Jpn J Human Genet 38, 229–232, 1993

Case Report

A CASE OF SCHIZOPHRENIA WITH A DICENTRIC Y CHROMOSOME

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Summary A case of DSM-III-R schizophrenia with a dicentric Y chromosome (46,X,dic(Y)(q11)) is reported. Structural chromosome abnormalities such as this case may provide clues to finding regions of the genome etiologically involved in schizophrenia.

Key Words schizophrenia, dicentric, Y chromosome, XYY

INTRODUCTION

During an X and Y chromatin survey among 8,000 inpatients in Japanese mental hospitals (Nanko, 1985), a Y chromatin negative male was found. He was reported to have a 46,XYq− karyotype by chromosome analysis using ordinary and Q-banding staining. Recently, G-banding by trypsin using Giemsa (GTG) analysis of his karyotype and fluorescent *in situ* hybridization (FISH) reveals that he has a dicentric Y chromosome (46,X,dic(Y)(q11)).

CASE REPORT

A 46-year-old single male was admitted to the psychiatric ward of Ikeda hospital because of delusions of persecution. He was diagnosed as Schizophrenia chronic-disorganized type (295.12) according to DSM-III-R criteria. He was first examined by a psychiatrist at the age of 19 because of bizarre behavior, while a medical inpatient with pleuritis. He had symptoms of schizophrenia including delusions of persecution by poisoning and control, auditory hallucinations and

Received March 18, 1993; Accepted April 12, 1993.
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inappropriate laughter. Since that time his social functioning has gradually deteriorated. He has had several admissions to the psychiatric ward of Ikeda hospital because of psychomotor excitement, after developing delusions of persecution. He showed a chronic course without significant remission.

He was born in 1945 and was the second of three siblings. Nothing was known about mental illnesses in his family other than a report that his father sometimes spoke to himself. He suffered from febrile convulsions until 6 years of age, but otherwise little is known about his birth and early childhood.

The mental state examination of the patient showed formal thought disorder characterized by loosening of associations and blunting of affect. He was shy, timid and withdrawn. His intelligence was below normal with an IQ of 60 (verbal IQ, 62; performance IQ, 64). He could not complete the MMPI test. Physically, he was short in stature at 155 cm, and weighed 50 kg. There was no gynecomastia and the amount of body and pubic hair was normal, although the testes were soft and small. Serum prolactin was 18 ng/ml, which was above the normal range for males (1.5–9.7 ng/ml), while serum testosterone was 131 ng/dl, below the standard level for males (250–1,100 ng/dl). Neurological examination was normal as was electro-encephalography and cranial computed tomography.

Chromosomal analysis was carried out using G-, C-, and Q-banding techniques. The patient was shown to have a dicentric Y chromosome (Fig. 1). This result was confirmed by fluorescent *in situ* hybridization (FISH) technique using the Y chromosome centromere specific probe DYZ3 (Fig. 2) as well as DNA analysis of SRY (sex-determining region Y) gene using PCR technique. The probable breakpoint in this case is Yq11, so that the karyotype was described as 46,X,dic(Y)(q11).

DISCUSSION

A dicentric chromosome is symmetric with respect to the break point and

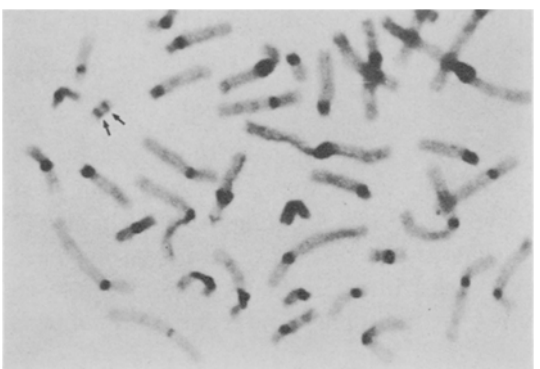

Fig. 1. Dicentric Y chromosome by C banding. Arrows indicate centromeres of Y chromosome.

Fig. 2. Dicentric Y chromosome by fluorescent *in situ* hybridization using probe DYZ3.

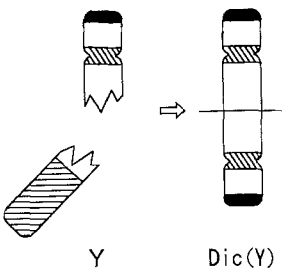

Fig. 3. Schematic representation of dicentric Y chromosome.

the derivative Y chromosome contains two centromeres. Dicentric Y chromosome are the most frequently encountered example of structural rearrangements of the Y chromosome (Fig. 3). Most cases exhibit the phenotype commonly associated with Turner syndrome. Some cases showed external genitalia of female type (Cohen *et al.*, 1973). Less frequently recognized phenotypes are males with hypospadias and two gonads, and males who appear normal but who are infertile (Drummond-Borg *et al.*, 1988). The observed variability in phenotype may be explained by the location of the break point. For example, external genitalia of female type is probably due to the deletion of the SRY gene which is located at the distal end of short arm. Absent spermatogenesis occurs in cases of loss of at least all of the long arm fluorescent portion, due to the presence of a gene(s) controlling spermatogenesis in that portion of the Y chromosome (Chandley *et al.*, 1986).

In the present case, the break point is probably at q11, so that the fluorescent region and possibly portions of the proximal long arm are missing. Hence there are two copies of the short arm and the proximal long arm (Fig. 3), which is genetically similar to XYY males.

The schizophrenia in this patient may be unrelated to the chromosomal ab-

normality, however, some schizophrenic patients with XYY karyotype have been reported (Forssman *et al.*, 1975; Faber and Abrams 1975; Dorus *et al.*, 1977; Nanko and Nomura, 1981). Double copies of the short and proximal long arms of the Y chromosome may predispose to some patients with schizophrenia, although an association between schizophrenia and the XYY karyotype has not been established (Nanko, 1985). Also, the recent suggestion that the pseudoautosomal region or an X-Y homologous region predisposes to schizophrenia (Crow, 1988; DeLisi and Crow, 1992) would gain some support from this case. We agree with the recent report (Bassett, 1992) that structural chromosome abnormalities may provide the clues to finding regions for linkage and other molecular genetic studies of schizophrenia.

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