Is it time to change from classical karyotyping to rapid testing in prenatal diagnosis?

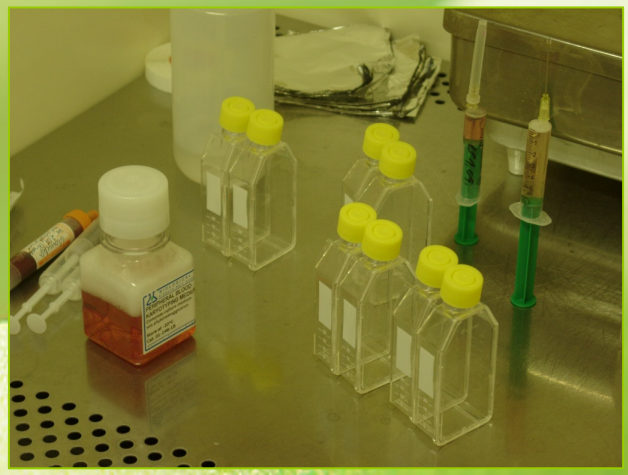
Pesz KA, Laczmanska I, Kozlowska J, Makowska I, Slezak R, Smigiel R, Stembalska A, Sasiadek MM

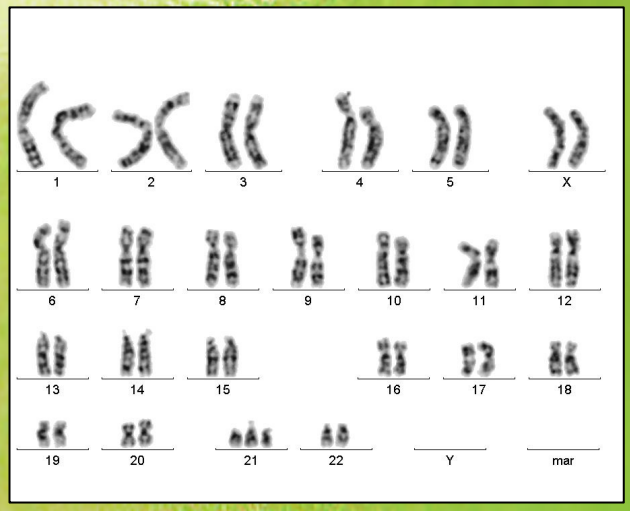
Wroclaw Medical University
Chair and Department of Genetics

INTRODUCTION

The golden standard for prenatal diagnosis:

- **culture of foetal cells (chorion villi sampling, amniocentesis, cordocentesis)**
- **karyotype analysis**





ISSUES FOR CONSIDERATION

- High percentage of miscarriages after early pregnancy prenatal diagnosis – CVS, early amniocentesis
- Referral of women on advanced stages of pregnancy for prenatal diagnosis (~50% > 17 week of gestation)
- In case of classical cytogenetic methods the results are issued after a long time (2-3 weeks)
- High anxiety levels in pregnant women

RAPID ANEUPLOIDY TESTING

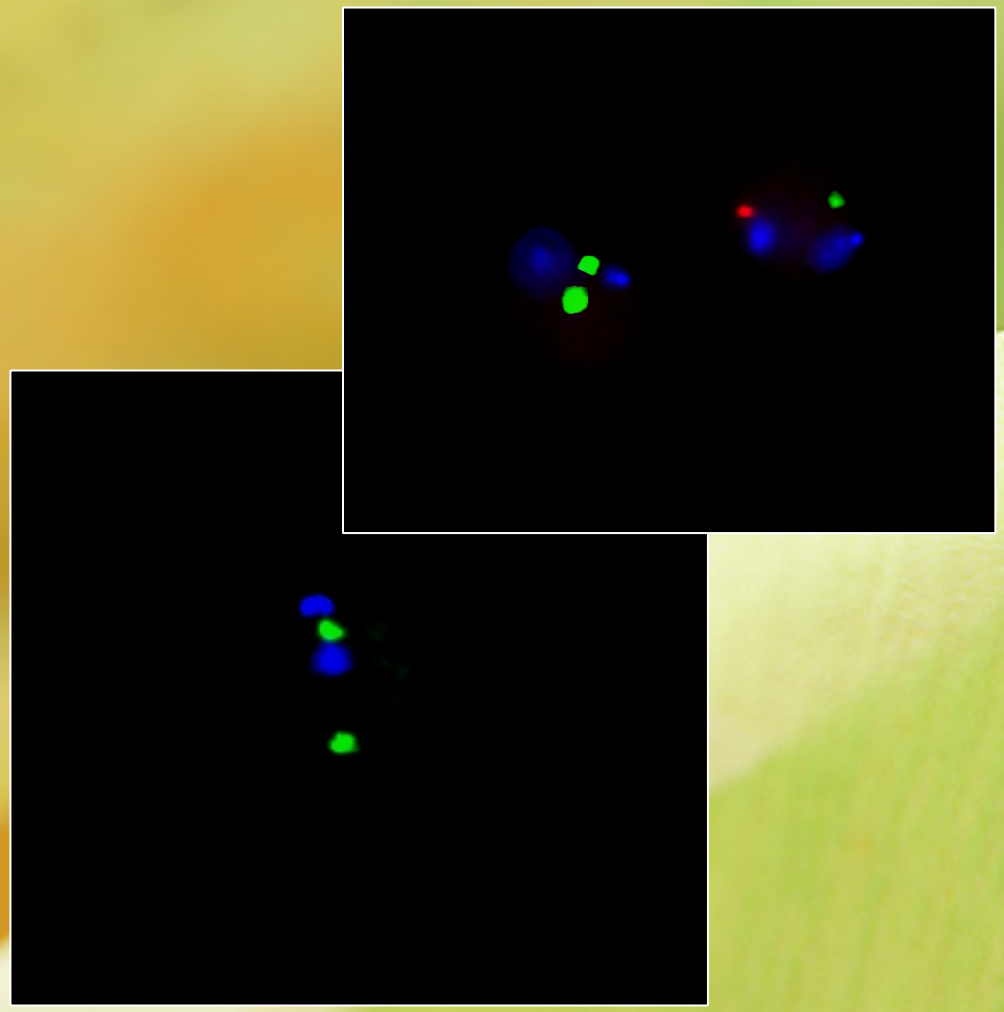
- **Methods: QF-PCR, MLPA, RAPID-FISH**
- **Decreases the time of waiting for the results of prenatal testing**
  - **normal result: reduction of maternal anxiety during the waiting period**
  - **abnormal result: important when considering termination of pregnancy**

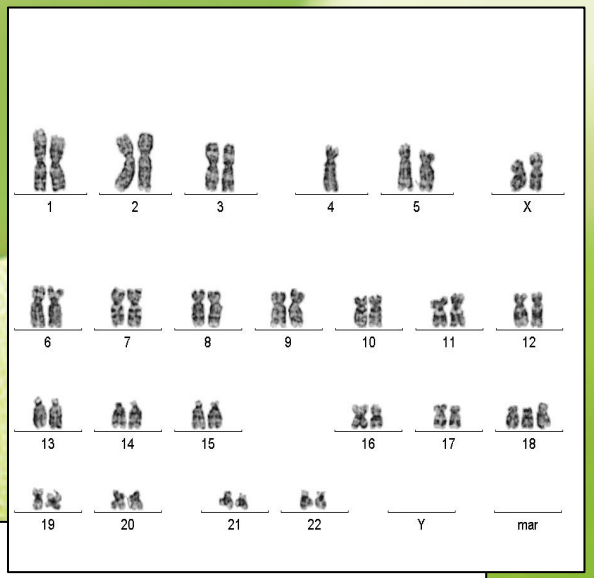
RAPID-FISH

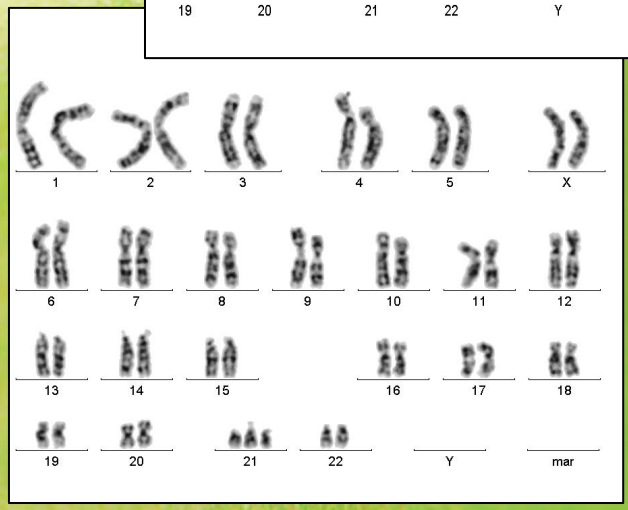
- **Detection of numerical aberrations of 13, 18, 21, X and Y chromosomes (as well as poliploidy)**

- **High risk of aneuploidy is the indication for prenatal testing in 80-90% of pregnancies**

RAPID-FISH *versus* classical karyotyping



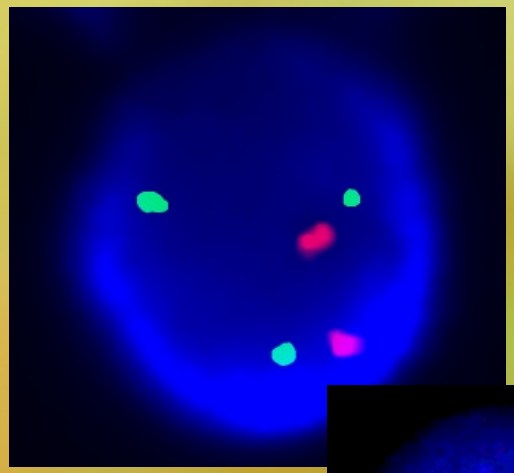




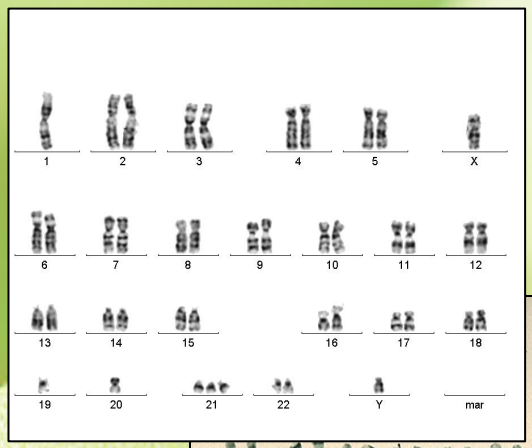
MATERIALS AND METHODS

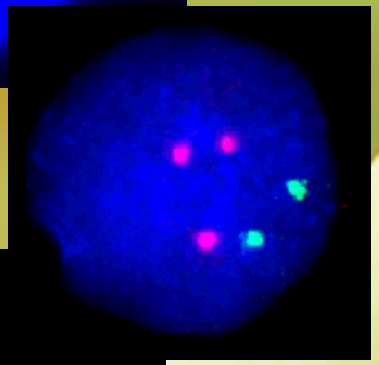
- 363 amniotic fluid samples (II 2005-IV 2008)
- Written informed consent
- RAPID-FISH followed by classical karyotyping
- Causes for referral:
  - maternal age
  - positive results from non-invasive biochemical screening
  - ultrasound abnormalities (increased NT, hypoplasia of NB)
  - previous child with chromosomal abnormality

RESULTS



2 weeks later





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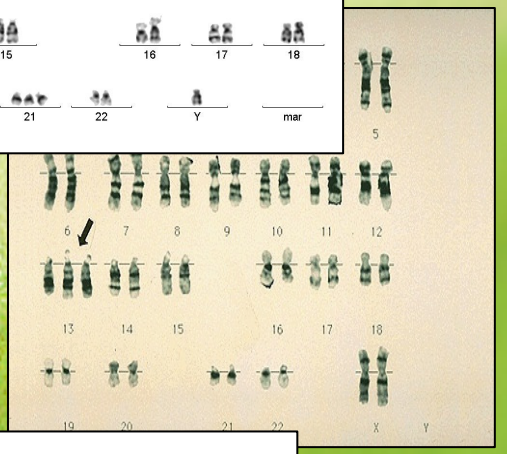

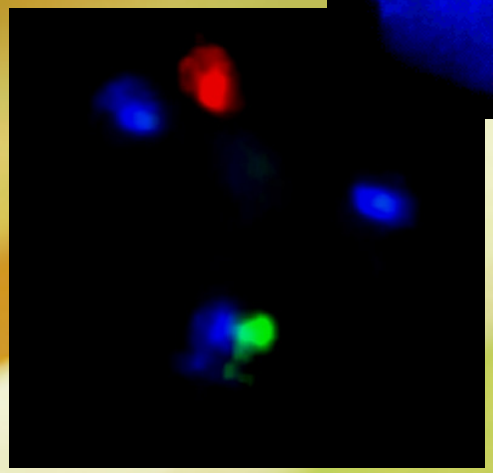

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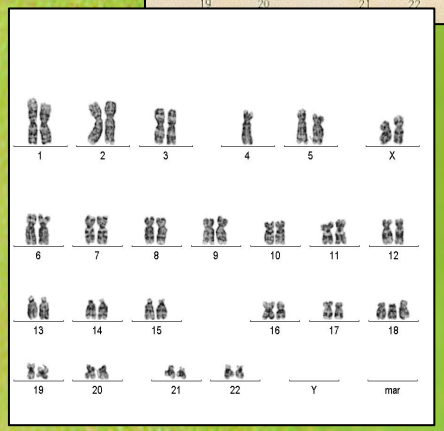

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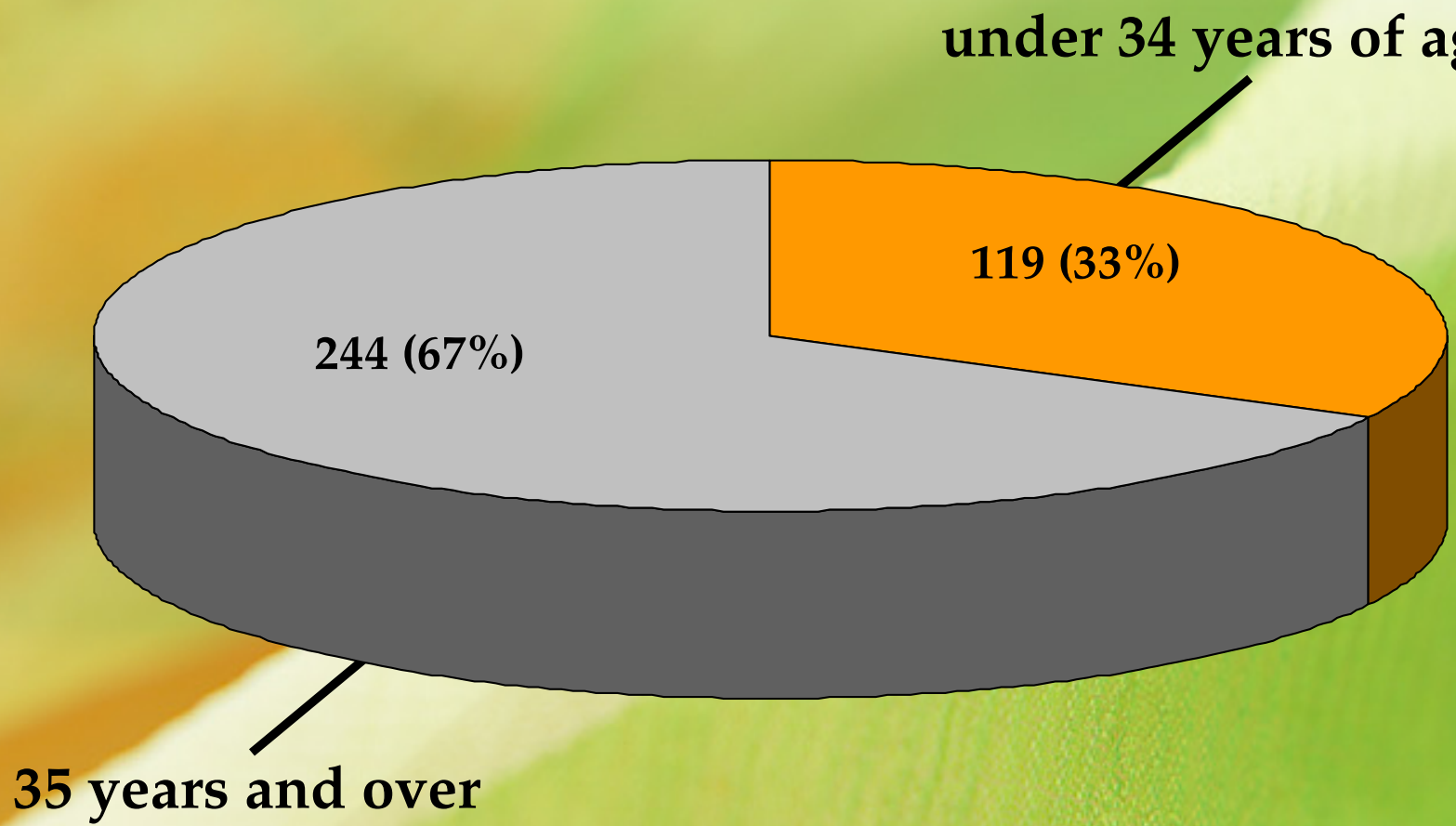
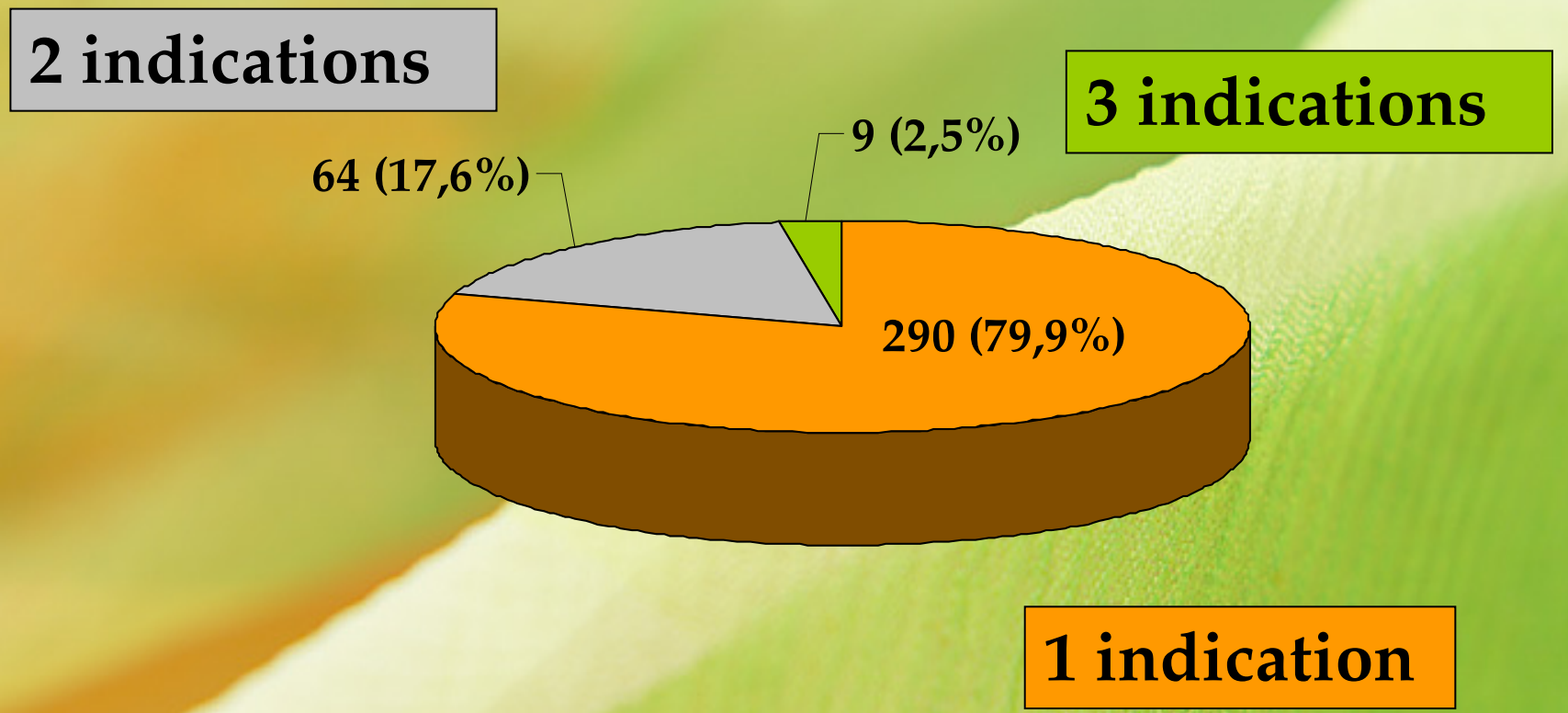


INDICATIONS



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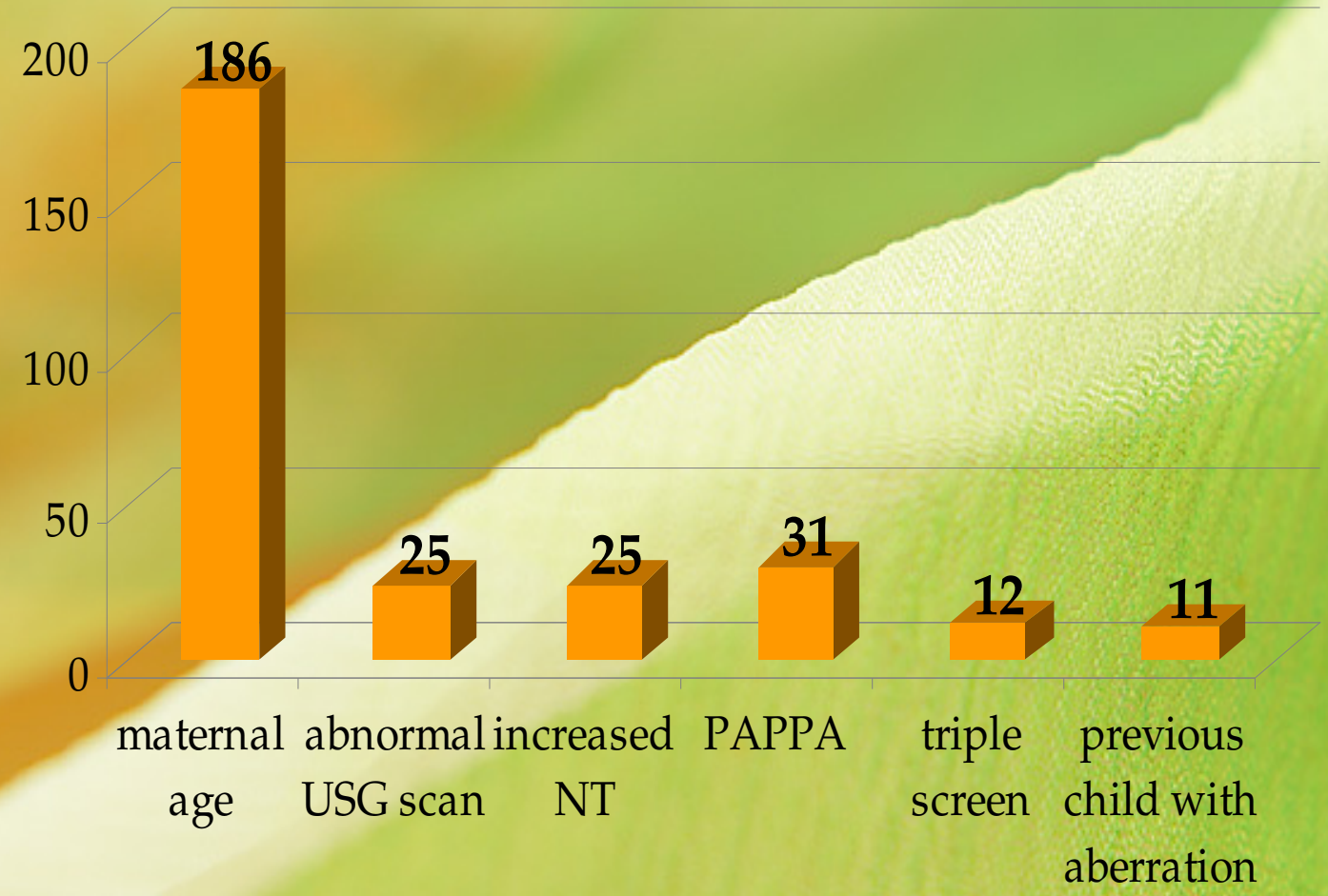
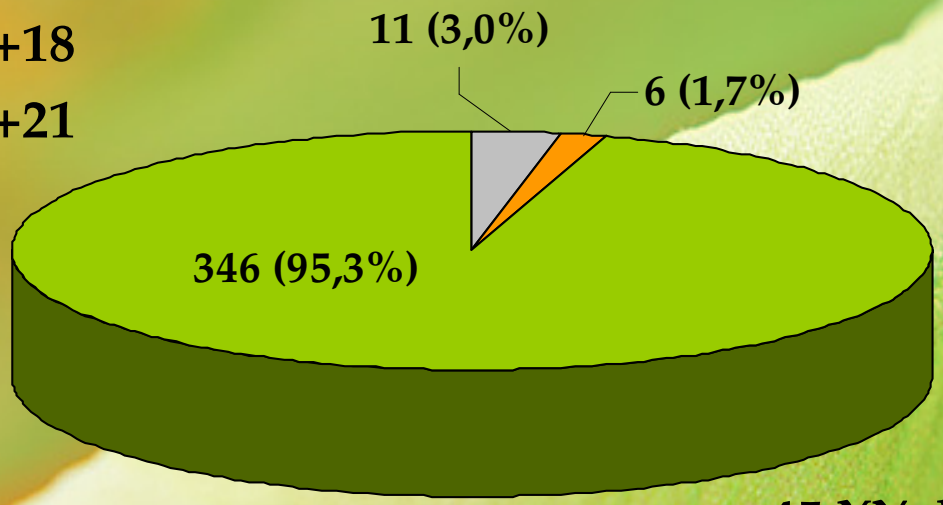


COMPLIANCE

46,XX
46,XY
47,XX,+13/47,XY,+13
47,XX,+18/47,XY,+18
47,XX,+21/47,XY,+21
47,XXX
47,XXY
47,XYY
45,X



45,XY,der(13;14)
45,XX,der(13;14)
46,XX,t(8;14)

46,XX,add(18)
46,XX,der(6)t(4;6)
46,XX,dup(9)

COMPLIANCE

- 45,XY,der(13;14)
- 45,XX,der(13;14)
  - previous child with chromosome abnormality, in both cases mother was found to be a carrier of a balanced translocation
- 46,XX,t(8;14)
  - maternal age

- 46,XX,add(18)
- 46,XX,der(6)t(4;6)
  - malformations found on ultrasound
- 46,XX,dup(9)
  - NT=2,9 mm

CONCLUSION

The reliability and rapidity of RAPID-FISH diagnosis of the most common numerical chromosomal aberrations in prenatal testing creates the foundation for introducing it as a routine method of prenatal diagnosis in cases of increased risk of aneuploidy of chromosomes 13, 18, 21, X and Y in the offspring.

INDICATIONS FOR RAPID ANEUPLOIDY TESTING

- maternal age ≥ 35
- previous child with numerical chromosome aberrations
- abnormal biochemical screening results
- increased NT

Additionally: anomalies found on ultrasound suggestive of a poliploidy in the foetus

INDICATIONS FOR CLASSICAL KARYOTYPING

- foetal anomalies found on the ultrasound scan
- one of the parents is a known translocation carrier

GOOD LABORATORY PRACTICE

- analysis of indications for prenatal testing
- following the producer's instructions and standards of quality control
- if aneuploidy found – confirmation of the result by classical karyotyping or a second RAPID-FISH test performed by another person with different reagents


Thank you for your attention!