ANNUAL REPORT SUMMARY FOR TESTING IN 2013
Prepared by the Relationship Testing Program Unit

PREFACE

The annual survey provides information on the state of the relationship testing community and tries to ask questions that may be of interest and track trends in testing. As a reminder evaluation of these data is anonymous. None of the members of the Relationship Testing Standards Program Unit is aware of which laboratories submitted data. Presentation of the most current data occurs every year at the AABB workshop at the International Symposium on Human Identification. Many of the laboratories report testing a broad range of cases, including relationship tests for routine paternity testing, immigration, prenatal evaluations, and post-mortem evaluations. Almost all of the laboratories reporting performed immigration testing, reconstruction (family study) cases.

The Relationship Testing Standards Program Unit (RTSPU) would also like to remind readers that the *Guidance for Standards for Relationship Testing Laboratories,* discusses the *Standards* in some detail and provides suggestions on how to comply with the standards and contains explanations of the standards, various calculations used, and addresses other issues in relationship testing.

ANNUAL VOLUME OF TESTING

The volume reported for cases tested in 2013 was 371,719. Some laboratories did not cooperate and this is an underestimate of the actual number of cases tested by AABB accredited laboratories. Case with chain of custody accounted for 84.4% of the reported case and non-chain of custody cases 15.6%.

LABORATORIES BY SIZE

Table 1 indicates the size of the various responding laboratories by volume of cases reported. Not all of the responding laboratories provided total volumes. Note that this breakdown is by each laboratory, but a single corporation may own several laboratories.

Table 1. Laboratories by the Volume of Cases Reported.

Number of Cases Rerported	Number Laboratories
<100	1
100 - 1,000	12
1,000 - 10,000	3
10,000 - 100,000	1
>100,000	2

EXCLUSION RATE

For 2013 some laboratories did not track the number of exclusions. For the laboratories tracking exclusions there were 371,719 cases completed and 89,675 (24.12%) were reported as exclusions. A summary of the percent exclusion is shown in Table 2.

Table 2. Exclusions seen with Non Chain of Custody (non-legal), with Chain of Custody and Total

	Non-legal	Legal	Total
Exclusions*	28.83%	23.25%	24.12%
Average Exclusion**	30.42%	16.13%	18.03%
Standard Deviation	8.76%	8.77%	8.47%
Median Exclusion Rate	30.19%	17.40%	19.22%
Range	19 - 47%	2 - 33%	4.5 - 33%

*Total Number of Exclusion/Total Cases
 ** Average of the Laboratories participating

COMBINED PATERNITY INDEX (COMBINED LIKELIHOOD RATIO)

The laboratories were asked to indicate what combined paternity index (CPI) they considered acceptable for cases with a standard trio (mother, child, father), single parent cases (mother (or father) not tested cases), and reconstruction cases (cases where the disputed parent is missing and other relatives are used to evaluate parentage). Some laboratories reported using different CPIs for different classes of clients (private verses public contracts, or for different technologies).

The results for the laboratories that responded are shown in Table 3. The most common minimum CPI for a standard trio is 100 with 65% of laboratories using this value, with a range of 100 to 2,500. For mother not tested cases the most common minimum CPI is 100 with 75% of laboratories using this value, with a range of 100 to 2,500. Almost all laboratories considered a likelihood ratio of 100 or less as acceptable for sibling studies.

Table 3. Laboratories minimum combined likelihood ratios (% of laboratories using a W as their minimum) for Standard Trios, One Parent (Mother (or father) not tested), Reconstruction Cases and sibling (Note: not all laboratories indicated a CPI for each type of case).

W	Trio	One Parent	Reconstruction	Full Sibling v. Unrelated	Half Sibling v. Unrelated
What Ever is Obtained	0.00	0.00	78.57	66.67	66.67
1	0.00	0.00	0.00	5.56	5.56
5	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	5.56	11.11
25	0.00	0.00	0.00	0.00	0.00
100	65.00	75.00	21.43	22.22	16.67
101	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00
200	5.00	5.00	0.00	0.00	0.00
500	5.00	0.00	0.00	0.00	0.00
1000	20.00	15.00	0.00	0.00	0.00
1001	0.00	0.00	0.00	0.00	0.00
2500	5.00	5.00	0.00	0.00	0.00
10,000	0.00	0.00	0.00	0.00	0.00
100,000	0.00	0.00	0.00	0.00	0.00

TECHNOLOGY USE

Table 4 provides a breakdown of the technology used to resolve the reported paternity cases.

Table 4. The Technology Used in Cases Reported in 2013

Technology	Number of Cases	Utilization (%)
STR	368357	99.84
RFLP	48	0.01
HLA Class II Molecular	1	0.0003
Y Chromosome	489	0.13
HLA Class 1 Molecular	46	0.01
SNP	0	0.00
Total of All Technologies	368941	100

*Note that some cases used more than one technology.

SAMPLE SOURCE

Laboratories reported approximately 896694 samples used for the casework in 2013. Not all laboratories reported the samples they used. Of these samples, buccal swabs account for 99% of the samples. Whole blood samples accounted for 0.16%. Various other samples were also reported (See Table 5).

Table 5. Sample Source in 2013.

Sample	Number	Percent
Buccal Swabs	892256	99.5051
Blood	1458	0.1626
Blood Spot Cards	1356	0.1512
Amniotic Fluid	463	0.0516
Misc. Tissues	314	0.0350
Paraffin Blocks	67	0.0075
Hair	364	0.0406
CVS	385	0.0429
Bone	31	0.0035
Total	896694	100.00

MUTATION CALCULATION AND FREQUENCIES

Single inconsistencies are routinely seen in the testing of paternity cases. If a laboratory comes to the conclusion that the inconsistency is a mutation, then the mutation result must be incorporated into the reported results. Laboratories were asked how they calculated the paternity index (PI) for these loci. Some laboratories are using, most commonly, use the mutation rate divided by the average probability of exclusion (58.33%) and some laboratories used Brenner's method (20.83%).

Mutation Formulas used

μ/APE	58.33%
Brenner	20.83%
Fimmer	4.17%
μ as PI	8.33%
Standard	4.17%
Other	4.17%

Standard = standard likelihood ratio formula with mutation rate as the transmission possibility
Other = μ / Power of Exclusion