Biomarkers in Cerebrospinal Fluid Predict Alzheimer's Disease

August 11, 2010 — Cerebrospinal fluid contains important information that should be part of the clinical diagnosis and care of patients with mild cognitive impairment, report researchers. Using lumbar punctures, investigators identified 3 biomarkers that predict who is most likely to develop Alzheimer's disease. Researchers detected a signature of low cerebrospinal fluid levels of β-amyloid 1-42, high total tau protein, and elevated phosphorylated tau_{181P}. Overall, the diagnostic sensitivity was 90% for Alzheimer's disease with a specificity of 64%. These results were consistent in 3 independent data sets. The investigators, led by Geert De Meyer, PhD, from Ghent University in Belgium, point out that the unexpected presence of these biomarkers in more than a third of cognitively normal subjects suggests that Alzheimer's disease is "active and detectable earlier than has heretofore been envisioned."

Commentary by Dr. Frank Hernandez:
August 14, 2010 - The search for elegant and economic markers for mental health conditions is a perennial quest of any clinician invested in assisting his / her patients in a most expeditious and efficient manner. Unfortunately, faster and fancy is not always better. Although the allure of neuroimaging or other biological markers is always popular with both professionals and the lay public, the statistical power behind new technologies should always be scrutinized before we responsible endorse them. For decades now, many available biomarkers have immensely enhanced the fields of neurology, psychiatry, neuropsychology, and many others. Its contributions are countless. Although it is feasible that one day these techniques will also be able to make even faster diagnosis of conditions such as Alzheimer's Disease, it is imperative to see the technique as contributory to such efforts but not as a replacement of more comprehensive and accurate methods. Perhaps it should be remember that at the core of every diagnostic decision there are risks that center on the well-known statistical concepts of Type I and Type II errors. Summarizing, it is not only important to be able to accurately say when a patient has a condition but also to be able to have a certain degree of confidence when ascertaining that a patient does NOT have a condition. In this article, the stated specificity and sensitivity aspects of the exam allows us to create such a level of confidence. Unfortunately, the stated sensitivity (90%) and specificity (64%) of these new biomarkers just do not yet compare favorably to other available methods available to explore the probabilities of the presence of Alzheimer's Disease. To cite just one of the many sources in the literature, research shows that the Mattis Dementia Rating Scale has sensitivity rates of 98% and specificity rates of 97%.

The authors of the current article also comment on the possible "cost-benefit" of this new tool. The claim that "In most centers, the consulting physician's bill, the charge for neuropsychological testing, and the cost of a magnetic resonance brain scan are all greater than obtaining cerebrospinal fluid values." In my opinion, they fail to mention that the cost of the referring physician would also have to be included in any cost-benefit equation used to claim that this new biomarker is indeed more economical. Furthermore, magnetic resonance brain scans are not required while performing an adequate neuropsychological battery and should not be calculated as a necessary expense while performing neuropsychological testing. Therefore, to that extent, the cost benefit argument to me seemed misleading.

Neuropsychologists and neuropsychology in general should welcome, embrace, and become well--versed in the biomarkers studies currently in progress. Nevertheless, it is important to keep in mind that faster and better (albeit a formidable goal) should not dissuade specialists from seeking to obtain comprehensive assessments via a thorough neuropsychological examination.