“Classical cytogenetics” is not equal to “banding cytogenetics”

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Abstract

Background: Human cytogenetics is a field suffering from the argumentation that it is nowadays really outdated and to be replaced by molecular high throughput approaches. Thus, it is to be expected that non-cytogeneticists do mistakes in nomenclature of cytogenetics, which is exposed to repeated reforms, like e.g. recently the now hardly manageable and readable nomenclature for array-comparative genomic hybridization.

Results: An unexpected nomenclature problem becomes more and more obvious in human cytogenetics – it seems to become difficult to understand how and when to use the designations “classical cytogenetics” or “banding cytogenetics”. Here it is highlighted that “classical cytogenetics” stands for studies undertaken by Orcein or Giemsa staining without (!) previous trypsin-treatment. However, in human (diagnostic) cytogenetics almost exclusively “banding cytogenetics” is applied.

Conclusion: The terms “classical cytogenetics” and “banding cytogenetics” have to be clearly distinguished and correctly applied.

Keywords: Classical cytogenetics, Banding cytogenetics, Research, Diagnostics, ISCN
banding era (1879–1970), the pure banding era (1970–1986) and the molecular cytogenetic era (1986–today). The prebanding era is characterized by the first visualization the word “chromosome” (from chroma = color and soma = body) in 1888, the determination of the correct modal human chromosome number in 1956 and the detection of the first chromosomal abnormality in Down syndrome in 1959. The banding era started with the discovery of the Qbanding method by Dr. Lore Zech (Upsala) in 1970 [14]. Many more chromosomal abnormalities, such as translocations, inversions, deletions and insertions, could be detected from now on. Currently, the GTG-banding approach (G-bands by Trypsin using Giemsa) [15] is still the gold-standard for all cytogenetic techniques. However, the pure banding era ended in 1986 with the first molecular cytogenetic experiment on human chromosomes” [1].

For the nomenclature problem raised here it is important to recall that the pre-banding era was characterized by the exclusive ability to stain human chromosomes in one color, e.g. Orcein or Giemsa staining without (!) trypsin-treatment. In case someone does a study like that, which is still routinely done in many animal chromosomes [16], or in mutagenesis studies [8], he performs a “classical cytogenetic study”. Still, nowadays no-one will do “classical cytogenetics” in human clinical diagnostic applications, as here we routinely apply “banding cytogenetics”!

Unfortunately, it is not hard to find published studies where this difference was not considered (I intentionally do not refer to them here). Also as editor and referee I get more and more submissions with the statement ‘we did classical cytogenetics in this clinical case’. And I have to say then: ‘no you did not, you did banding cytogenetics; please correct that point before we can accept your publication’.

So I herewith want to appeal to all specialists doing banding cytogenetics and who publish or talk about it, please denominate correctly the approach you use. Remember and teach to your students that “classical cytogenetics” is not equal to “banding cytogenetics”.

Thanks a lot.

Abbreviations
GTG: G-bands by Trypsin using Giemsa

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