

Schizophrenia

Biological Explanation



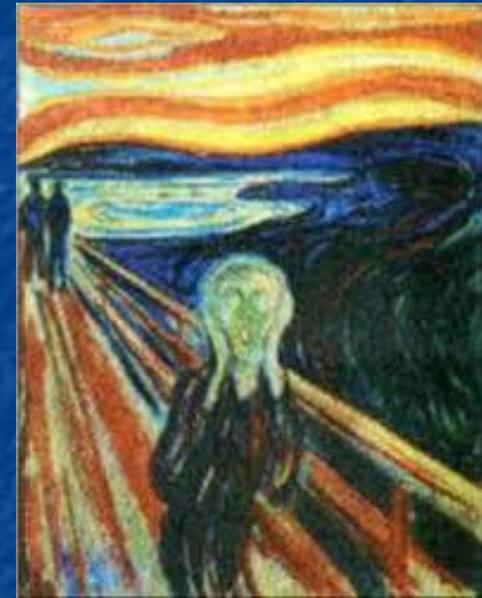
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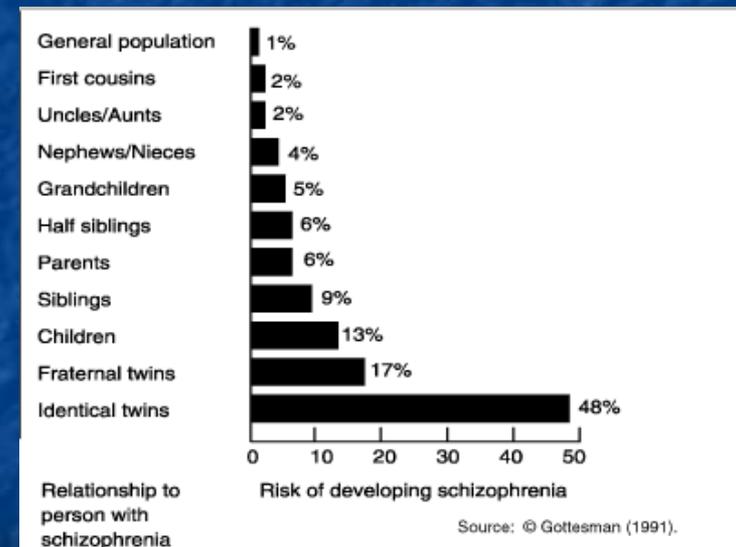
Schizophrenia: Prevalence

- Prevalence of schizophrenia is the same all over the world (about 1%)
 - Supports a biological view as prevalence does not vary with environment
 - However, there **are** variations within broad geographical areas (e.g. Torrey 2002 Croatia & Ireland)
- Risk factors include low SES, minority ethnicity, urban residence - Urbanicity data

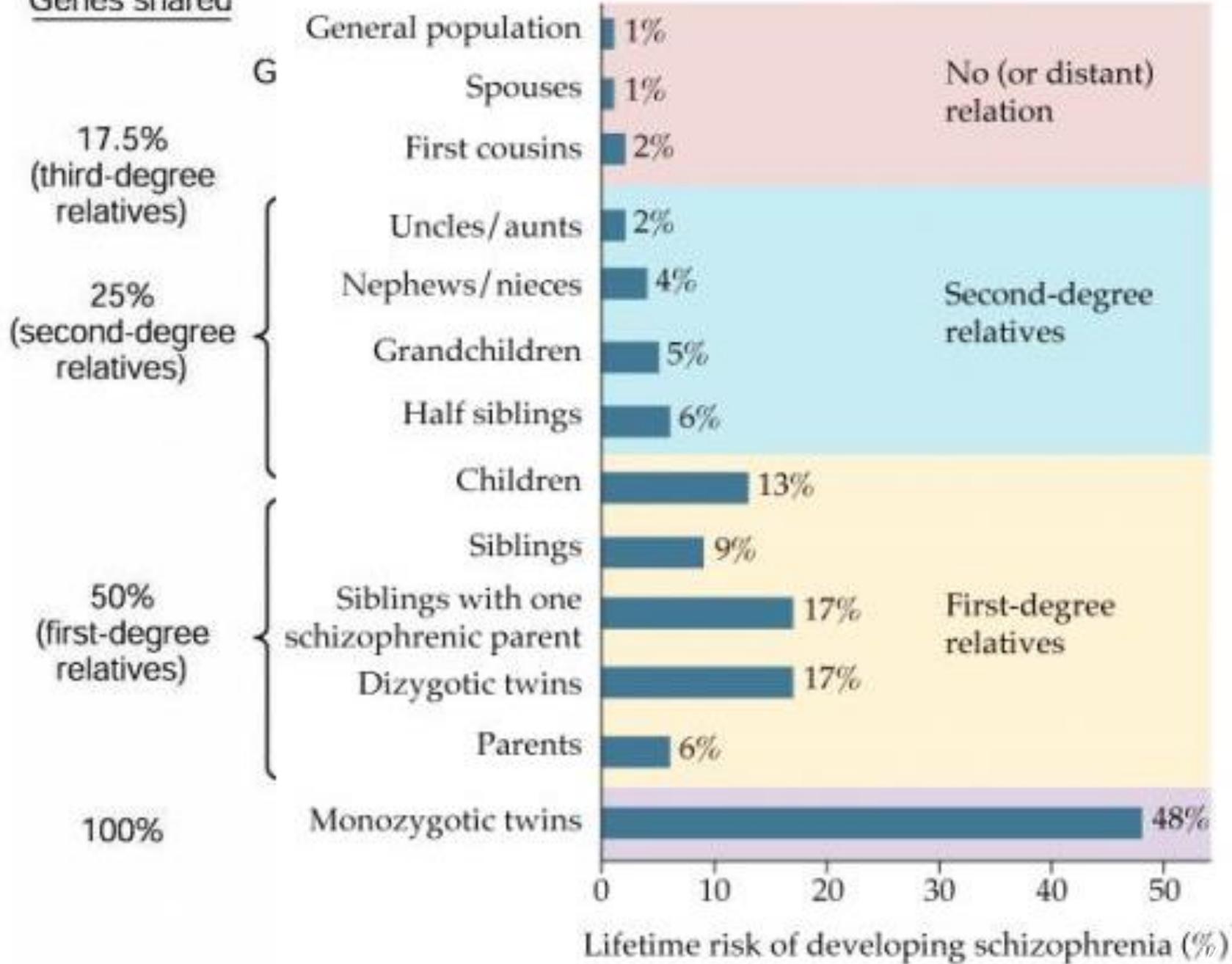


Schizophrenia: Prevalence

- Kendler et al (1985) found that 1st degree relatives of those with schizophrenia are **18 times** more at risk than the general Population
- Children with both parents who suffer from schizophrenia have a **CONCORDANCE RATE** of 46%



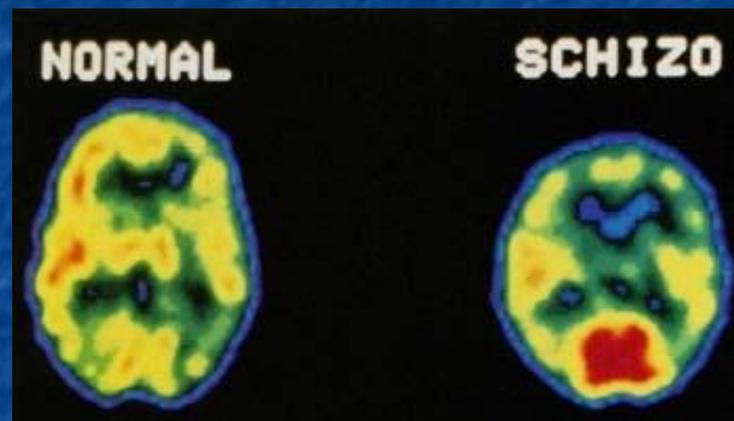
Genes shared



Source: Gottesman (1991)

Schizophrenia: Genetics

- Risk rises with degree of genetic relatedness
 - Spouse – 1% (same as G.P.)
 - Child – 13%
 - DZ twin – 17%
 - MZ twin – 48%
- Effect of shared environment?



SCHIZOPHRENIA IN IDENTICAL TWINS

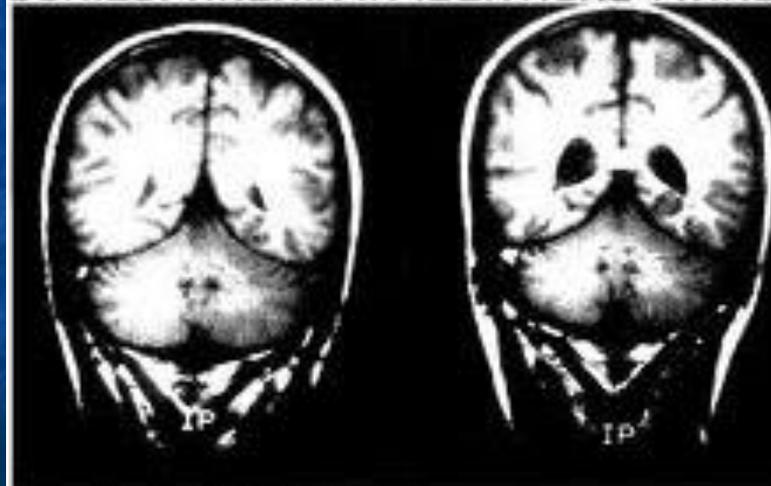


Photo courtesy of Drs. W. Pater Torrey and Carlos Wessinger.

MRI scans of 28-year-old male identical twins showing the enlarged brain ventricles in the twin with schizophrenia (right) compared to his well brother (left).

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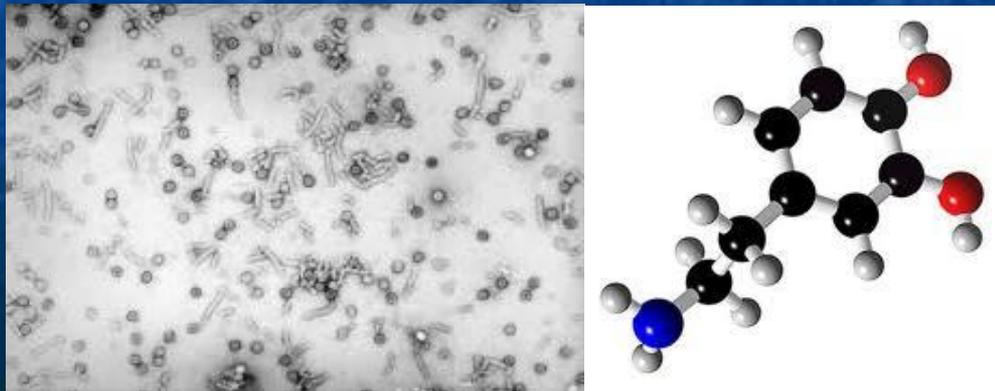
Schizophrenia: Genetics

The Copenhagen High-Risk Study (Kety *et al.*)

- Kety identified 207 offspring of mothers diagnosed with schizophrenia (high risk) along with a matched control of 104 children with 'healthy' mothers (low risk) in 1962
- Control group were matched on age, gender, parental socio-economic status and urban/rural residence. Children aged between 10-18 years at start of study

Schizophrenia: Genetics

- Schizophrenia diagnosed in 16.2% of high risk group compared to 1.9% in low risk group
- Sherrington found that **chromosome 5** has evidence of susceptible schizophrenia.



Schizophrenia: Genetics

- To research more on the impact of genetics on schizophrenia, we can compare concordance rates for identical (**MZ**) and fraternal (**DZ**) twins
- Both share the same environment but only MZ twins have identical genetics – if schizophrenia is genetically related, the concordance rate of schizophrenia should be much higher in MZ twins.
- To prove this many studies have been conducted – ALL OF THEM show much higher concordance rate in MZ than DZ twins

Schizophrenia: Genetics

- To prove the genetic influence further, you have to research the power of genetics in separate environments
- Researchers have sought out MZ twins reared apart where at least 1 has been diagnosed with schizophrenia
- Gottesman used the Maudsley twin register and found 58% (7/12 MZ twins reared apart) were concordant for schizophrenia



Schizophrenia: Genetics

■ Adoption studies

	Prevalence amongst biological relatives	Prevalence among adoptive relatives
Kety et al (1968) schizophrenia only	13%	2%
Tienari et al (1994) all 'severe' psych. diagnoses	30%	15%

Schizophrenia: Genetics

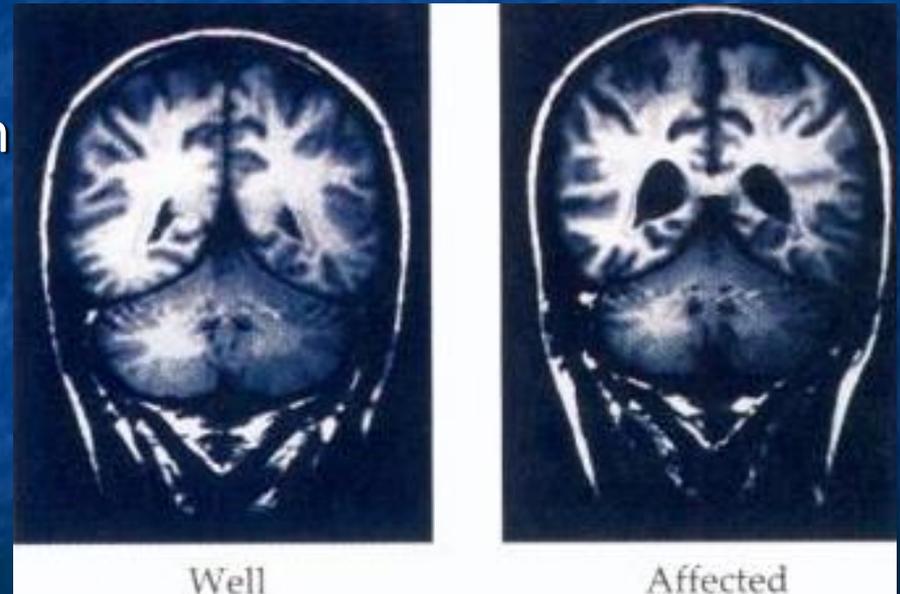
- Substantial evidence for a genetic contribution
- Some evidence disputed:
 - Shared environment issues
 - Diagnostic criteria in adoption studies
- All the evidence also suggests environmental triggers

Schizophrenia: Genetics

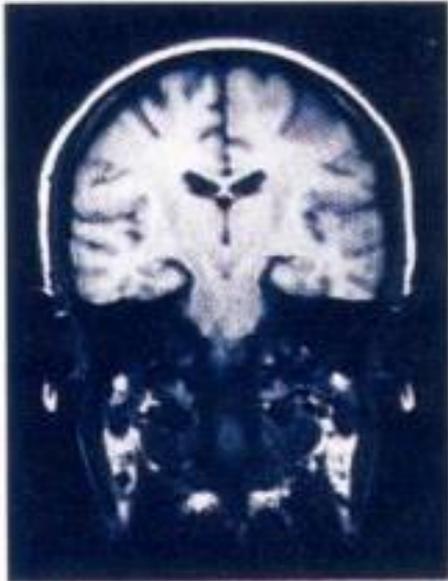
- Although twin, adoption and family studies continue to support that the degree of risk of developing schizophrenia increases with degree of genetic relatedness, there are two factors which stop us concluding biology as the source;
- No twin study has yet shown 100% concordance in MZ twins
- Studies conducted so far don't tell us which genes might be important for the transmission of schizophrenia.

Brain Structure

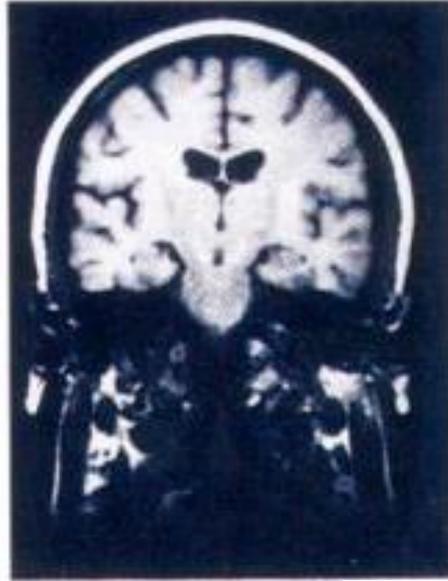
- Using PET, MRI and Cat scans researchers have discovered that many schizophrenics have enlarged ventricles, cavities in the brain that supply nutrients and remove waste.
- The ventricles of a person with schizophrenia are on average about 15% bigger than normal (Torrey, 2002).



35-year-old female identical twins



Well



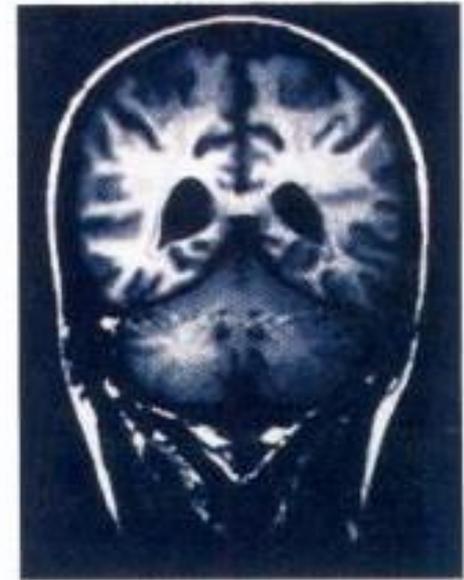
Affected

Ventricular Enlargement

28-year-old male identical twins



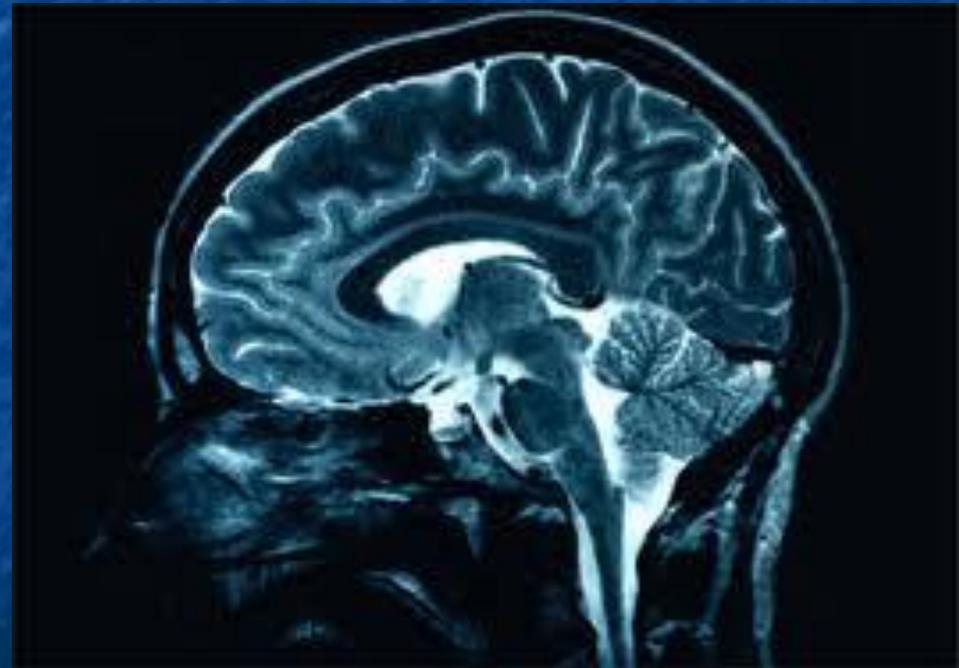
Well



Affected

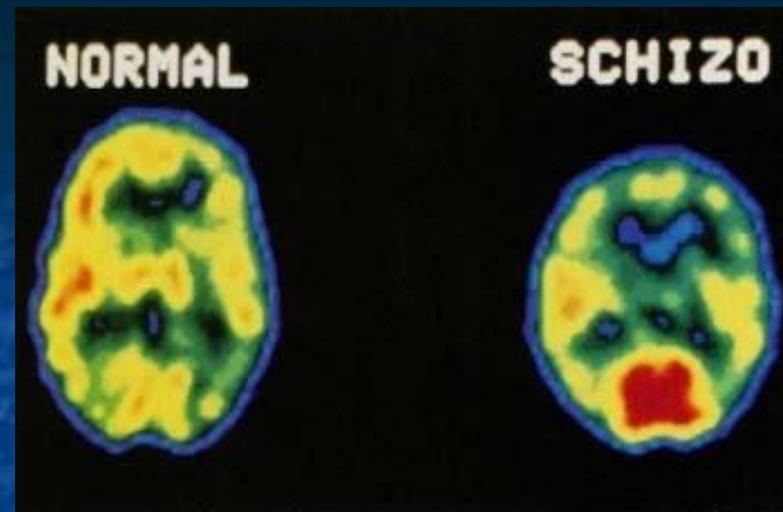
Brain Abnormalities

- Brown et al. (1986) found decreased brain weight and enlarged ventricles, which are the cavities in the brain that hold cerebrospinal fluid.
- Flaum et al. (1995) also found enlarged ventricles, along with smaller thalamic hippocampal and superior temporal volumes.



Brain

- Buchsbaum (1990) found abnormalities in the frontal and pre-frontal cortex, the basal ganglia, the hippocampus and the amygdala.
- As more MRI studies are being undertaken, more abnormalities are being identified.
- Structural abnormalities have been found more often in those with negative/chronic symptoms, rather than positive/acute symptoms, lending support to the belief that there are two types of schizophrenia: **Type 1 (acute)** and **Type 2 (chronic)**.



Cellular Disarray

(f) Normal control



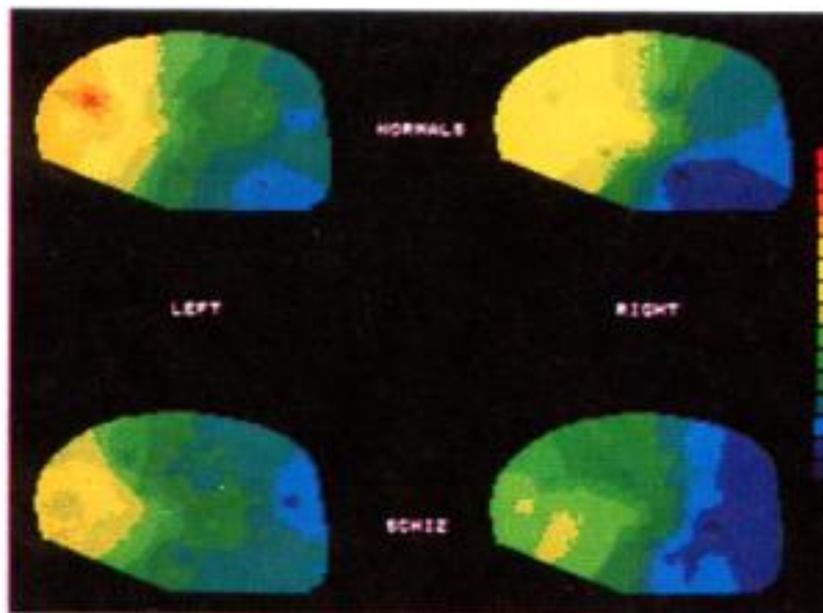
(g) Schizophrenic patient



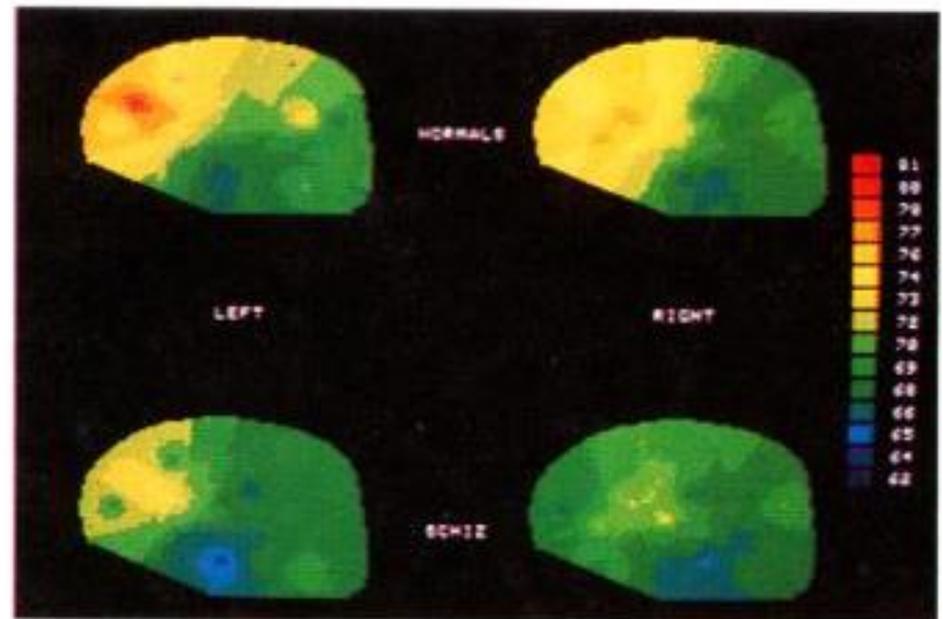
**16.5 Cellular Disarray of the Hippocampus
in Chronic Schizophrenia**

Hypofrontality

(a) At rest



(b) During Card Sort test



Brain Abnormalities Evaluation

- Research into enlarged ventricles and neurotransmitter levels have **high reliability** because the research is carried out in highly controlled environments, which specialist, high tech equipment such as MRI and PET scans.
- These machines take accurate readings of brain regions This suggests that if this research was **tested and re-tested** the same results would be achieved.

Brain Abnormalities Evaluation

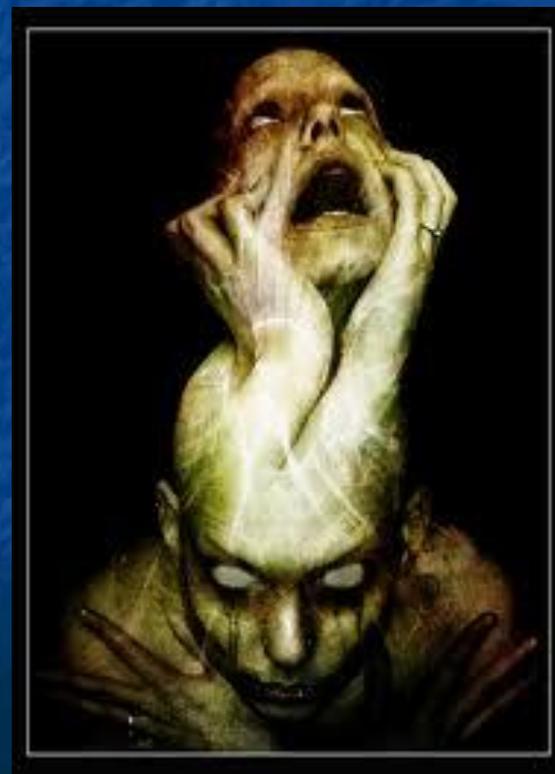
- **Suddath et al.** (1990) used MRI to obtain pictures of the brain structure of MZ twins in which one twin was schizophrenic.
- The schizophrenic twin generally had more enlarged ventricles and a reduced anterior hypothalamus.
- The differences were so large the schizophrenic twins could be easily identified from the brain images in 12 out of 15 pairs. This suggests that there is **wider academic credibility** for enlarged ventricles determining the likelihood of schizophrenia developing.

Brain Abnormalities Evaluation

- Beng-Choon Ho (2010) in a longitudinal correlational study of 211 schizophrenics found that antipsychotic drugs have measurable influence on brain tissue loss over time.
- This was supported by Lewis (2009) who administered antipsychotic drugs to primates and found a brain volume loss of 10% .
- However this was a correlational study so it does not show cause and effect and this study was carried out on animals so we cannot extrapolate to humans without caution.

Brain Abnormalities Evaluation

- If the reduction in brain volume is the cause of the schizophrenic symptoms then it cannot explain why after 30 years of the initial onset, **35%** of the schizophrenics are classified as "*much improved*".



Evaluation of Biological Explanation

- ✓ Humane approach; poses no blame on the individual or their families – states that the people who become ill are purely “unlucky”
- ✓ Tends to provoke little fear or stigma
- ✓ Effective treatments
- ✓ Well established scientific treatments
- × Reductionist approach – Reference to Diathesis-Stress Model
- × Animal studies
- × Relies on self report
- × Treats symptoms, not causes

