

ASYMMETRY OF THE BRAIN IN SCHIZOPHRENIA

*Falkai P, *Ovary I, Bogerts B*

Department of Psychiatry , University of Düsseldorf, Bergische
Landstrasse 2 , 4000 Düsseldorf 12 , FRG

* Department of Neuropathology, Köves u. 2 - 4 .
1204 Budapest , Hungary

The history of asymmetry of the Human brain reaches as far back as to the discovery of aphasia as a disease process of one brain hemisphere .

Kraepelin was one of the first who thought about neuropathological changes in endogenous-psychosis. But it took about 70 more years to establish this idea. Today they are several well controlled morphometric post-mortem studies giving evidence of pathological changes in the limbic system of schizophrenics (Bogerts 1982,1984,1985, Brown et al 1986 , Jakob and Beckmann 1986 , Kovelmann and Scheibel 1984). Nearly all studies were done on only one hemisphere , which meant that a comparison of both hemispheres was not possible so far. On a completely new set of whole brain sections from 20 schizophrenic patients and 20 age-and sex-matched controls we determined the volume of the hippocampal formation and amygdala planimetrically. The volume of the hippocampus was significantly reduced in both hemispheres in the

schizophrenic group by approximately 35 % . whereas the amygdala showed no difference compared to the controls (Bogerts et al. personal communications). Crow and his team filled the lateral ventricle of 19 formalin-fixed brains of schizophrenic patients and 23 controls with radio-opaque material (urographin 150) to obtain an X-ray image of the ventricle from the lateral aspect. He found that on the right side of the brains the difference between the schizophrenic and control groups in temporal horn area was negligible ; on the left side however it was in excess of 130 %. It was concluded that the structural changes in schizophrenia have an affinity for the temporal region selective to the left hemisphere (Crow et al 1989).

CT-and MRI-studies confirm this finding of asymmetry in the brains of schizophrenics. In the CT scans of 54 schizophrenics and 54 controls matched for age and sex , we found the left Sylvian fissure most enlarged on several levels (by 79-233 %) , followed by the right Sylvian fissure (42-96%) (Bogerts et al. 1987). In a recent study we measured the anterior horn of the lateral ventricle planimetrically on two CT-levels in 150 schizophrenic patients and 150 age-and sex-matched controls. The left anterior horn area was significantly enlarged in the schizophrenic group (Falkai et al 1989).

Finally Delisi et al (1988) found a significant volume reduction of the limbic complex - meaning the amygdala plus the hippocampal formation - in both hemispheres in the MRI's of schizophrenics. Lack of gliosis and a lateralized volume reduction of temporal lobe structures reflects an arrest of cerebral growth in this region. Handedness and the asymmetries in the brain to which it relates are a late evolutionary development; they may be

controlled by a single gene. Thus schizophrenia could result from an anomaly of this specifically human gene (Crow et al. 1989).

LITERATURE

Bogerts B, Meertz E, Schönfeld-Bausch R(1982 and 1984) Morphometrische Untersuchungen an Gehirnen Schizophrener. Talk given at the 2nd Kongress of the German Society of Biological Psychiatry, Düsseldorf 1982; published in: Hopf A (editor) Biological Psychiatry, Springer Berlin, 1984, pp 227-233

Bogerts B, Meertz E, Schönfeld-Bausch R(1985) Basal ganglia and limbic system pathology in schizophrenia. Arch Gen Psychiatry 42:784-791

Bogerts B, Wurthmann C, Piroth HD(1987) Hirnsubstanzdefizit mit paralimbischem und limbischem Schwerpunkt im CT Schizophrener. Nervenarzt 58:97-106

Brown R, Colter N, Corsellis JAN, Crow TJ, Frith CD, Jagoe R, Johnstone EC, Marsh L(1986) Post-mortem evidence of structural brain changes in schizophrenia. Differences in brain weight, temporal horn area and parahippocampal gyrus compared with affective disorder. Arch Gen Psychiatry 43:36-42

Crow TJ, Ball J, Bloom SR, Brown R, Bruton CJ, Colter N, Frith CD, Johnstone EC, Owens DGC, Roberts GW(1989) Schizophrenia as an Anomaly of Development of Cerebral Asymmetry. (Science submitted)

Delisi L, Dauphinais D, Gershon ES(1988) Reduced volume of limbic complex in schizophrenia. Schiz.Bull. 11:243-48

Falkai P, Bogerts B, Klieser E, Waters H, Schlüter U, Klimke A, Mooren I(1989) Erweiterung des Unterhornes im CT Schizophrener. Ein Hinweis auf eine limbische Pathologie? (Psycho submitted)

Jakob J, Beckmann H (1986) Prenatal developmental disturbances in the limbic allocortex in schizophrenics. J Neural Transmission 65: 303-326

Kovelmann JA, Scheibel AB(1984) A neurohistological correlate of schizophrenia. Biol Psychiatry 19: 1601-1621