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Abstract	Generations of therapists can attest to the ability of psychotherapy to effect change in people's lives, changes that we now know undoubtedly reflect changes in the brain. At the same time, as Gabbard [1] suggests, the need to understand *explicitly* the neural basis of psychotherapy through scientific research is greater than ever. In this chapter, we review an ongoing study investigating psychological and neural correlates of brief psychodynamic psychotherapy in individuals suffering from major depression. The study, to the best of our knowledge, is the first of its kind; most studies to date of neural correlates of psychotherapy have focused on cognitive behavioral therapy and interpersonal therapy (IPT) ([2], Chap. 9).

Keywords (separated by '-')	CCRT - depression - neuroimaging - PET - psychodynamic psychotherapy - QEEG

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Chapter 16
Bridging Technology and Psychotherapy: Toward Investigating Psychological and Neural Correlates of Psychodynamic Psychotherapy

Sharmin Ghaznavi, Janet M. Witte, Raymond A. Levy, and Joshua L. Roffman

Keywords CCRT • Depression • Neuroimaging • PET • Psychodynamic psychotherapy • QEEG

> "… we are in a society that is enamored of high tech. So, people think that psychotherapy is just handholding – that it cannot actually have a serious impact on a person or his brain. This is one of the reasons it is so important… to get scientific results that lend credibility to psychotherapy as a real treatment…"
>
> Glen O. Gabbard
> American Psychiatric Association Annual Meeting 2010
> "Psychoanalysis and Psychotherapy: Long-Term Outcome."

Generations of therapists can attest to the ability of psychotherapy to effect change in people's lives, changes that we now know undoubtedly reflect changes in the brain. At the same time, as Gabbard [1] suggests, the need to understand *explicitly* the neural basis of psychotherapy through scientific research is greater than ever. In this chapter, we review an ongoing study investigating psychological and neural correlates of brief psychodynamic psychotherapy in individuals suffering from major depression. The study, to the best of our knowledge, is the first of its kind; most studies to date of neural correlates of psychotherapy have focused on cognitive behavioral therapy and interpersonal therapy (IPT) ([2], Chap. 9).

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This chapter will describe the evolution of our ongoing study of the neural correlates of psychodynamic psychotherapy for depression. We review the criteria by which we selected a mode of psychodynamic psychotherapy. We will also review measures of the therapeutic process and psychological functioning, to illustrate how they might be utilized to assess change over the course of the therapy. Finally, we will review how to incorporate neuroimaging (in this case, ^{18}F fluorodeoxyglucose positron emission tomography, or FDG PET) in a way that is informative and has the potential to be clinically relevant. In showcasing our methods, it is not our goal to provide a definitive roadmap for investigating how psychodynamic psychotherapy affects individuals and their brains, nor to draw definitive scientific conclusions, as our study is not complete. Rather, we hope to demonstrate how the building blocks of psychotherapy research, many of which are described in this book, can readily be merged with brain imaging technology to discover concrete answers to the question of what changes psychodynamic psychotherapy may have on brain function.

Goals of Psychodynamic Psychotherapy

Arguably, any investigation into the impact of psychodynamic psychotherapy necessitates an understanding of the goals of psychodynamic psychotherapy. If one is to study the change that can be brought about by a given intervention, what better place to start than with the changes one hopes to bring about by employing that intervention? One of the most succinct and elegant discussions of the goals of psychodynamic psychotherapy can be found in Nancy McWilliams' book, *Psychoanalytic Case Formulation* [3]. She conceptualizes the overarching objectives of alleviating suffering and improving functioning through changes in character as a set of nine goals, which provide a useful framework for thinking about the change that psychodynamic therapists seek to bring about in their patients (described more fully in Chap. 20).

One of the goals of psychodynamic psychotherapy which McWilliams [3] identifies is *symptom relief*. Most people enter into psychodynamic psychotherapy with the hopes of finding relief from a particular problem, be it relief from depression or relief from a pattern of unhealthy relationships. Another goal, and arguably one of the most central to analytically oriented therapies, is *insight*, bringing what is unconscious into consciousness. By doing so, one may achieve an understanding about the reasons one is predisposed to certain patterns of behavior, thought, and affect. A third goal is for patients to achieve a sense of agency, which speaks to the powerlessness many patients experience because of their symptoms and maladaptive defenses. As McWilliams [3] eloquently puts it,

> [Patients] are being controlled by their depression or their anxiety or their dissociation or their obsession or compulsion or phobia or paranoia and have lost the sense of being master of their own ship.

Related to this, another goal of psychodynamic psychotherapy is for the patient to attain a better sense of *identity*, a conscious sense of who he or she is and how to reconcile that sense with the individual's wishes and drives, among other things. The fifth goal identified by McWilliams [3] is for the patient to gain *self-esteem*, by which she means one's ability to accept oneself despite being less than perfect.

The last four of the nine goals of psychodynamic psychotherapy identified by McWilliams [3] are more difficult to articulate, but, as a group, provide a gestalt for achieving fulfillment and satisfaction in life. One of those goals is being able to *recognize and handle feelings* effectively. That is, being able to know what one feels, to understand why one feels that way, and to use those feelings to benefit oneself and others. Another goal of psychodynamic psychotherapy is achieving *ego strength and self cohesion*, by which McWilliams [3] means the patient's ability to recognize realities, even harsh ones, and adapt to them in a resilient fashion. A penultimate goal is for patients to attain or increase their *capacity for love and work*. The capacity for love – building and maintaining healthy relationships – grows out of the ability to appreciate not only one's own complexities and

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shortcomings but those of others. The capacity for work arises out of a balanced understanding of what is in one's power to change, and speaks to having a sense of purpose or meaning in life. A final goal of psychodynamic psychotherapy is achieving *serenity*, enjoying what is rather than pursuing the ever elusive happiness which often seems to rest on the pursuit of unattainable and/or self-defeating goals.

Brief Psychodynamic Psychotherapy

The time-limited nature of the treatment makes brief psychodynamic psychotherapies more amenable to scientific investigation than traditional long-term psychodynamic psychotherapy. Given some of the loftier goals of psychodynamic psychotherapy – the capacity to love and work, achieving serenity – it is no surprise that most people associate it with being in treatment for several years. However, Freud himself treated a number of patients successfully, over only weeks or months [4]. Brief psychodynamic psychotherapy is, thus, not only *not* heretical, but in some instances actually quite effective. Necessarily, the goals of a brief psychodynamic psychotherapy are more circumscribed than those of a longer term treatment; however, the main difference is not in the type of change sought, but the scope of that change. Book [5] described the difference in the following way:

> Brief psychodynamic psychotherapy has as its goals symptomatic relief and *limited, but significant, character change*…[whereas in long term psychotherapy] the goal is *major and pervasive* character change along a number of dimensions.

The brief psychodynamic therapies usually last less than 1 year and consist of sessions once weekly [5] as opposed to traditional psychodynamic psychotherapies or analyses which can last several years and require multiple weekly sessions. Gabbard [1] has defined brief as less than 24 sessions lasting less than 6 months.

Therapy Process

Intervention duration is not the only potential challenge for researchers of psychodynamic psychotherapy; therapy process, which can vary between patients and therapists, presents yet another challenge. Studies examining psychotherapy process with rigorous criteria strongly suggest that psychotherapeutic approaches are often considerably more eclectic than intended. One way to address this challenge is to select a manualized therapy.

However, utilization of a manualized treatment alone is not sufficient to address potential differences in process. In a study looking at a trial of IPT, which tends to be more psychodynamically oriented versus cognitive behavioral therapy (CBT) for depression [6], process in *both* treatment groups was closely aligned with cognitive behavioral techniques. Conversely, in another investigation of CBT for depression [7], it was found that psychodynamic elements influenced both the course of treatment and the outcome [8].

To address this challenge, we elected to videotape all sessions and measure process using the Psychotherapy Q-Set (PQS) [9]. The PQS is a 100-item measure that describes the contributions of the patient, therapist, and patient–therapist interactions to the session. It addresses with considerable effectiveness many of the complexities encountered in the study of the therapy process and has been utilized in research for 25 years [10]. PQS ratings can not only determine the degree to which sessions adhere to a psychodynamic model of therapy, but can also provide discrete process measures that can be correlated with both symptomatic/functional improvement and corresponding changes in brain physiology (described more fully in Chap. 20).

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Selecting the Therapy: The Core Conflictual Relationship Theme Method

For the purposes of our study, we selected a brief manualized psychodynamic psychotherapy known as the Core Conflictual Relationship Theme (CCRT) method [11]. The therapy is limited to 16 individual sessions and is centered on a core, repetitive, interpersonal concern. The patients in our study present for treatment of depression; the core conflict identified early in the therapy may contribute substantially to the development and perpetuation of depression by interfering with the capacity for satisfying relationships in the person's life. The patient may be relatively unconscious of the CCRT, or may have some sense of this problematic and recurring theme, at the beginning of treatment.

The 16 sessions consists of three phases. In Phase I, "Demonstrating the Ubiquity of the CCRT" (sessions 1–4), the therapist and the patient together identify a CCRT that frequently causes difficulty in the patient's relational life. Although the CCRT describes maladaptive interpersonal functioning, it is derived empirically from "relationship episodes" described by the patient. In essence, it is a summary statement of the patient's experiences rather than a psychodynamic interpretation. A CCRT consists of three components: a wish in the context of a relationship, an actual or anticipated response from the "other" in the relationship, and the subsequent affective or behavioral response from the self (the patient). The goals of Phase I are to use the patient's own words to articulate the CCRT and to help the patient realize how ubiquitous this particular CCRT is in the patient's life.

In Phase II, "Working Through the Response of the Other" (sessions 5–12), the therapist and patient examine either the actual or anticipated reactions to the patient's identified wish, examining and challenging the patient's expectations of how the other will react. By doing so, the patient can learn to be motivated by intrinsic wishes/goals rather than potentially distorted fears of how others might respond. Work in this phase focuses on the patient's understanding that fear or anticipation of negative responses from others may be a distortion rooted in early childhood experience. Further, the patient comes to appreciate that he may play a role in eliciting actual negative responses from others, again because of early experiences with important others. The therapist conceptualizes the former as transference distortions and the latter as episodes of a repetition compulsion. Thus, Phase II relies strongly on psychodynamic concepts and an appreciation for the patient's developmental history. Phase II can also focus on the patient–therapist relationship itself, and indeed, the therapist is encouraged to identify and discuss transference episodes arising in the treatment that relate to the CCRT.

In Phase III, "Termination" (sessions 13–16), the therapist and patient focus on the upcoming conclusion of therapy. Termination issues, which are often difficult, are colored by the patient's CCRT. The therapist might even see the patient regress amidst the stress of termination, so the phase allows yet another opportunity to challenge underlying assumptions of the CCRT. Finally, the therapist and patient work to consolidate the gains made by the patient during treatment. To ensure a valid termination, the patient and therapist may not continue their working relationship beyond the last session, a point that is emphasized as needed by the therapist over the course of treatment. If the patient and therapist agree at the end of treatment that additional therapy is warranted, the patient is referred to a different psychotherapist.

Selecting the Patients and Therapists

The patients in the study are adults, between the ages of 18 and 60 years, with a diagnosis of major depressive disorder, according to the fourth edition of the Diagnostic and Statistical Manual for Mental Disorders-Text Revision [12]. Patients are evaluated using the Structured Clinical Interview (SCID) for DSM Disorders and must have a current depressive episode less than 5 years in duration. All patients come into the study having already started treatment with a Selective Serotonin Reuptake Inhibitor (SSRI), Serotonin Norepinephrine Reuptake Inhibitor (SNRI), or bupropion at adequate

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doses. At the time of the screening visit (to determine eligibility for the study), patients must have been on a stable dose of antidepressant for the past 4 weeks. Additionally, since changes in medication can result in changes in neural activity, patients who require medication adjustment during the study are discontinued from the study.

The reasoning behind including medicated patients was twofold. First, psychotropic medication use clearly affects brain physiology, as demonstrated by both functional neuroimaging and electroencephalogram (EEG) studies. For example, EEG studies have shown that SSRIs and SNRIs affect cordance, which is strongly associated with cortical perfusion, a measure of increased neural activity. Cook et al. [13] found that depressed patients who responded to treatment with either fluoxetine or venlafaxine showed significant decreases in prefrontal cordance measures from baseline when compared to medication non-responders or patients treated with placebo. Similarly, Leuchter et al. ([14], poster presentation at APA Annual Meeting, San Francisco, CA) demonstrated that treatment with venlafaxine results in significant decreases in QEEG cordance in the right frontocentral and left parietal regions among normal subjects; this effect was not observed in normal subjects treated with placebo. Given that one aim of the study is to investigate the effects of psychodynamic psychotherapy on the brain, we needed to limit the study to either medicated patients or non-medicated patients. Since studies have demonstrated that the most effective treatment for depression may be a combination of antidepressants and psychotherapy [15, 16], we elected to include only medicated patients.

To increase diagnostic homogeneity, individuals with a diagnosis of most major DSM-IV Axis I disorders other than major depressive disorder, presence or history of psychotic features, or a history of antidepressant-related mania are excluded. To ensure safety, women who are pregnant or with childbearing potential and not using a medically accepted means of contraception are excluded, due to potential harm of PET exposure on a developing fetus. Individuals with current serious safety risk (suicidal or homicidal) are excluded and appropriately referred. To increase the likelihood that the changes we observe are the result of our intervention, individuals who have had involvement in individual or group psychotherapy currently or in the past 6 months and electroconvulsive therapy (ECT) in the last 12 months are excluded. Those with a serious medical illness (e.g., unstable diabetes, kidney disease), including neurological illnesses (e.g., seizure or head trauma with loss of consciousness) are also excluded. In order to minimize confounding effects of medications or non-adherence with their antidepressants, we exclude patients taking other psychotropic agents (including benzodiazepines, anticonvulsants, antipsychotics, stimulants, and sedative hypnotics), or those who have a history of medication non-adherence. Patients with a history of more than three previous adequate (in the judgment of the screening psychiatrist) attempts at psychodynamic psychotherapy, which were considered unhelpful or unsuccessful (as reported by the patient), are excluded, as this history might reflect an inability to profit from/engage in psychodynamic treatment. Finally, patients with a severe personality disorder that would interfere with their ability to participate in treatment are excluded.

The psychotherapists for the study are faculty members in the Massachusetts General Hospital Outpatient Psychiatry Department, who self-identify as being psychodynamically oriented. All have at least 10 years of post-doctoral psychodynamic psychotherapy experience and, as a group, have an average of over 20 years of experience. An independent senior psychiatrist/psychoanalyst with experience in psychodynamic research and familiarity with the CCRT was included to oversee all of the treatments and provide supervision.

Symptom Relief

We administered several measures of psychological functioning at different times (Table 16.1 and Fig. 16.1) during the treatment to assess psychological changes over the course of the therapy. Some were patient rated and others were therapist rated.

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Table 16.1 Psychological measures

Psychological measure	Description	Therapist or patient rated	Subscales/types of items
28-Item Hamilton Rating Scale for Depression (HAM-D [28, 29])	Scale consisting of 28 items that aims to quantify the degree of depression in patients who already have a diagnosis of major depression	Therapist	None
Beck Depression Inventory (BDI [30])	Scale consisting of 21items that assesses the severity of affective, cognitive, and	Patient	Affective Cognitive Vegetative
The Clinical Global Impression Scales (CGI [31])	Scales used to measure symptom severity and treatment response	Therapist	CGI-severity CGI-improvement
Kellner's Symptoms Questionnaire (SQ [32])	A measure of symptoms of anxiety, depression, and hostility, as well as somatic symptoms	Patient	Depression, anxiety, somatic, anger, somatic wellness, content, relax, friendly
Cognitive/Physical Functioning Questionnaire (CPFQ [33])	Seven-item scale which measures various cognitive symptoms (e.g., inattentiveness and forgetfulness) and physical symptoms (e.g., fatigue and sleepiness)	Patient	Apathy, sedation, fatigue, inattentiveness, forgetfulness, word finding, mental slowing
Quality of Life, Enjoyment, and Satisfaction Questionnaire [22]	Measure of the quality of life and degree of enjoyment and satisfaction experienced by patients in various areas of functioning	Patient	Physical, feelings, work, house, school, leisure, social, general
Well-Being Scale [19]	Scale consisting of 54 items which measures six dimensions of psychological well-being taken from the literature	Patient	Positive relations with others Autonomy Environmental mastery Personal growth Purpose in life Self acceptance
Reflective Functioning Scale (RFS [21])	Scale which measures the patient's capacity to understand self and other as independently functioning	Therapist	Awareness of mental states Lack of explicit efforts to tease out mental states Recognition of developmental aspects of mental states

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Recall that one of the primary goals of psychodynamic psychotherapy is *symptom relief*. The patients enrolled in our study were in the midst of a major depressive episode and entered therapy to obtain relief from their depressive symptoms. So, we employed a number of measures to assess whether there was a reduction in depressive symptoms over the course of the therapy. These included the HAM-D, the BDI, the CGI severity subscale, and the SQ Depression subscale. As predicted by previous research using the CCRT [17, 18], we found a reduction in depressive symptoms on the HAM-D in one patient (Fig. 16.2).

Anxiety, apathy, and anger are other symptoms that are commonly co-morbid in major depression (reference), and we looked at these symptoms using the CPFQ apathy subscale, the SQ anxiety subscale, and the SQ anger subscale.

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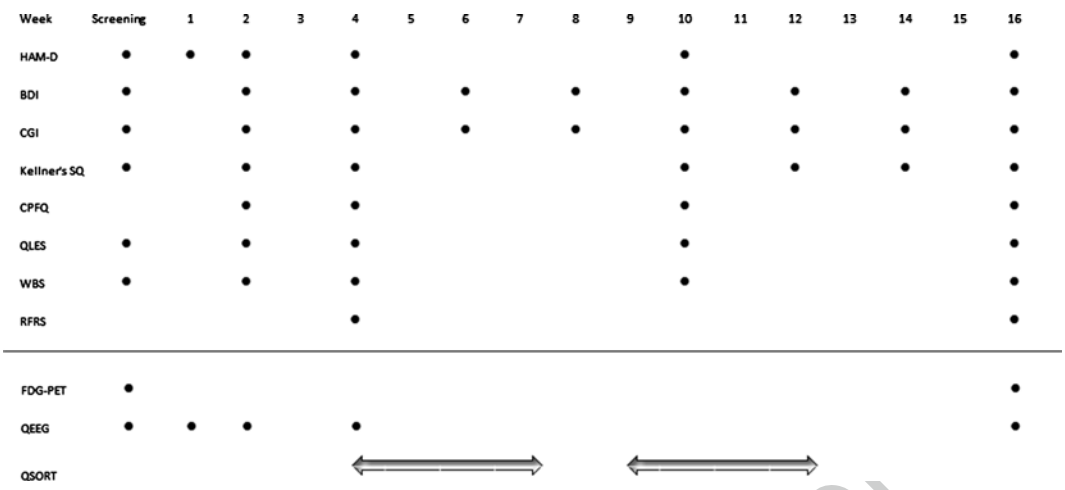

Fig. 16.1 Study timeline

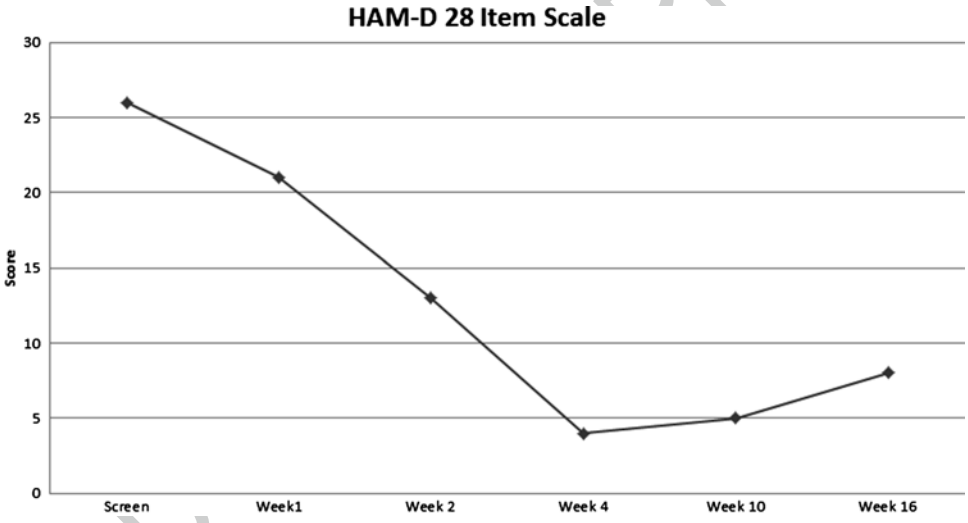

Fig. 16.2 Hamilton depression inventory 28 Item Scale: data from one patient

Agency, Identity, and Self-esteem

Now, let us consider some of the other goals of psychodynamic psychotherapy, in particular, the goals of helping the patient achieve an increased sense of agency, a better sense of identity, and improved self-esteem. Collectively, these goals aspire to help the patient develop a sense of personal psychological well-being. The individual who feels in control of her life, possesses a strong sense of self, a strong sense of purpose, and who truly accepts who she is, faults included, is an individual who is well prepared for the challenges that life brings. Ryff [19] has operationalized these components of personal psychological well-being in the subscales of the Well-Being Scale (WBS).

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The autonomy subscale of the WBS includes questions that assess an individual's sense of agency, sense of self, individuation, and identity. The environmental mastery subscale measures an individual's sense of competence in managing their environment, including organizing tasks, taking advantage of opportunities, and tailoring the environment to suit one's needs. The sense of competence in managing one's environment is closely related to agency, specifically the sense that locus of agency is within oneself and not in one's environment. The self-acceptance subscale of the WBS measures the individual's ability to recognize and accept their positive as well as their negative qualities. In McWilliams' framework [3], self-acceptance corresponds to self-esteem.

The Capacity for Work

Another goal of psychodynamic psychotherapy outlined earlier is attaining or increasing the capacity for work. The capacity for work arises out of a balanced understanding of what is in one's power to change and speaks to having a sense of purpose or meaning in life. Ryff's WBS [19] contains two subscales, the personal growth subscale and the purpose in life scale which begins to address the goal of attaining or increasing the capacity for work.

The personal growth subscale of the WBS is a measure of an individual's sense of his or her capacity for growth and improvement, as well as a sense of realizing one's true potential.

The purpose in life subscale of the WBS measures an individual's sense of directedness and goals in life, a sense of meaning in life.

Interpersonal Understanding and the Capacity for Love

Recall that the capacity to love grows out of the ability to appreciate not only one's own complexities and shortcomings but those of others in the purpose of building and maintaining healthy relationships. It requires being able to reflect on what might be motivating others actions, namely their thoughts and feelings (i.e., mental states) as well as an awareness of the social and societal factors which affect others' thoughts and feelings. This capacity has been called the capacity for mentalization [20]. Levy et al.'s [21] Reflective Function Rating Scale (RFRS), derived from Fonagy's work, captures these essential elements. The RFRS consists of three subscales, one which assesses *awareness of the nature of mental states*, a second which assesses the failure or *lack of explicit efforts to tease out mental states underlying behavior*, and one which assesses *recognition of the developmental aspects of mental states*, which corresponds roughly to an appreciation of the social and societal factors affecting mental states. Interestingly, Ryff's WBS [19] also contains a subscale that assesses positive relations with others; the capacity for love in action.

Insight and the CCRT

In case the reader thinks we have forgotten that goal which is central to analytically oriented therapies, namely *insight*, we have not. While there is no scale by which we might measure insight, one indication of insight is the patient's contribution to their CCRT formulation and the work to examine and challenge the reasons for their expected responses from others. This can be assessed by examining the Psychotherapy Q-Sort during sessions 5–16. Also, arguably, some of the psychological measures that assess the ability to relate to other others (WBS – Positive Relations with Others

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Subscale, the RFRS subscales, which assess the ability to reflect about one's own mental states and those of others, the QLES Social Subscale, etc.) provide an indirect measure of insight at work, especially given the CCRTs focus on interpersonal functioning.

Quality of Life

We are now left with discussing just two of the goals of psychodynamic psychotherapy outlined earlier: attaining or increasing *ego strength and cohesion*, and achieving *serenity*. Similar to insight, ego strength and cohesion might best be assessed by a close look at the patient's contributions to the work to examine and challenge the reasons for and content of the patient's expected responses from others. Do they persist in distorting realities or can they accept realities, and can they be thoughtful rather than impulsive?

Serenity is arguably the loftiest and the most difficult to assess of the goals of psychodynamic psychotherapy. In fact, one might say the ultimate goal of psychodynamic psychotherapy is *serenity*, which can only be achieved by progress in the other goals outlined. While we cannot measure serenity itself, which requires the test of time, we can assess a patient's quality of life and satisfaction with life, which arguably increases the chances of achieving *serenity*. Endicott's Quality of Life, Enjoyment, and Satisfaction Questionnaire [22], as the name of the questionnaire suggests, was developed with assessing a patient's quality of life, enjoyment, and satisfaction in mind. Importantly, research into those factors that contribute to a patient's sense of quality of life revealed that illness-specific symptoms explained only a small to modest percentage of the variance, and that factors such as personality dimensions (e.g., resilience), resources that allow access to enjoyable activities, greater social supports, and degree of life success or attainment of life goals contribute considerably to overall quality of life [23].

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Assessing Neural Correlates of Change

An essential question is whether the changes in psychological functioning brought about by the brief course of psychodynamic psychotherapy in the patient described reflect changes in brain function. This is one of several reasons to investigate neural correlates of the psychological change brought about by psychodynamic psychotherapy. But, additionally, information about how psychodynamic psychotherapy affects the brain is potentially invaluable for patients and clinicians. It might be used to guide treatment choice, as information about baseline brain activity might be useful to guide us about those patients who stand to benefit most from psychodynamic psychotherapy as opposed to another type of therapy. It has the potential to provide a concrete, objective measure of improvement during the course of therapy. Finally, it reinforces the notion that psychotherapy has a biological substrate and places it in the same category as other "medical" treatments that induce measurable changes in physiology, biochemistry, or morphology. Empirical support for this notion could make a powerful contribution to combating the residual stigma associated with psychotherapy (and psychiatric treatment in general) that incurs hesitation in many potential patients, prevents the achievement of parity with other medical treatments, and nurtures an unfounded skepticism and mistrust within some elements of culture and society.

To examine neural changes brought about by the course of psychodynamic psychotherapy in our study, we used ^{18}F FDG PET. ^{18}F FDG PET is a nuclear medicine imaging technique which measures metabolic function, i.e., which brain areas are more active at a given time. We selected PET, as opposed to other modes of neuroimaging frequently used in the research literature such as functional

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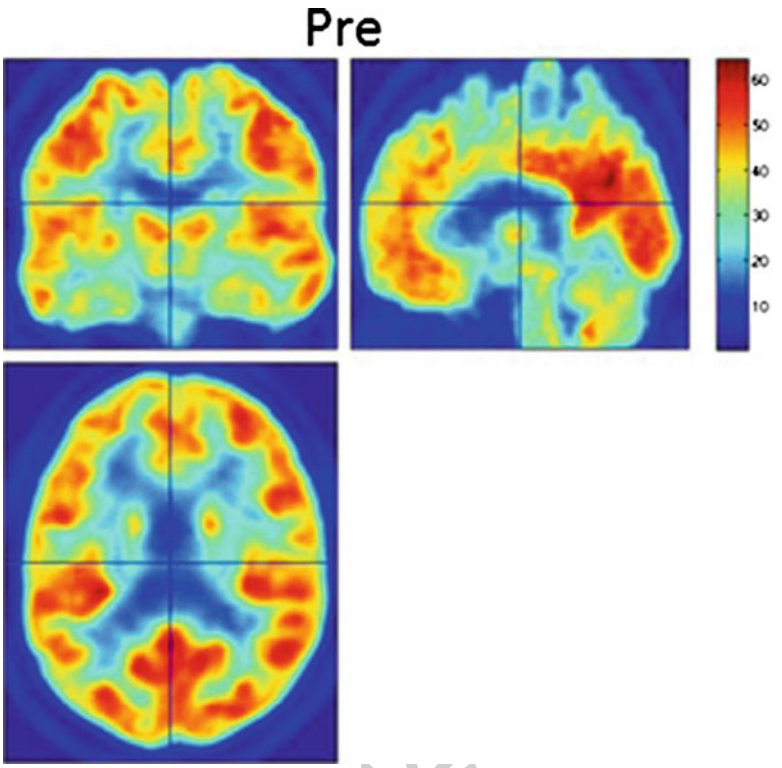

Fig. 16.3 ^{18}F FDG PET brain scan prior to starting psychotherapy (pre-treatment)

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magnetic resonance imaging (fMRI), because of its established use as a clinical imaging modality, ease of administration, relative non-invasiveness, and relatively straightforward analysis.

In our study, a baseline resting state scan is performed just prior to initiation of psychotherapy. A follow-up resting state scan is performed within 2 weeks of the last psychotherapy session. Patients who terminate treatment before their week 10 psychotherapy appointment are not eligible to complete their second scan. Here, we present sample baseline data from a patient undergoing the pre-treatment scan (Fig. 16.3). The colors in the heat map correspond to the degree of brain activity, with warmer colors indicating more activity.

As more data are collected, we plan on carrying out a preliminary analysis that will identify regions-of-interest (ROI) by contrasting regional cerebral metabolism averaged among 15 patients (grouped as responders to treatment and non-responders to treatment) with that of ten previously acquired scans from healthy subjects matched for age and gender. Statistical parametric maps will be inspected to identify foci of significant differences between groups. These foci will be used for subsequent ROI analysis within the depression cohort. Based on previous studies of depression (Chaps. 10 and 11), it is anticipated that these ROIs will reflect between-group differences in prefrontal and limbic regions. We will also be able to correlate changes in brain activity within these regions with changes in symptom scores, process variables (measured with the PQS), and measures of therapeutic alliance.

In addition to using ^{18}F FDG PET to look at resting state neural activity before and after the brief course of psychodynamic psychotherapy, we are also using Quantitative Electroencephalography (QEEG) to measure electrical patterns of activity at the surface of the scalp, which in turn reflect cortical electrical activity. In recent years, studies have shown differences in absolute and relative power of QEEG signals between responders and non-responders to antidepressant treatment [24, 25] and

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demonstrated the utility of serial QEEG assessments early in treatment to predict eventual clinical response to SSRI antidepressants [26, 27]. We are interested in whether patterns found in QEEG measurements recorded early in the course of psychotherapy can predict with some useful level of accuracy the likelihood of response to a brief course of psychodynamic psychotherapy.

At the study's completion, we hope to correlate the neural changes with the psychological changes assessed by the different measures of psychological functioning detailed previously in this chapter, as well as with therapy process as assessed by the Psychotherapy Process Q-Set. This will serve to inform us about the relationship between the effects of psychodynamic psychotherapy on psychological functioning and its effects on the brain, which will in turn help shed insight on the mechanisms of change in psychodynamic psychotherapy.

Conclusion

In this chapter, we provided an overview of an ongoing study of the psychological and neural correlates of brief psychodynamic psychotherapy. The study represents a multidisciplinary effort drawing upon psychodynamic theory, psychology, clinical trials, functional neuroanatomy, neuroimaging, and neurophysiology, using many of the building blocks detailed in other chapters in this book. Our hope is that research efforts such as this will greatly enhance our understanding of how psychodynamic psychotherapy affects psychological and related neural function. Moreover, in this new era of individualized medicine, the use of baseline characteristics to predict response to specific treatments may help optimize treatment selection: for example, patients with certain patterns of brain physiology at the time of diagnosis may be expected to do better with one form of treatment or another, as has been demonstrated in studies comparing behavior therapy to pharmacotherapy for obsessive compulsive. Finally, we hope that, by providing a new biological context for psychodynamic psychotherapy using state-of-the art tools from clinical neuroscience, we may reduce some of the barriers that prevent its use among the very patients who would benefit most from this time-honored form of treatment.

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