

ISCN rules in FISH analysis: how to report a rare recombinant chromosome?

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The authors declare that they have no conflict of interest.

INTRODUCTION

Unbalanced chromosomes are often the result of inheritance of a balanced chromosome rearrangement from one parent. During meiotic segregation, the chromosomes with balanced alterations in the parent may "unbalance" in the gametes and, consequently, in the offspring, resulting in a partial gain and a partial loss of different regions of that chromosome.

We present the FISH results of two samples (mother and daughter) to confirm the underlying rearrangement of the chromosome 4 alterations detected in the daughter's chromosomal microarray analysis (dup4p16.3 and del4q35) and to confirm the presence of a pericentric inversion of chromosome 4 in the mother.

METHOD

Both FISH studies were performed on 10 metaphases (peripheral blood) hybridised with probes specific to the subtelomeric regions of chromosome 4 (Vysis TotalVysion).

RESULTS

In the analysed metaphases of the mother's sample, the observation of the subtelomeric regions allowed to identify a chromosome 4 with a pericentric inversion.

In the analysed metaphases of the daughter's sample, it was observed a normal subtelomeric pattern for one of the chromosomes 4, while in the other chromosome, in place of the normal subtelomeric region of the long arm (4qter), one signal was observed for the subtelomeric region of the short arm of the same chromosome (4pter).

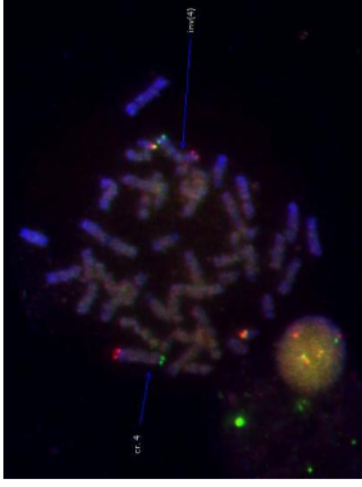


Figure 1 - Mother's FISH image showing a pericentric inversion of chromosome 4. 4pter is marked with a green signal and 4qter with an orange signal. The inversion is evident relatively to the position of the centromere.

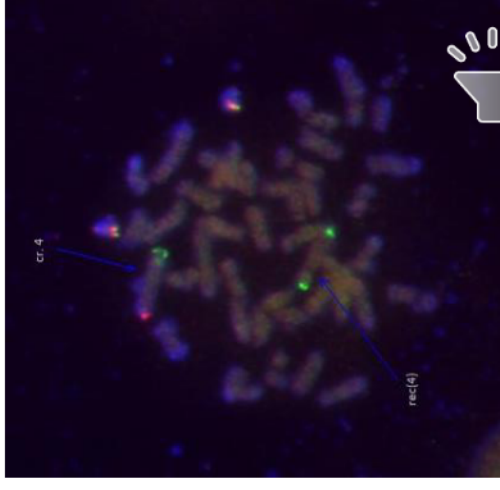


Figure 2 - Daughter's FISH image showing the rearrangement of chromosome 4 compatible with the result of chromosomal microarray analysis – dup4p16.3 and del4q35. 4pter is marked with a green signal and 4qter with an orange signal. The recombinant has two green signals (4pter) and no orange signal (4qter).

DISCUSSION AND CONCLUSION

The pericentric inversion of chromosome 4 in mother was confirmed: ish inv(4)(pterqter)(D4S3359+,D4S2930+)

However, the nomenclature of the daughter's result was not straightforward and there were no examples in ISCN for this specific alteration; we have than followed the available examples for other distinct cases and a formulation was achieved, presumed to describe what was observed by FISH:

ish rec(4)dup(4p)inv(4)(pter+;qter-,pter+)
(D4S3359+;D4S2930-,D4S3359+)dmat

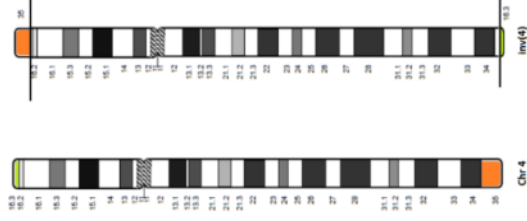


Figure 3 - Mother's idiogram showing the pericentric inversion of chromosome 4. 4p16.3 is painted green and 4q35 is painted orange.

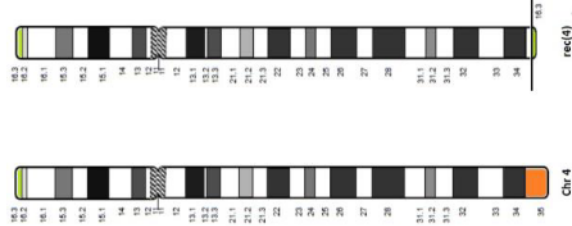


Figure 4 - Daughter's idiogram showing the recombinant of chromosome 4. 4p16.3 is painted green and is duplicated in the recombinant. 4q35 is painted orange and is deleted.

DISCUSSION AND CONCLUSION

In face of the difficulty in the description of this kind of variants, as no examples were available in the ISCN nomenclature, and considering that the scientific community is a place for discussion, a few proposals were submitted to the ISCN team, in order to achieve a consensus.

After ISCN internal discussion and consideration, the final versions were:

Mother: ish inv(4)(pter)(D4S2930+)(qter)(D4S3359+)

and

**Daughter: ish rec(4)dup(4p)inv(4)(pterqter)
(D4S3359+,D42930-,D4S3359+)dmat**

A direct communication channel between the ISCN experts and the analytical laboratories is essential for the evolution in the establishment of nomenclature rules and, consequently, of scientific knowledge.