Abstract:
Recent studies using neuroimaging techniques as PET or MRI have shown that the cingular gyrus is implicated in attentional orientation. Electrophysiological studies often use oddball paradigms in which subjects are presented with deviant stimuli amongst a train of standards. The N2-P3 components generally elicit are functionally related to attentional orientation. In this study, normal controls and patients with depression, dementia, alcoholism disorder and schizophrenia (40 groups by subject) were confronted with a classical auditory oddball design. 3D-localization algorithms (MUSIC and LORETA) were applied on the N2-P3 complex. The results suggest that (1) the cingular gyrus may be a main generator site; and (2) schizophrenic patients present a pattern significantly different from all the other groups, thereby suggesting the involvement of a markedly different brain network when they have to orient their attention to a target. We discuss also the opportunity of those 3D analysis and modelling in clinical routine.

Introduction:
Electrophysiological graphs, EEG and EP, is intricate for the non-invasive characterization of brain function. Scale electric potential distributions are a direct consequence of inter-neural currents associated with neuronal firing and can be measured in discrete recording sites on the scalp surface over a period of time. Estimation of the location and distribution of current sources within the brain from the potential recorded on the scalp (i.e., source localization) requires the solution of an inverse problem. This problem is posed in the standard form: sensitivity, specificity, in solution is not necessarily unique. Physically, this is a consequence of the linear superposition of the electric field. Specifically, different internal source configurations can provide similar external electromagnetic fields. Additionally, it is a finite number of measurement of scalp potential are available, increasing the ill-posedness of the problem. There exist several different approaches to solving the source localization problem; initial, most of these were implemented on a non-finite model of the head. These methods, which are especially designed for their ability to estimate the location of a single or a small number of sources, have been developed, and then applied, to problems of some clinical series. The source localization problem is still controversial in clinical medicine, however, the desire to know the source of excitation in the brain is one of the most promising methods involves the measurement of an orientation complex linked to the task and the detection of an abnormal stimulus (target). Numerous PET scan studies have shown that the cingulate cortex has an important role in attentional orientation. In this study, normal controls and patients with depression, dementia, alcoholism disorder and schizophrenia (40 groups by subject) were confronted with a classical auditory oddball design. 3D-localization algorithms (MUSIC and LORETA) were applied on the N2-P3 complex. The results suggest that (1) the cingular gyrus may be a main generator site; and (2) schizophrenic patients present a pattern significantly different from all the other groups, thereby suggesting the.

Conclusion:
3. Analysis by source localization and diffusion (MUSIC) can “relatively” discriminate between patient groups for both the N2 and P3 components and in a lesser extent for the P3b.
4. The results suggest that the cingular gyrus may be a main generator site in the normal group.
5. This algorithmic analysis cannot give univocally the precise localisation of the neural networks and generators which activity is reflected by the P300 measured on the scalp.
6. MUSIC and LORETA analysis don’t give the same localization for both the N2-P3 components.
7. On the other hand, the methodological errors and bias are applied to all the patient groups make us believe that this methodology can be use as a complement to other analysis. In this way source localisation (MUSIC) can increase the sensitivity and the specificity of CEPs to discriminate between groups and individual patients in pathology.