THE NEED FOR TRACEABILITY IN LABORATORY MEDICINE

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... an integrated discipline in health care: risk assessment, diagnosis of health and disease, follow-up and monitoring of patients.

... using physical, chemical, biochemical, immunological, molecular biological techniques for measurements of body fluids, tissues, and cells
Inadequate or incorrect analytical performance has consequences for practical medicine and the health care system:

- incorrect interpretation of results by the physician
  - wrong diagnosis and treatment
  - additional diagnostic procedures
  - impairment of the patient’s situation and behavior
- increase in health care expenses
  - wrong political decisions
### AQAS - Method Target Values in 2 Control Samples

<table>
<thead>
<tr>
<th>Analyte</th>
<th>LIA</th>
<th>EIA</th>
<th>MEIA</th>
<th>RIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFP (ng/ml)</td>
<td>39</td>
<td>32</td>
<td>35</td>
<td>26</td>
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<tr>
<td></td>
<td>79</td>
<td>93</td>
<td>99</td>
<td>72</td>
</tr>
<tr>
<td>CEA (ng/ml)</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
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<tr>
<td></td>
<td>28</td>
<td>31</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>CA 19-9 (U/ml)</td>
<td>12</td>
<td>21</td>
<td>26</td>
<td>15</td>
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<tr>
<td></td>
<td>63</td>
<td>84</td>
<td>87</td>
<td>52</td>
</tr>
<tr>
<td>PSA (ng/ml)</td>
<td>12</td>
<td>7</td>
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<td></td>
<td>120</td>
<td>70</td>
<td>80</td>
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</tr>
</tbody>
</table>
ANALYTICAL BIAS

Number of Measurements

Reference Method

All Routine Methods

One Routine Method

Quantity - Result

R. DYBKAER 1975
EQUAS

NEED FOR STANDARDISATION

- Characterisation of Analyte
- Clinical Needs
- Reference Procedure
- Reference Material
- Reference Laboratories
STANDARDISATION

A technical process to reach conformity of measurement procedures by applying highest scientific standards

REFERENCE SYSTEM

REFERENCE METHODS
REFERENCE MATERIALS
REFERENCE LABORATORIES
• **ISO/EN 15195**
  Requirements for **reference measurement laboratories** in laboratory medicine

• **EN 12286**
  Measurements of quantities in samples of biological origins – Presentation of **reference measurement procedures**

• **EN 12287**
  Description of **reference materials**
TRACEABILITY

Property of the result related to national or international standards through an unbroken chain of comparisons all having stated uncertainties

ISO/EN 17511
Measurement of quantities in samples of biological origin – Metrological traceability of values assigned to calibrators and control materials

ISO/EN 18153
Measurement of quantities in samples of biological origin - Methodological traceability of values for catalytic concentration of enzymes assigned to calibrators and control materials
TRACEABILITY

ISO/EN 17511
Measurement of quantities in samples of biological origin
– Metrological traceability of values assigned to calibrators and control materials

A: traceable to SI
B: non-traceable to SI

• Int’l Reference measurement procedure and int’l calibrator
• Int’l Reference measurement procedure but no int’l calibrator
• Int’l calibrator but no int’l reference measurement procedure
• Manufacturer's measurement procedure but neither int’l reference measurement procedure nor int’l calibrator

EU Lex: Directive 98/79 EC
application on in vitro diagnostic medical reagents
EN 17511
No prim ref proc, no prim ref material

E.g.:
HbA1c

Material

Procedure

Responsibility

International reference measurement procedure

Int'l scientific organisations (IFCC, ISTH, WHO; BIPM)

Manuf's selected procedure

Manuf's working calibr

Manuf's product calibr

Routine sample

RESULT

International conventional calibrator

End-user's routine procedure

ML, End-user

ML

ML

traceability
No prim. int’l conventional calib., no int’l conventional ref. procedure,

E.g.:
Hep B surface Ag Choriogonadotropin

A. Kallner
• Prioritize analytes based on medical needs
• Coordinate development of reference materials/methods
• Develop interpretive guidelines for manufacturers, NMIs, clinical laboratories and medical practitioners to assist implementation of traceability requirements
A JOINT VENTURE OF PROFESSIONALS

from Diagnostic Laboratories (IFCC)
from Metrology (BIPM)
from Certifying Bodies (FDA)
from Diagnostic Industry (AdvaMed, EDMA, JACR)
from Health Authorities (WHO)
from Accreditation Bodies (ILAC)

CONSENSUS
To support comparability and equivalence of measurement results in Laboratory Medicine, through world-wide accepted traceability effort following the principles of metrology.

To support IVD manufacturers in registration and licensing the CE label conforming with the EU directive.
Collaboration with

- Enzymes
- HbA1c
- Cortisol
- others

Not-SI-traceable

Metrology Institutes
Industry
• Workshop, Paris, June 2002
  Foundation of JCTLM
  Promotors: IFCC, CIPM/BIPM, WHO, ILAC
• Priority Setting (medical needs)
  What is needed - not what is easy
• Working-Groups
  Reference Materials
  Reference Measurement Procedures
  Costs - Benefits
• Network of Reference Laboratories
• Recognition by Authorities (NMIs)
Focus on Standardisation and Traceability

♦ Needs for Patients
♦ Excellence in Analytical Performance based on modern concepts of metrology and science

...will add QUALITY and VALUE to CLINICAL CHEMISTRY and LABORATORY MEDICINE