Edutrak 3308
Metrological Traceability of In-Vitro Diagnostic Calibrators:
Emerging Issues
F. William Sunderman, MD, PhD, ScD
23 October, 1898 - 9 March, 2003
“It’s A Small World”

Richard and Robert Sherman
Trends in International Migration

• “The Rapid increase in the foreign-born population from 9.6 Million in 1970 to 28.4 million in 2000 reflects the high level of international migration during the past generation”

• U.S. Census Bureau “Profile of the Foreign Born Population in the United States: 2000
### Trends in International Commerce
Foreign Autos in the U.S.

<table>
<thead>
<tr>
<th>Acura</th>
<th>Alfa Romeo</th>
<th>Audi</th>
<th>BMW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buick</td>
<td>Daewoo</td>
<td>Dodge</td>
<td>Eagle</td>
</tr>
<tr>
<td>Geo</td>
<td>Honda</td>
<td>Hyundai</td>
<td>Jaguar</td>
</tr>
<tr>
<td>Infiniti</td>
<td>Isuzu</td>
<td>Kia</td>
<td>Land Rover</td>
</tr>
<tr>
<td>Lexus</td>
<td>Mazda</td>
<td>Mercedes</td>
<td>Mitsubishi</td>
</tr>
<tr>
<td>Nissan</td>
<td>Porsche</td>
<td>Saab</td>
<td>Subaru</td>
</tr>
<tr>
<td>Suzuki</td>
<td>Toyota</td>
<td>Volkswagen</td>
<td>Volvo</td>
</tr>
</tbody>
</table>

(Olympic Imported Parts Corp. Catalog List)
Trends in Laboratory Testing

• The U.S. exported $2,074MM in Laboratory testing instruments from January to May, 2003.

• The U.S. Imported $ 895MM in Laboratory testing instruments from January to May 2003.
Excluding home diagnostics,

- World wide IVD market is $20 billion
- The IVD market in Europe was 5.6 billion in 1998 and estimated at 6.6 billion in 2002
- 60% of the IVD products currently on the market in Europe are imported from the USA
Metrological Traceability

The traceability of values assigned to calibrators and/or control materials must be assured through available reference measurement procedures and/or available reference materials of a higher order - IVD Directive Annex 1 Section A.3

The measurement of quantities in biological samples requires reference measurement systems including:

- The definition of the analyte…
- A reference measurement procedure…
- Suitable Reference materials….

ISO 17511 Introduction
Harmonization of Results

CAP Medical usefulness limits - established using sensitivity analysis to determine the effect of analytic error on test diagnostic efficiency.

The Limits are for total error relative to a true value and are not appropriate for use with a peer group mean.

- Calcium: 3.3%
- Cholesterol: 6.6%
IRMM - IMEP 17 Trace and Minor Constituents in Human Serum

IMEP®

provides certified values with demonstrated traceability and demonstrated uncertainty, independent of the participants’ results

enables result-oriented rather than procedure oriented evaluation of performance

demonstrates a degree of equivalence in measurement results on an international scene
Human Serum Pool - reference method based values assigned
Sent to 1037 participants in 35 countries
Individual laboratories submitted 10 results collected over 5 days
20 Constituents

http://www.imep.ws/maintenance.htm?aspxerrorpath=/
IMEP 17 - Calcium

IMEP 17: Trace and minor constituents in human serum
Certified value: 2.334 2 ± 0.006 9 mmol·L⁻¹ \([U = k \cdot u_c \ (k=2)]\)

Results from all participants (983 laboratories)
IMEP 17 - Calcium

IMEP-17: Trace and minor constituents in human serum
Certified value: 2.3342 ± 0.0069 mmol·L\(^{-1}\) \([U=k \cdot u_c \ (k=2)]\)

Results from all participants from Germany (20 laboratories)
IMEP-17: Trace and minor constituents in human serum
Certified value: 2.334 ± 0.0069 mmol·L⁻¹ [U = k·uᵣ (k = 2)]

Results from all participants from USA (51 laboratories)
IMEP - Cholesterol

IMEP-17: Trace and minor constituents in human serum
Certified value: 5.111 ± 0.021 mmol·L⁻¹ \[ U = k \cdot u_c \ (k=2) \]

Results from all participants from Germany (20 laboratories)
IMEP - Cholesterol

IMEP- 17: Trace and minor constituents in human serum
Certified value: 5.111 ± 0.021 mmol·L⁻¹ [U=k·u_c (k=2)]

Results from all participants from USA (49 laboratories)