

## Medication Titration

Neuroimaging researchers using PET and SPECT have also demonstrated reliable measures of in vivo occupancy of dopamine D2 receptors by antipsychotic medications. It has been shown with the use of this imaging that the amount of D<sub>2</sub> receptor occupancy is related to clinical response as well as side-effects.<sup>46</sup> When the D2 receptors are greater than 65% occupied with the D2 antagonists, a clinical response to the anti-psychotic medication is observed. When the D2 receptors are 72% occupied, hyperprolactinemia is found. When the D2 receptors are blocked at 78%, extrapyramidal side-effects occur. Research suggests that near-future clinicians may use PET and SPECT as a tool in titrating antipsychotic medications to therapeutic dose thresholds below which medication-induced adverse effects would be expected and thereby avoided.<sup>47</sup>

## Mapping Genetic Risk

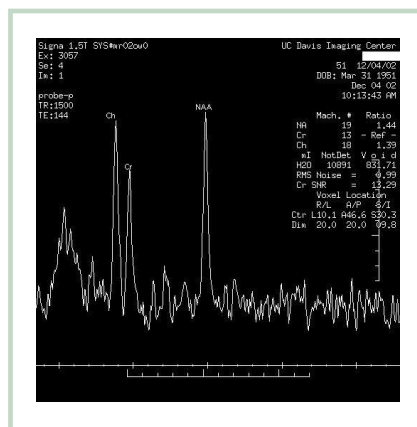
Structural aspects of brain development are under strong genetic regulation. Certain structural brain patterns associated with genetic risks are called genetic brain maps.<sup>48</sup> Researchers have mapped neuroimaging patterns of genetically influenced brain development in schizophrenia.<sup>49</sup> When a potential genetic risk for schizophrenia is known (ie, positive family history of schizophrenia), neuroimaging can be used to identify

patterns of brain maturation associated with the development of schizophrenia. In the near future this technique may be used for early detection and treatment of schizophrenia.

## DISCUSSION

In the 5th century BCE “the father of medicine,” Hippocrates, insightfully observed, “from the brain, and from the brain only, arise... our sorrows, pains, griefs, and tears... It is the same thing which makes us mad [psychotic].”<sup>50</sup> Similarly, from its initial description in modern medicine by Kraepelin in 1896, schizophrenia (then termed dementia praecox) was considered a brain disorder.<sup>51</sup> Alzheimer, also convinced that this was a disorder of the brain, searched for the neuropathology of schizophrenia.<sup>52</sup> Bleuler first coined the term schizophrenia in 1911 and furthermore recognized the heterogeneity of the disorder in describing the “group of schizophrenias.”<sup>53</sup> Schizophrenia is likely a syndrome of several related disorders<sup>54</sup> and this heterogeneity has made the search for the neurobiology challenging. The *Diagnostic and Statistical Manual III* greatly helped to better define schizophrenia by providing researchers with standard diagnostic criteria of this disease, thereby narrowing the search for its underlying pathology. For many years neurobiologic schizophrenia research was considered a “graveyard” for researchers,<sup>55</sup> and many simply dismissed schizophrenia as a “functional disorder” or

## MAGNETIC RESONANCE SPECTROSCOPY (MRS) SPECTRUM



**Figure 6**

(Nordahl TE, UC Davis Imaging Center. Permission from Nordahl TE)  
Kile SJ. *Mental Fitness*. 2004;3(3):24-31.