

SHORT COMMUNICATION

A SPECIFIC RECURRENT CHROMOSOMAL BREAK REGION (2q24 - 2q32) IN HUMAN GLIOMAS

Silvia Regina Rogatto¹ and Cacilda Casartelli²

ABSTRACT

Twelve human primary gliomas were cytogenetically studied and six of them presented a specific recurrent chromosome break region (2q24 - 2q32) never described before in any neoplasias.

INTRODUCTION

Gliomas are the most commonly occurring brain tumors. They may be divided into "benign" and malignant, not because the "benign" tumors are not lethal, but because patient survival is considerably prolonged in their presence (Walker, 1982).

Many karyotypic studies have been performed on human gliomas, although most of them were able to show only few numerical or structural alterations. These comprise gains of chromosome 7 and losses of chromosomes 10, 22 and of gonosomes. Several structural alterations involved different breakpoints of chromosome no. 9 (Wilson *et al.*, 1970; Mark, 1971, 1974a,b; Yamada *et al.*, 1980; Al Saadi and Latimer, 1983; Rey *et al.*, 1983; Bigner and Mark, 1984; Bigner *et al.*, 1984, 1986a,b).

We report here a specific region of chromosome breakage (2q24 - 2q32) involved in rearrangements in human gliomas.

¹ Departamento de Biologia Geral, Universidade Estadual de Londrina, 86100 Londrina, PR.

² Departamento de Genética, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo, 14049 Ribeirão Preto, SP, Brasil. Send correspondence to C.C.

MATERIAL AND METHODS

Cytogenetic analysis was performed on cultured cells from 12 primary gliomas: astrocytoma grade I- 1; astrocytoma grade II- 4; glioblastoma multiforme - 3; medulloblastoma- 2; ependymoma- 1; oligodendroglioma- 1. The G-banding technique (Scheres, 1972) was used, with some modifications.

RESULTS

Of the twelve gliomas studied, six presented specific breakpoints in chromosome no. 2, which were involved in different rearrangements:

– ins (4; 2) (4pter → 4q31:: 2q24 → 2q32:: 4q31 → 4qter; 2pter → 2q24:: 2q32 → 2qter) – present in 1 astrocytoma grade I (70% of cells) and in 2 astrocytomas grade II (24% and 42% of cells) (Figure 1A).

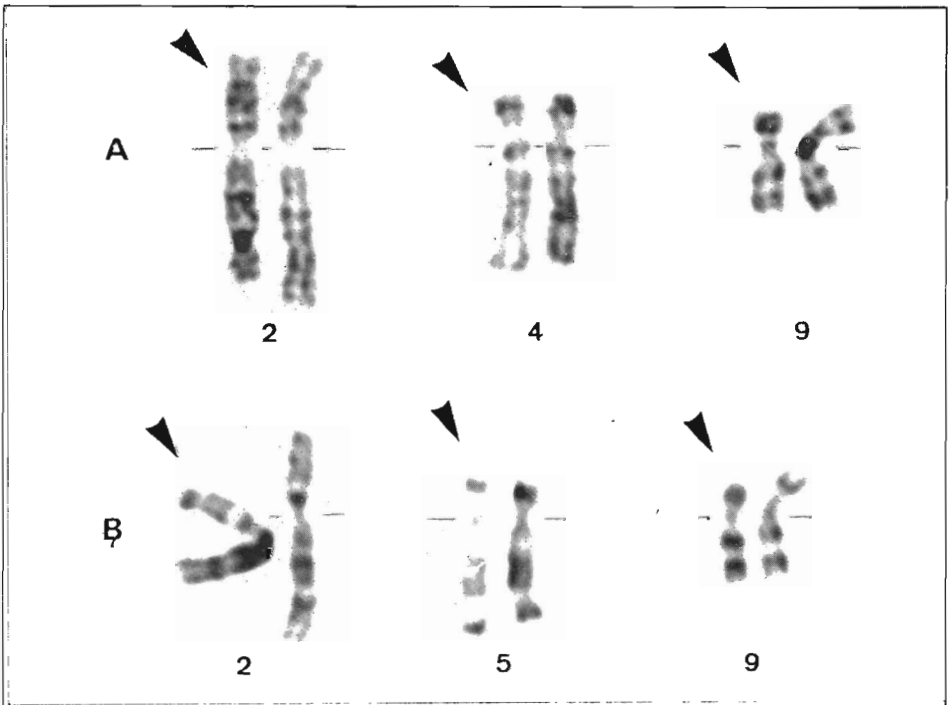


Figure 1 - A, Chromosome pairs 2, 4 and 9 from a cell of a grade I astrocytoma. Chromosomes 2 and 4 show ins (4; 2) (q31; q24q32) (arrows) and chromosome 9 show del(9) (qter → p21:) (arrow). B, Chromosome pairs 2, 5 and 9 from a cell of a grade II astrocytoma. Chromosomes 2 and 5 show ins (5; 2) (q23; q24q32) and chromosome 9 shows del(9) (qter → p21:) (arrow).

– ins (5; 2) (5pter → 5q23::2q24 → 2q32::5q23 → 5qter; 2pter → 2q24::2q32 → 2qter) – present in 1 astrocytoma grade II (15% of cells) (Figures 1B and 2).

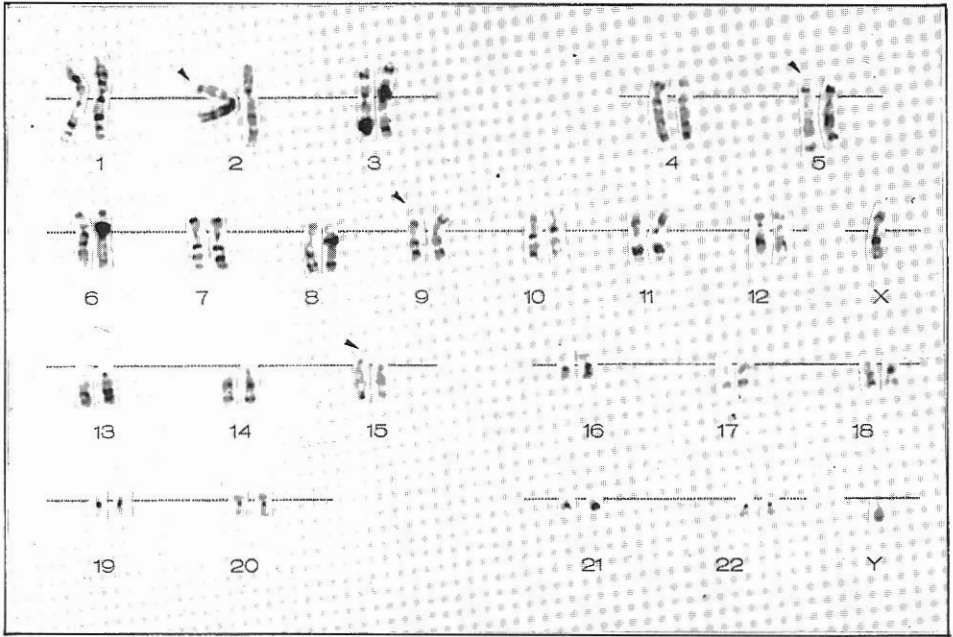


Figure 2 - Cell from a grade II astrocytoma, with 46 chromosomes. There is a deletion of chromosome 9, an addition to the short arm of chromosome 15 and ins (5; 2) (q31; q24q32) (arrows) (see detail in Figure 1B).

– ins (5; 2) (5pter → 5q31::2q24 → 2q32::5q31 → 5qter; 2pter → 2q24::2q32 → 2qter) – present in 1 oligodendroglioma (80% of cells) (Figure 3A).

– del(2) (pter → q24::q32 → qter) – present in one ependymoma grade III (42% of cells) (Figure 3B).

Other consistent alterations were found in all of the tumors, but they were not repeated from tumor to tumor. The only other repetitive alteration that appeared was: del(9) (qter → p21:). This was present in 1 astrocytoma grade I (20% of cells) and in 1 astrocytoma grade II (6% of cells) (Figures 1A,B and 2).

DISCUSSION

According to Bigner *et al.* (1984), chromosomal alterations in gliomas occur at random and mainly involve gains or losses of entire chromosomes.

The breakpoints involved in the chromosomal rearrangements in our tumors

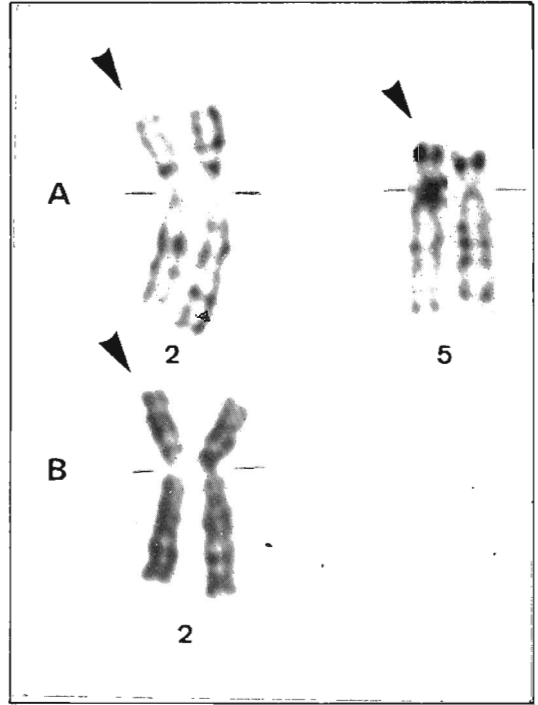


Figure 3 - A, Chromosome pairs 2 and 5 of a cell from an oligodendroglioma, showing ins (5; 2) (q31;q24q32) (arrow). B, GTG-banding of chromosome 2 with del (2) (pter → q24::q32 → qter) (arrow) from a grade II ependymoma.

were compared with the human chromosomal map of Yunis (1986) and with the specific tumor chromosome regions reviewed by Berger *et al.* (1985).

- breakpoints 2q32 and 4q31 coincide with the localization of common (constitutive) fragile sites.

- breakpoint 5q23 coincides with a common fragile site and breakpoint 5q31 coincides with a common fragile site and with a breakpoint specific for neoplasias.

- breakpoint 9p21 coincides with the localization of a rare (heritable) and of a common fragile site and with a recurrent break region in other neoplasias.

To our knowledge, no descriptions of chromosome region 2q24-2q32 involved in neoplasias have been reported thus far. We consider this region to be specific for human gliomas.

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RESUMO

Doze gliomas humanos foram estudados citogeneticamente e 06 deles apresentaram uma região de quebra cromossômica (2q24 – 2q32), nunca antes descrita em nenhuma neoplasia.

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