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

| First author (year) | Clinical condition (n) | Neuroimaging method and activation paradigm | Baseline differences relative to healthy controls |
|---|---|---|---|
| Bucheim (2012) | Depression (16)<br>HC (17) | fMRI (metabolic activity)<br>Emotional stimuli: attachment-related scenes | Patients showed overactivation in regions of amygdala/hippocampus, dorsal prefrontal areas, and ventral cingulate region (BA25) |
| De Greck (2011) | Somatoform Disorder (15)<br>HC (20) | fMRI<br>Cognitive reward paradigms: anticipation of reward versus anticipation of no reward | Patients showed no differentiation in metabolic activity between paradigms.<br>Controls had increased activity with anticipation of reward in bilateral ventral striatum, frontal cingulate cortex, thalamus, and left posterior midbrain |
| Beutel (2010) | Panic Disorder (9)<br>HC (18) | fMRI<br>Emotional paradigm: words with negative, neutral and positive valence | Patients showed<br>a) decreased metabolic activity in the ventral and orbital prefrontal regions<br>b) increased activity in temporal regions |
| Lai (2007) | Borderline Personality Disorder (2)<br>HC (5) | SPET (regional perfusion rates)<br>a) baseline: quiet and stress conditions<br>b) post-treatment: stress condition | Quiet condition:<br>a) Patients showed hyperperfusion rates in frontal and limbic areas<br>Stress condition (5 min duration video stimulus with psychologically violent scenes)<br>a) Patients showed hyperperfusion rates in limbic, temporal, parietal and occipital areas<br>b) HC showed no changes in regional brain perfusion rates |

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

| First author (year) | Clinical condition (n) | Neuroimaging (measure) | Baseline differences relative to healthy controls | Post-treatment changes relative to baseline |
|---|---|---|---|---|
| Hirvonen (2011) | Depression (22):<br>-Treated with PP (8)<br>-or with Fluoxetine (14)<br>No HC | PET (D2/3 binding) | | PP Group: No changes in dopa in striatum and thalamus.<br>Fluoxetine Group: Increased D |
| Lehto (2008) | Atypical depression (8)<br>Typical depression (11)<br>No HC | SPECT (SERT & DAT) | No baseline difference in striatal DAT and midbrain SERT between the two clinical groups | Midbrain SERT increased in th no change was observed in pe |
| Saarinen (2005) | Depression (1)<br>HC (10) | SPECT (SERT) | Patient has decreased midbrain SERT (-2.5 SD) | Patient midbrain SERT normal |

| | | | | |
|---|---|---|---|---|
| Tolmunen (2004) | Case 1: Hypomania and dysthymia<br>Depression (6)<br>HC (10) | SPECT (SERT & DAT) | Case 1: elevated midbrain SERT (+2 SD); elevated striatal DAT<br>Patients with depression: decreased midbrain SERT | Case 1: decreased SERT in mi<br>(both towards normalization)<br>Depressed group showed incre<br>normalization) |
| Viinamaki (1998) | Borderline Personality Disorder<br>-Case 1: and mild depression<br>-Case 2: and severe depression<br>HC (10) | SPECT (SERT & DAT) | Case 1: decreased SERT (-2 SD) in medial prefrontal cortex, midbrain, thalamus; normal striatal DAT<br>Case 2: decreased SERT in medial prefrontal cortex; normal striatal DAT | Case 1: SERT increased (norm<br>midbrain and thalamus; no cha<br>Case 2: no changes (and did no |

Table 3. Direction of differences in synaptic neurotransmission

| Brain region | Clinical condition | Baseline, (N across studies) | | Post-treatment, (N across studies) | |
|---|---|---|---|---|---|
| Midbrain | Depression | ↓ SERT (9) | 17-19 | ↑ SERT (16) | 18 |
| | Hypomania | ↑ SERT (1) | 18 | ↓ SERT (1) | 18 |
| Thalamus | Depression | ↓ SERT (1) | 19 | ↑ SERT (1) | 19 |
| | | | | = D2/3 binding (8) | 12 |
| | | | | ↓ D2/3 binding (14) (after Fluoxetine) | |
| Medial prefrontal | Depression | ↓ SERT (2) | 19 | ↑ SERT (2) | 19 |
| Striatum | Depression | = DAT (8) | 18,19 | = DAT (21) | 19 |
| | | | | = D2/3 binding (8) | |
| | Hypomania | ↑ DAT (1) | 18 | ↓ DAT (1) | 18 |

DAT: dopamine transporter binding. SERT: serotonin transporter binding.

1 = Hirvonen 2011; 3 = Saarinen 2005; 4 = Lehto 2008; 5 = Tolmunen 2004; 6 = Viinamaki 1998SN

References still need fixing