dopamine D2/3 receptor binding availability in striatum and thalamus. Fluoxetine Group: Increased D2/3 binding potential in lateral thalamus but no changes in striatum
Karlsson (2010) [20] Karlsson (2013) [24]	Depression: - treated with PDT (8) - or with Fluoxetine (15) HC (4)	PET (5-HT _{1A} receptor binding potential)	Not provided	PDT group: Increase in 5-HT _{1A} binding after PDT with an effect size of 0.85 across brain regions: a) the prefrontal cortex: dorsolateral, medial, ventrolateral, orbital, and ventral anterior cingular; b) the insular cortex; c) the inferior and superior temporal gyri; and d) the parietal lobe: supramarginal and angular gyri. The increase in 5-HT _{1A} binding very strongly correlated with improvement in social functioning. Fluoxetine group: No changes in 5-HT _{1A} binding (and changes no greater than controls) Healthy controls: No changes
Lehto (2008) [13]	Atypical depression (8) Typical depression (11) No HC	SPECT (SERT & DAT)	No baseline difference in striatal DAT and midbrain SERT between the two clinical groups	Midbrain SERT increased in the group with atypical depression while no change was observed in people with typical depression
Saarinen (2005) [17]	Depression (1) HC (10)	SPECT (SERT)	Patient had decreased midbrain SERT (by -2.5 SD)	Patient midbrain SERT normalized
Tolmunen (2004) [18]	Hypomania and dysthymia (Case1) Depression (6) HC (10)	SPECT (SERT & DAT)	Case 1: Elevated midbrain SERT (+2 SD); elevated striatal DAT. Patients with depression: decreased midbrain SERT	Case 1: decreased midbrain SERT and striatal DAT (towards normalization) Depressed group showed increased SERT availability (towards normalization)
Viinamaki (1998) [19]	Borderline personality disorder with -Case 1: mild depression -Case 2: severe depression HC (10)	SPECT (SERT & DAT)	Case 1: decreased SERT (by 2 SD) in medial prefrontal cortex, midbrain, thalamus; normal striatal DAT	Case 1: SERT increased (normalized) in medial prefrontal region, midbrain and thalamus; no changes Case 2: no changes (and did not complete treatment)