"Molecular and genetic techniques in the forensic medical service in Russian Federation"

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Regardless of the level of expert institutions and geographic locations the expert department is composed of the following departments:

- Department of Forensic examination of corpses;
- Department of Forensic examination of the victims, the accused and other persons;
- Division of complex examinations and commissions;
- Division of examination of physical evidence;
- Forensic Chemistry Department;
- Forensic Biology Department;
- Molecular-genetic department;
- Department of Medical Criminology;
- Forensic histology department;
- Organizational and methodical department;

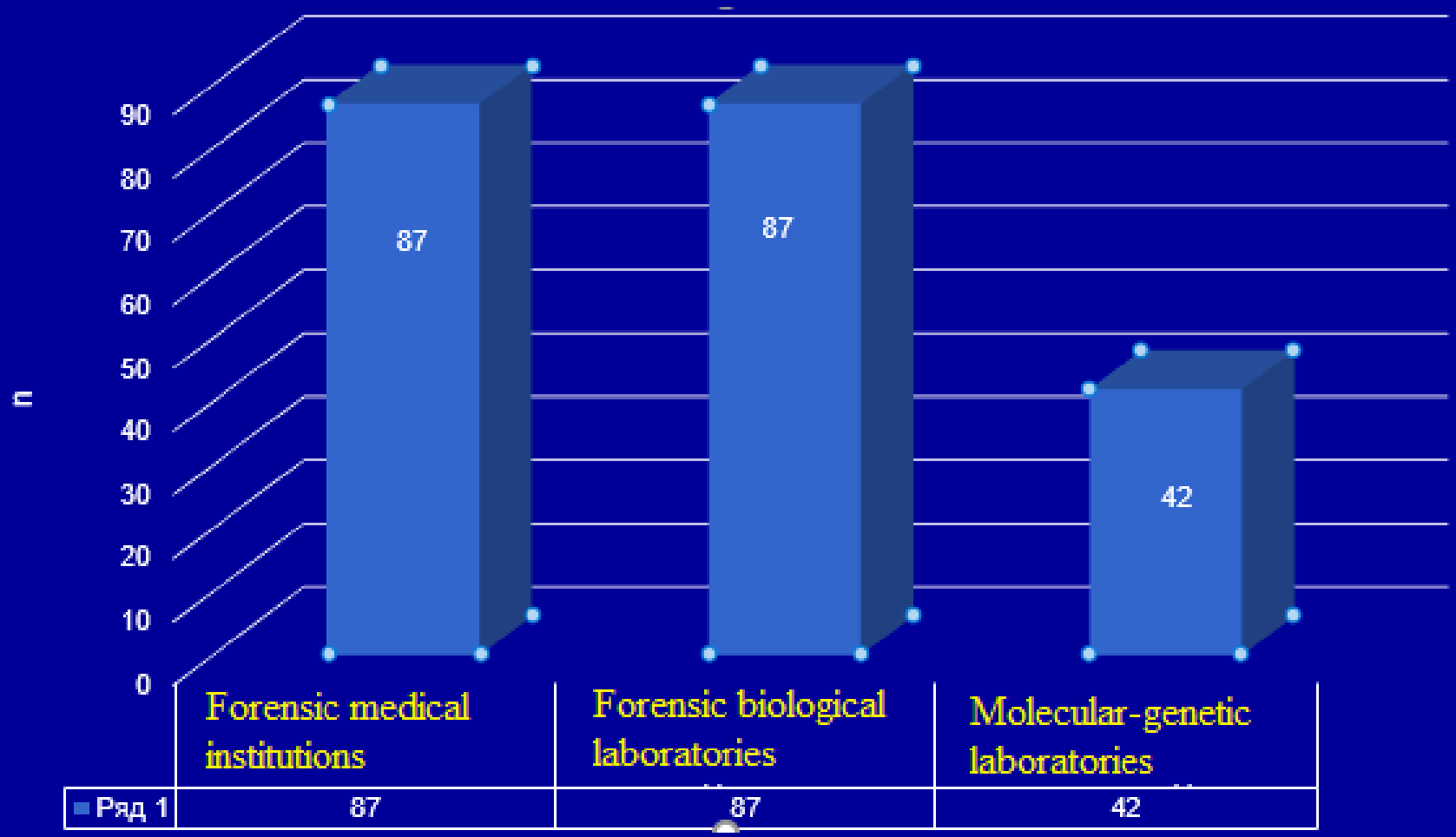
Federal state forensic medical expert institutions

87 State forensic expert institutions

1150 expert offices

The total number of staff units, designed to work in these departments is 40789

State forensic medical institutions in Russian Federation

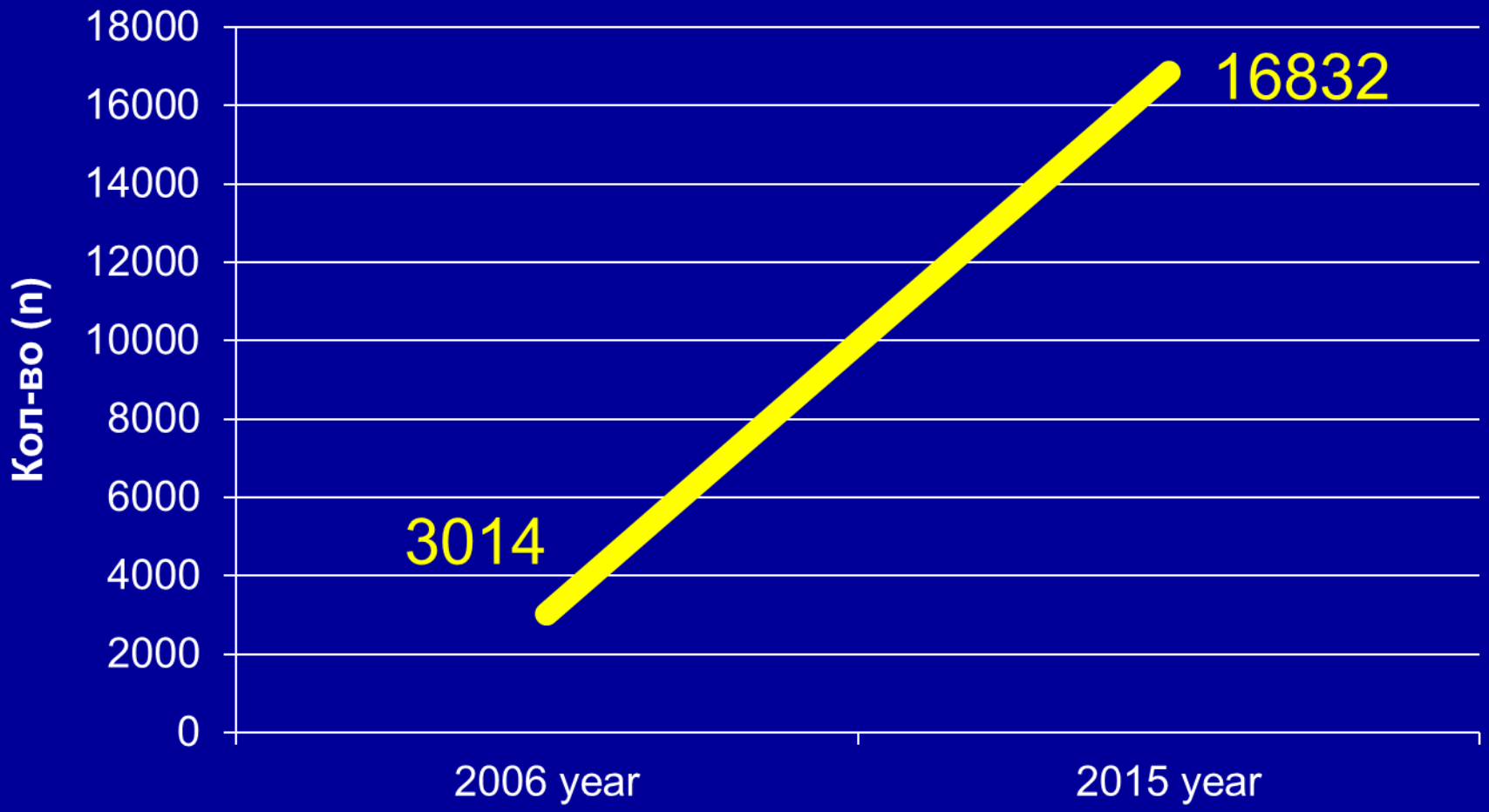


Genetic analysis technologies used in molecular genetic departments with the purpose of identification:

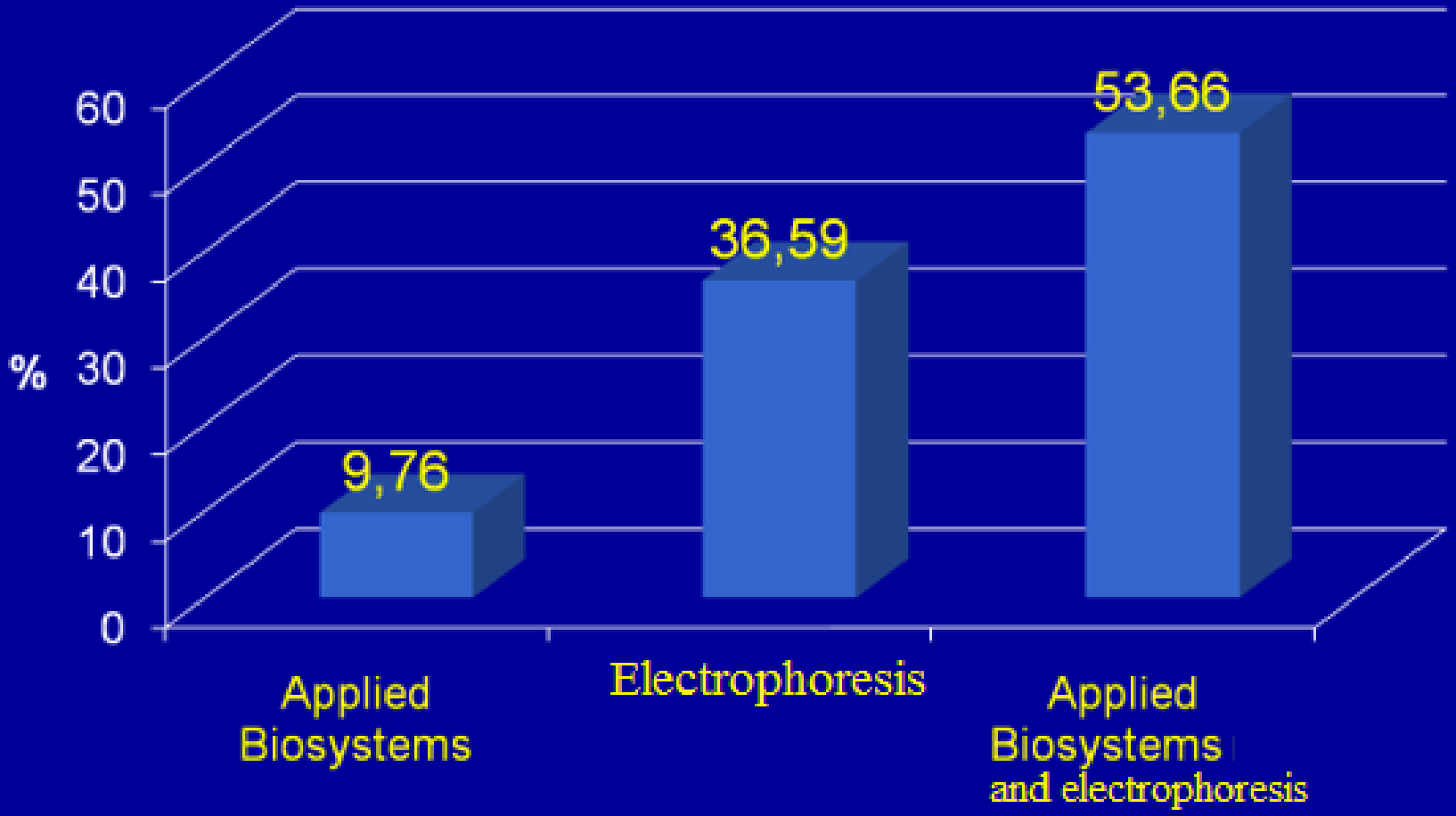
1. Using Genetic Analyzer Applied Biosystems (USA)
2. Electrophoresis with polyacrylamide gel plates.

Identifiler or GlobalFiler panels are used in identification of parentage or certain person.

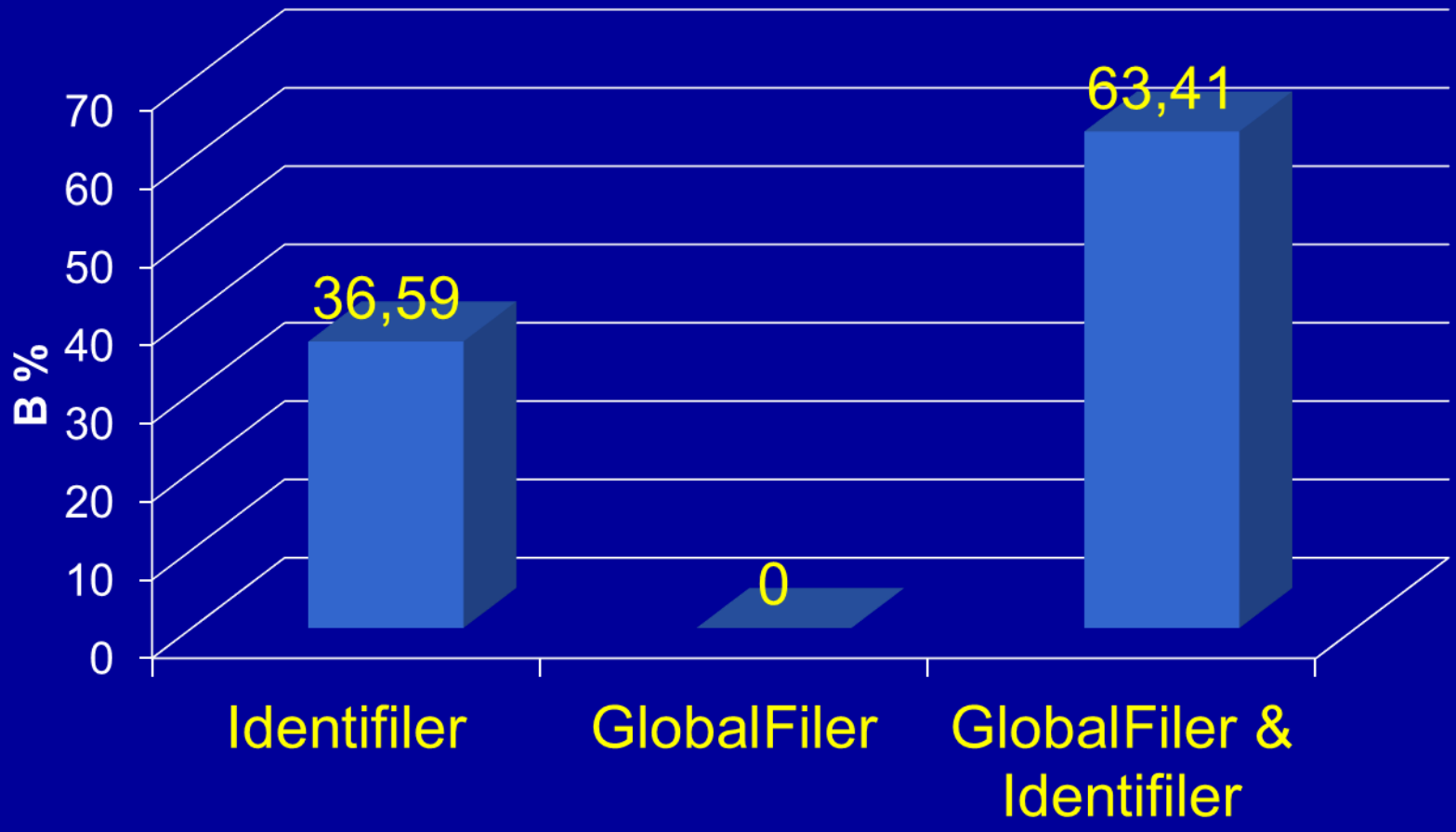
10-year dynamic of molecular genetic research in forensic medical departments in Russia



The proportion of expert institutions, using various genetic analysis technologies



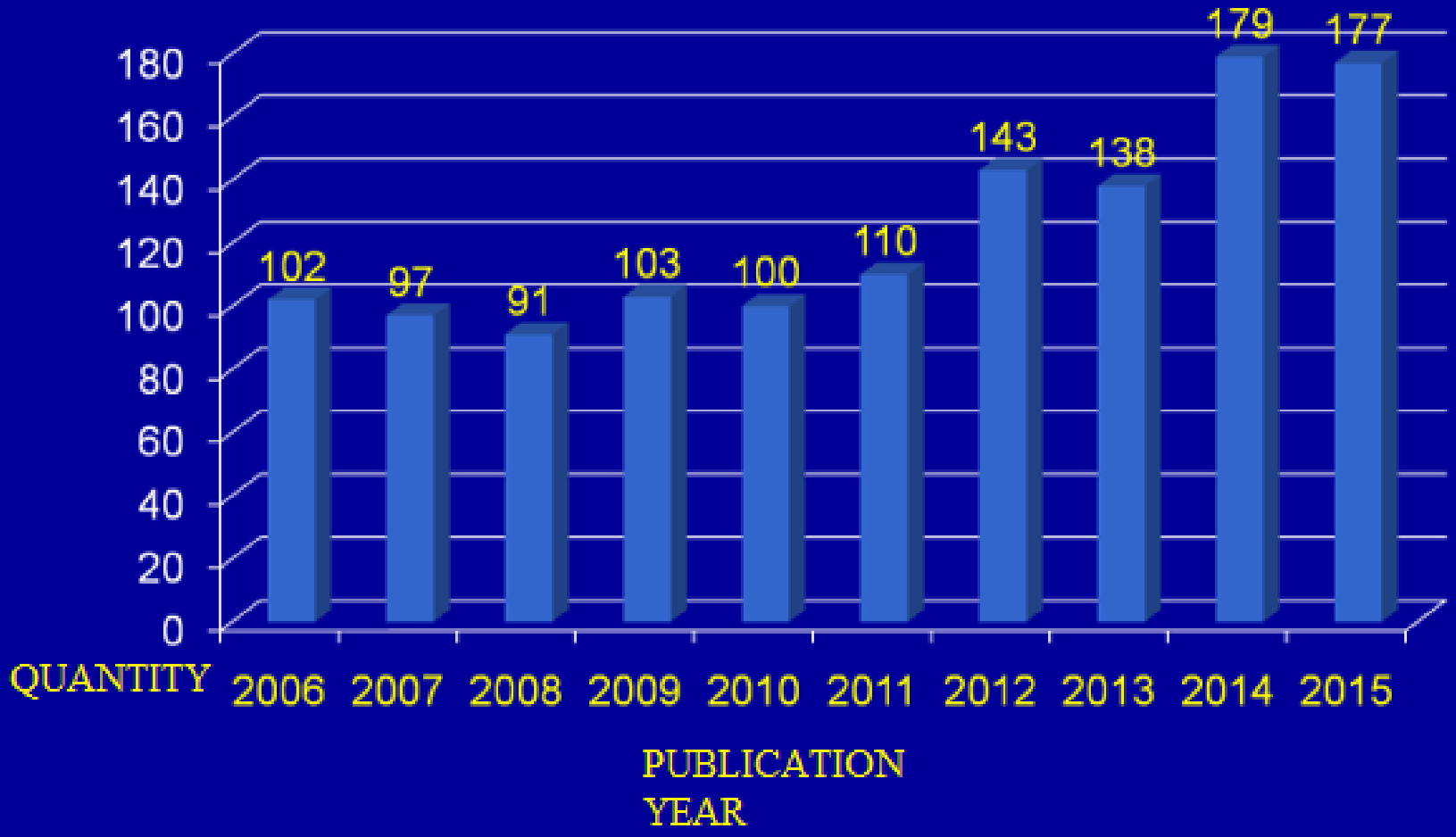
Forensic medical departments which use different genetic panels for personal identification and parentage identification



Molecular autopsy

- However, forensic medicine problem using molecular genetic techniques is much wider than the identification of the person or parentage. One of these problems is post-mortem genetic typing for the presence of mutations or genes polymorphisms, leading to disease susceptibility, for example in cases of sudden death
- In recent years, the term molecular autopsy (molecular autopsy) can be found in the scientific literature

Number of scientific publications devoted to the problem of molecular autopsy (Pubmed.gov)



Using of molecular-genetic methods

In our opinion, molecular genetic methods make it possible to specify the etiology and pathogenesis of thrombotic complications in victims during forensic examinations in cases of:

- after mechanical injury;
- after exercises;
- after surgery

Establishing of the causal relationship in a series of series of successive events is a special difficulty for forensic experts

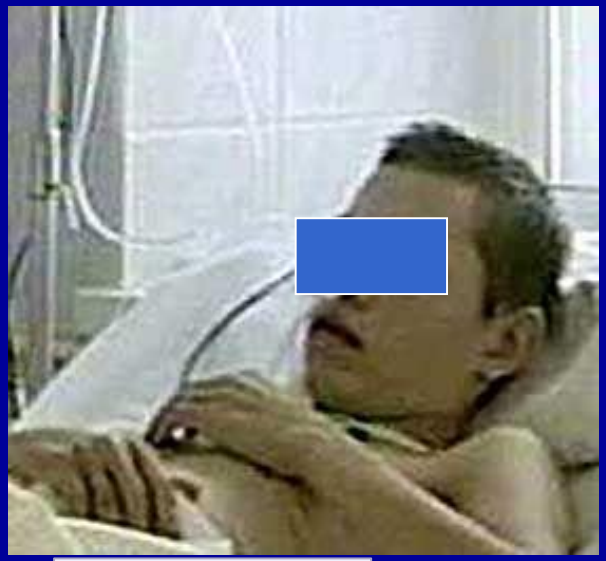
Trauma

Operative treatment

Thrombosis

PE

Death



A. Sychev

S. Kulivets

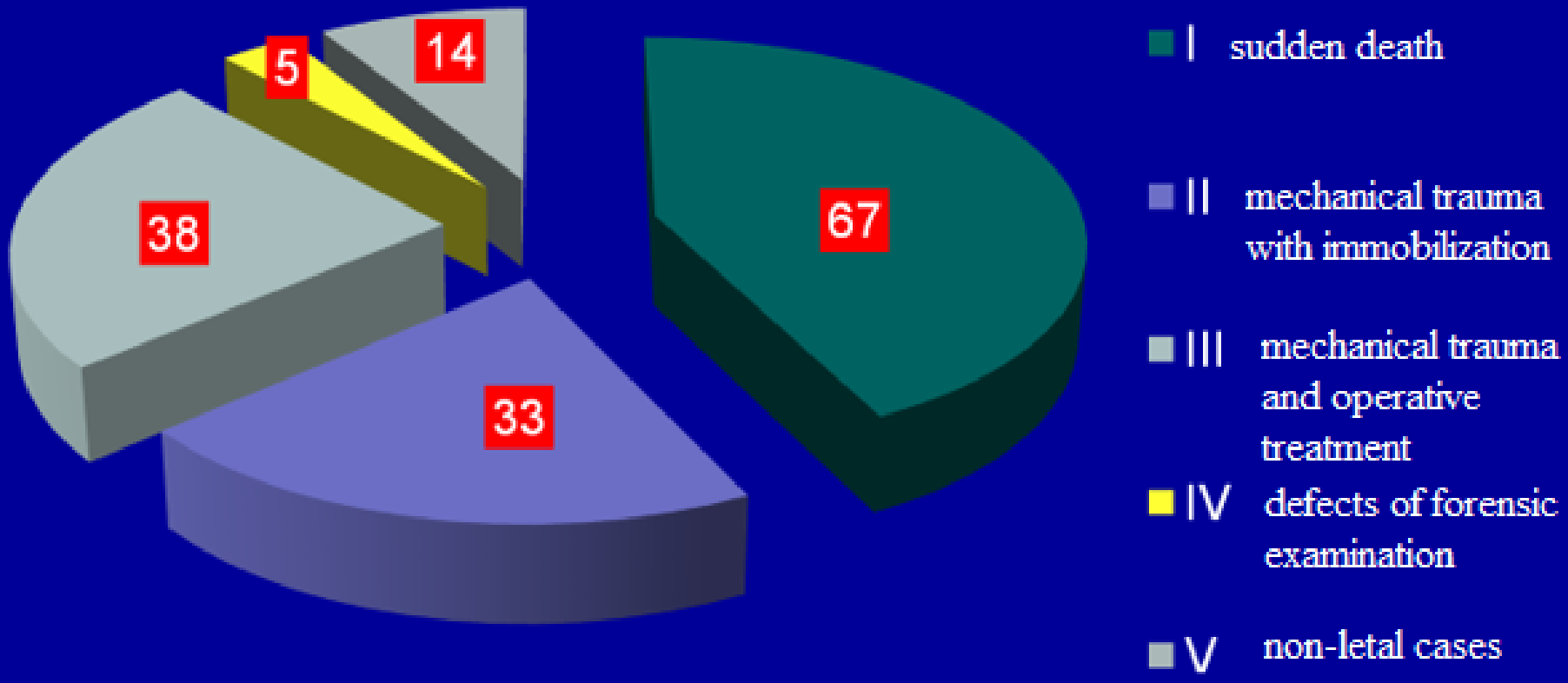
A. Rabovolik

An expert case with a wide social resonance – thrombotic complications in the injured girl after the medical manipulation - peripheral vascular catheterization

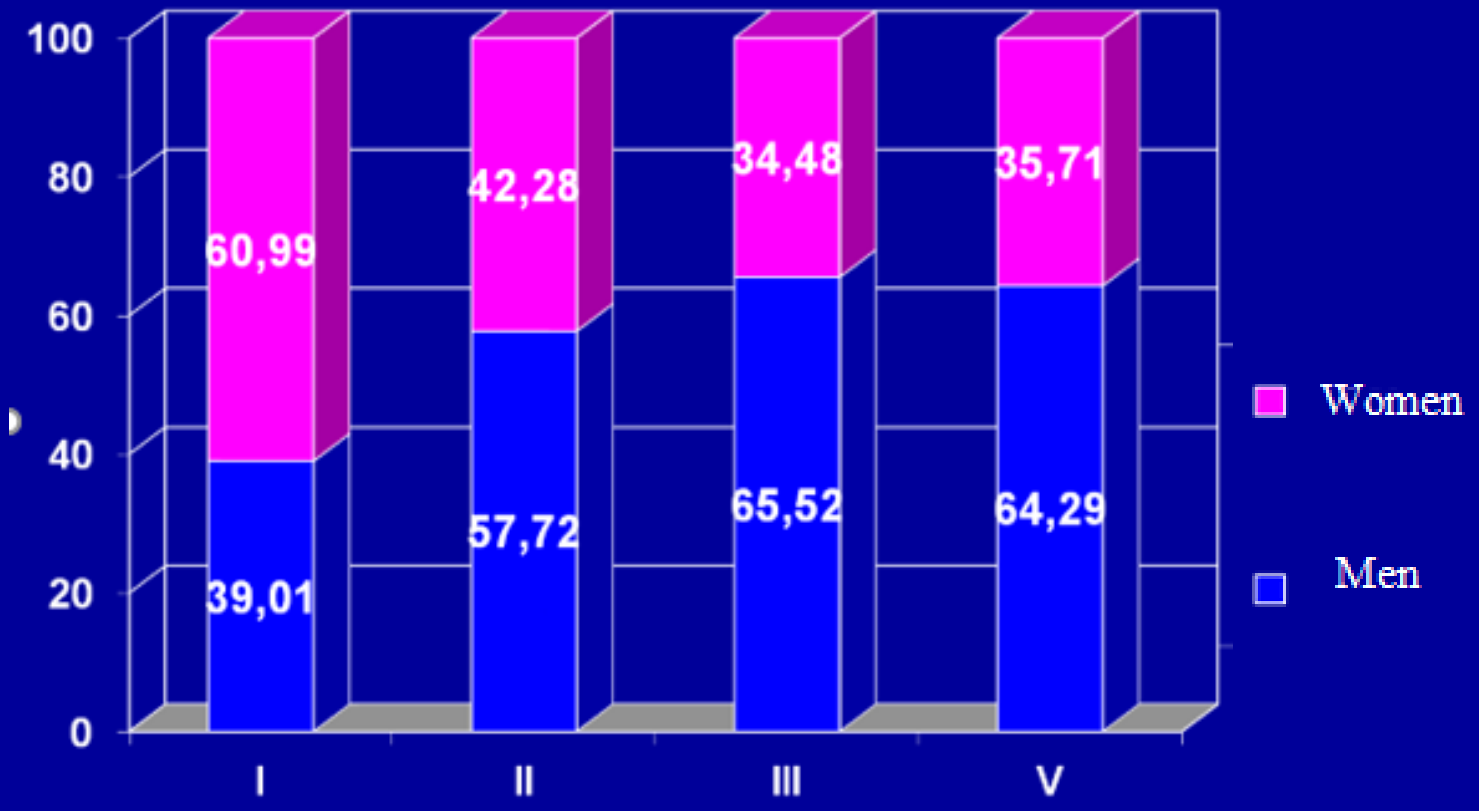
S. Kulivets

Epidemiology of thrombotic complications according to one large bureau of Forensic Medicine in Russian Federation

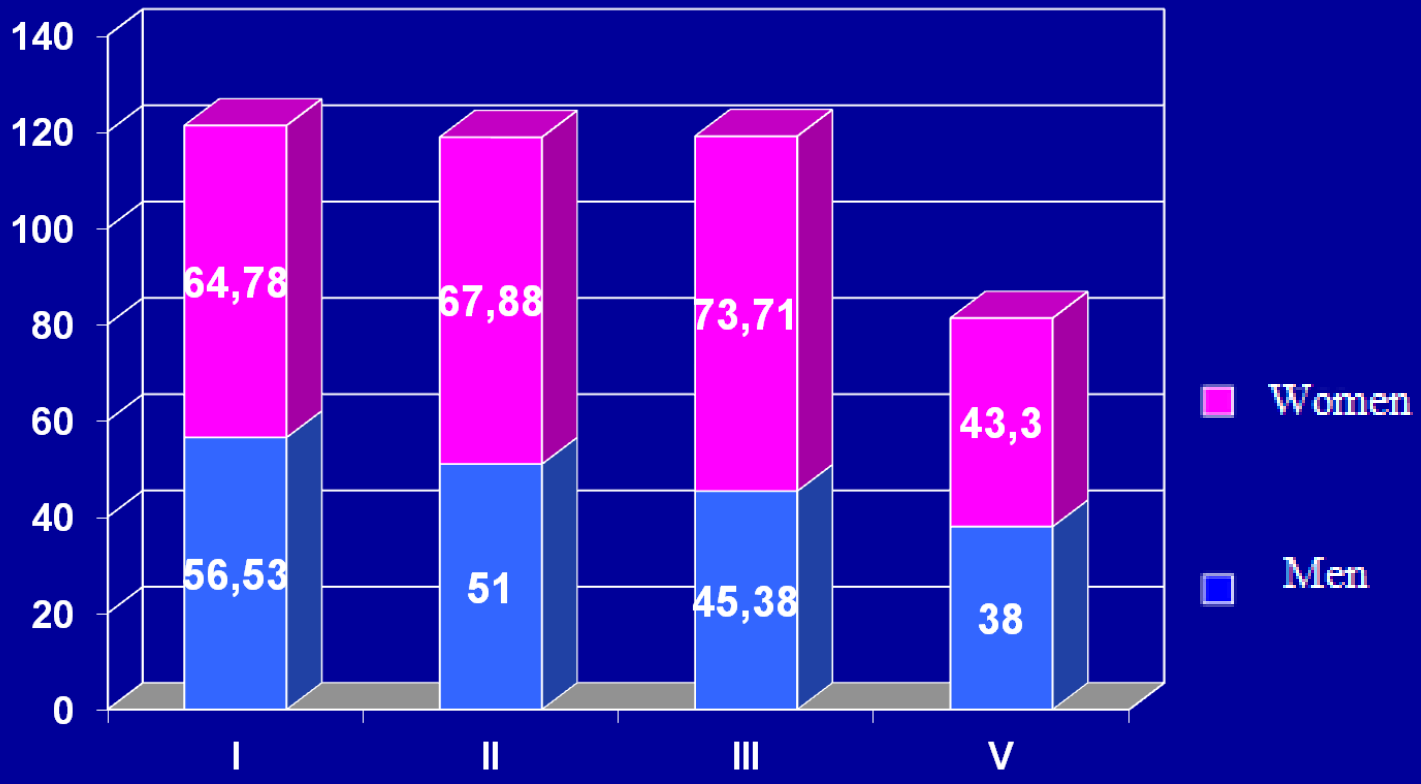
Number of expert cases with pulmonary embolism over a five year period



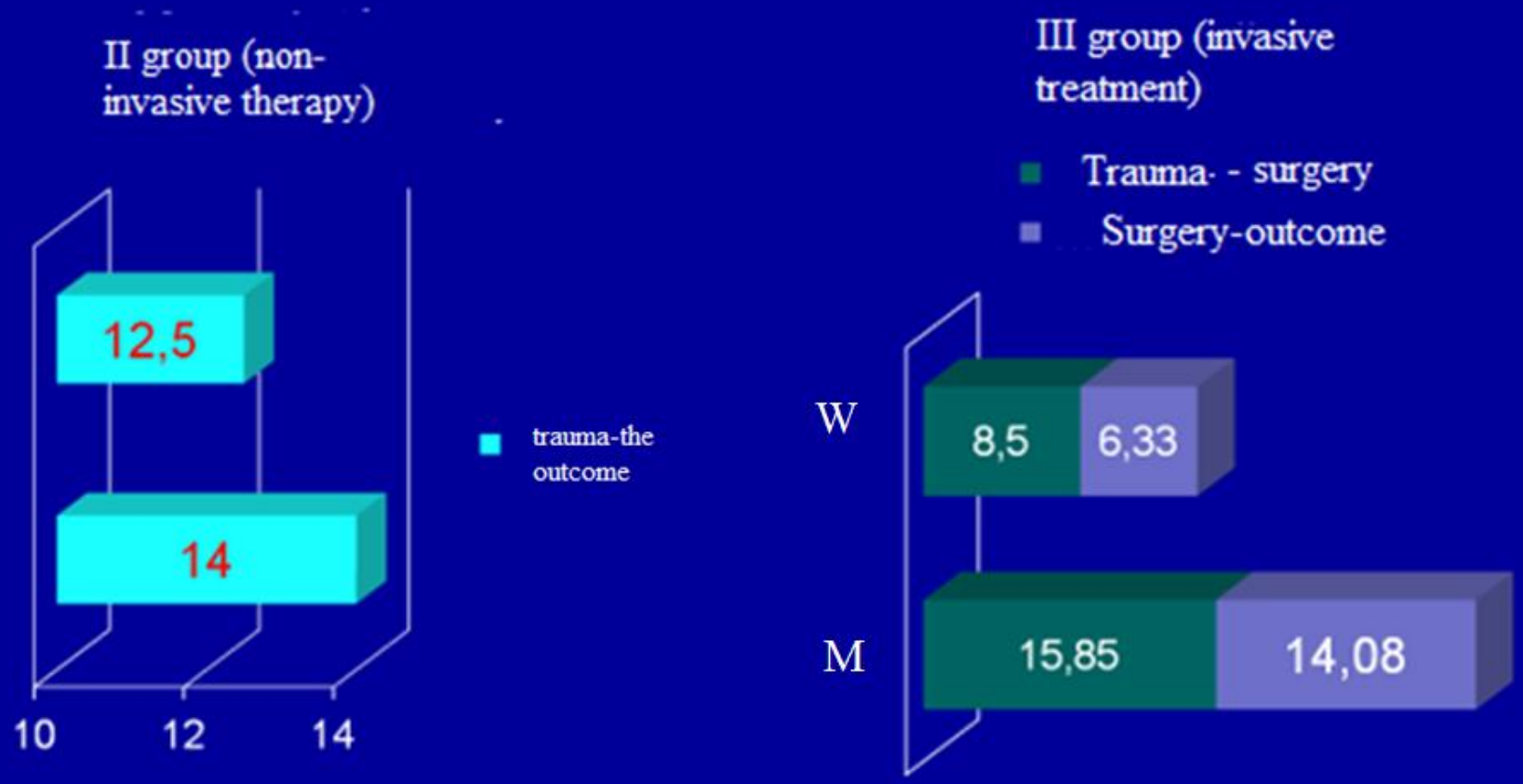
The distribution of cases by sex in the comparison groups (in%)



The average age of victims with thrombotic complications according to the comparison group

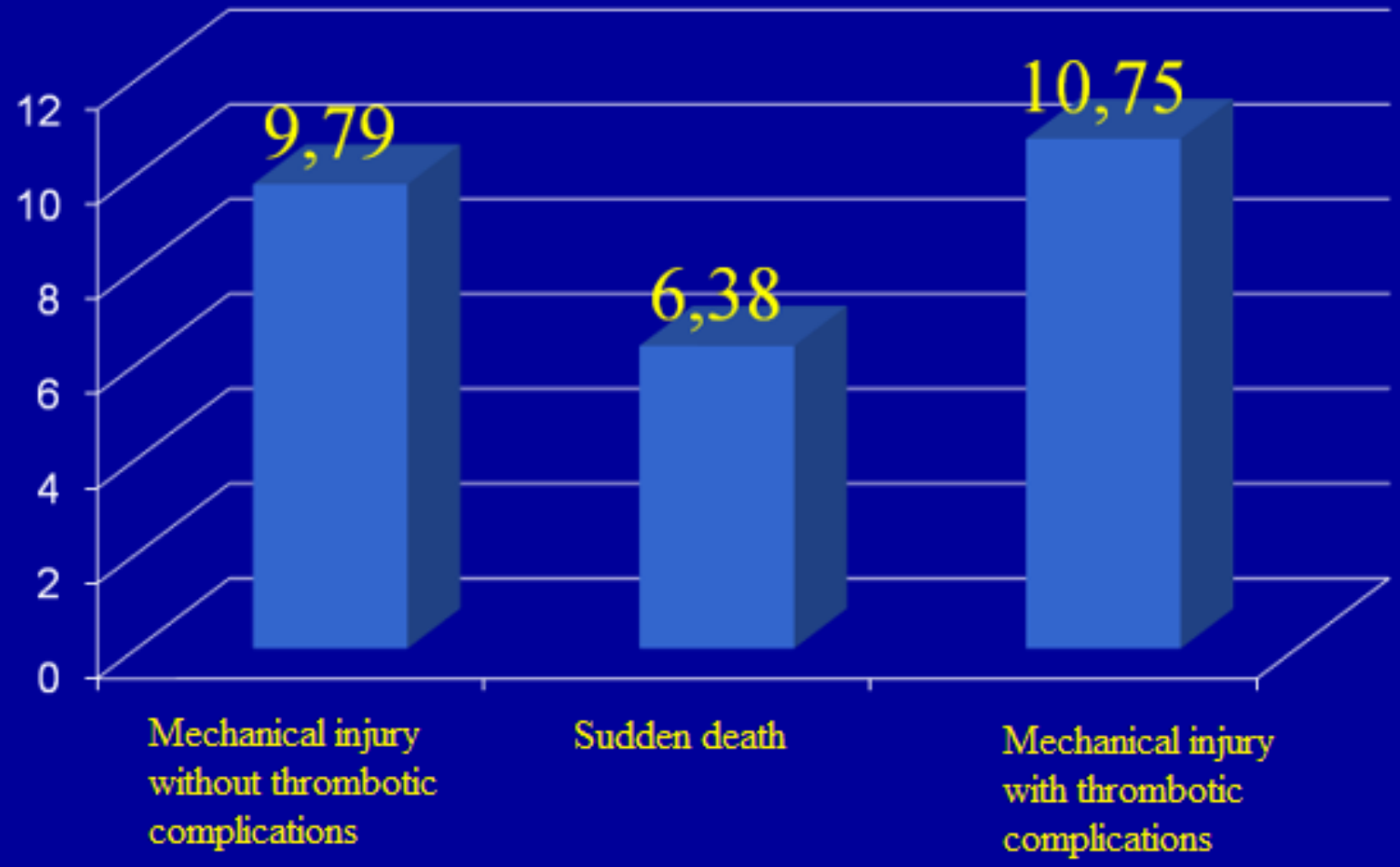


Time (days) of PE manifestation depending on the gender of the victims and methods of surgical treatment in cases of MSS trauma (The "phenomenon of the second week")



- The coefficient of relative risk of thrombotic complications was studied in accordance with the proposed recommendations of the International Society on Thrombosis and Haemostasis (2013)

The value of the relative risk (in arbitrary units) of thrombotic complications in the comparison groups



Genetic factors predisposing to thrombophilia

- Statistically significant differences in the value of the relative risk of thrombotic complications in comparison groups of victims who had mechanical damage, regardless of the method of treatment have not been established, we suggest the presence of genetic factors predisposing to thrombophilia in patients. For this reason genetic typing of biological samples was carried out.

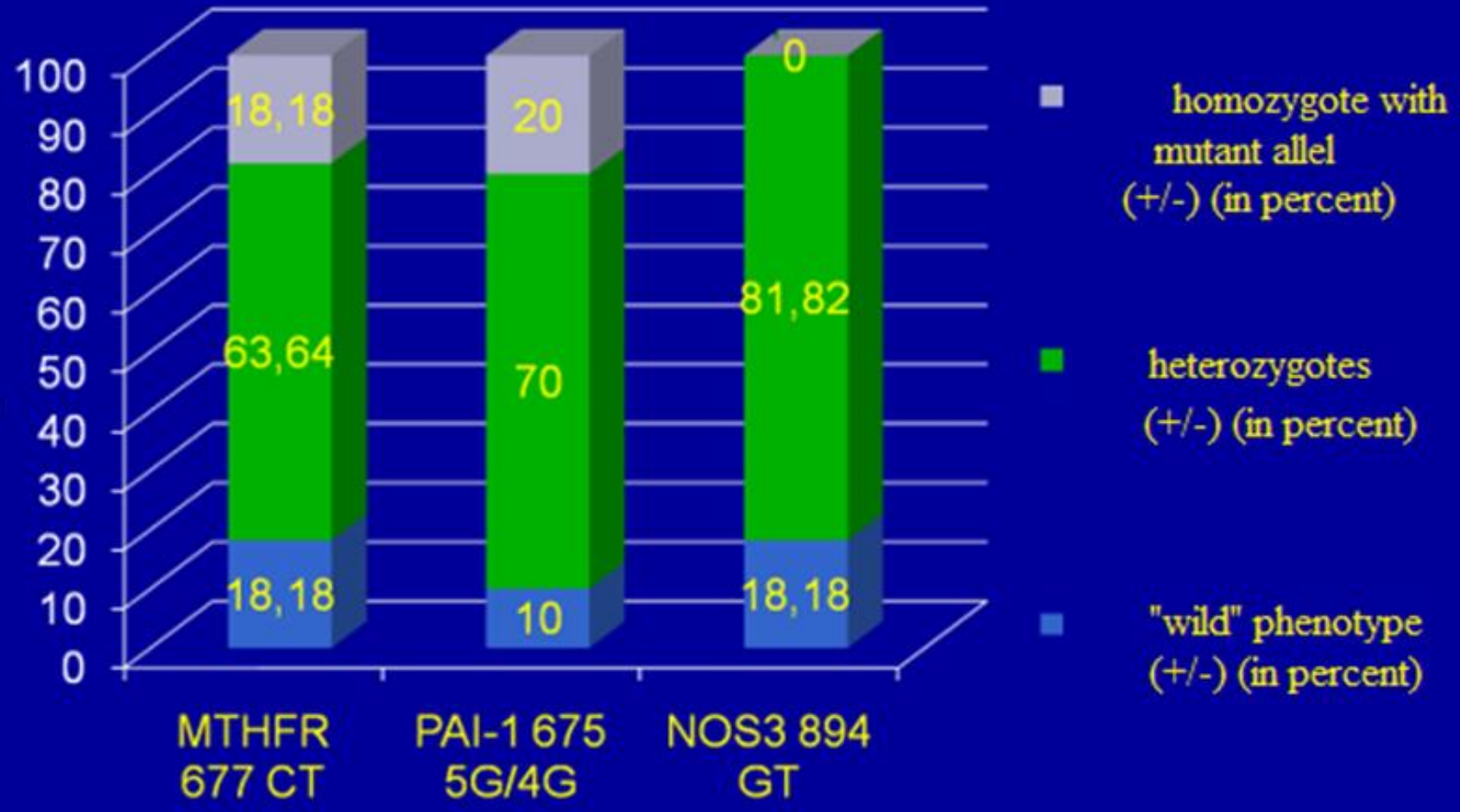
Genes characteristics and their allels

Gene, locus	Protein	Polymorphysm	
FII 11p11	Protrombin	G20210A	rs1799963
FV 1q23	Proacelerin	G1691A	rs6025
MTHFR 1p36.3	Methylentetrahydropholate reductase	C677T	rs1801133
FGB 4q28	Fibrinogen	-455 G/A	rs1800790
PAI-1 7q21.3-q22	Plasminogen activation inhibitor	-675 5G/4G	rs1799768
NOS3 7q35-36	Endothelial NO-synthase (3-rd type)	G894T	Rs1799983

Polymorphic alleles

- The most often polymorphic alleles in people from the group with mechanical damage and subsequent thromboembolic complication were in the genes MTHFR (677CT), PAI-1 (675 5G / 4G), NOS3 (894GT)

The genetic profile of a group of persons with mechanical injury and subsequent thromboembolic complications



CONCLUSION

- Genetic methods have proved themselves in forensic medical examination such as personal identification and identification of parentage.
- The future research techniques will use of molecular diagnostic methods for expert evaluation of sudden death and fatal complications in individuals with hereditary predisposition


THANK YOU FOR
ATTENTION