IFCC Task Force on Pediatric Laboratory Medicine

Improving diagnosis and management of patients from birth to adolescence

• Historical Background
• Motivation
• Aims and Goals
• Current status
IFCC Task Force on Pediatric Laboratory Medicine

History:

International Congresses of Pediatric Laboratory Medicine (ICPLM)

Start: 1st ICPLM, Jerusalem, 1980

Already in cooperation with IFCC
ICPLM - International Congresses of Pediatric Laboratory Medicine

- 1980 Jerusalem, Israel
- 1983 Toronto, Canada
- 1986 Bristol, United Kingdom
- 1989 Washington, DC, USA
- 1992 Bordeaux, France
- 1995 Vancouver, Canada
- 1998 Lisbon, Portugal
- 2001 Cairo, Egypt
- 2003 Rome, Italy
- 2005 Singapore
Most recent ICPLM:
Singapore,
September 2005

In cooperation with
SACB and IFCC

ICPLM - International Congresses of Pediatric Laboratory Medicine

10th INTERNATIONAL CONGRESS OF
Pediatric Laboratory Medicine (ICPLM)
SEPTEMBER 3 - 6, 2005
RAFFLES CITY CONVENTION CENTRE, SINGAPORE

Welcome Message:

EAST MEETS WEST
Meeting The Challenges In Pediatric Diagnosis And Management

On behalf of the Organising Committee of the 10th International Congress of Pediatric Laboratory Medicine (ICPLM), the International Association of Pediatric Laboratory Medicine (IAPLM), the International Association of Pediatric Laboratory Medicine (IAPLM), and the Singapore Association of Clinical Biochemists (SACB), we would like to extend a warm invitation to you to visit Singapore from 3 – 6, September 2005. Singapore is indeed proud to be the first Asia Pacific country to host the ICPLM. We plan to focus our attention on the latest scientific and technological achievements in all areas of pediatric clinical and diagnostic laboratory medicine and we are certain that all participants of this conference will be enriched and encouraged by its contents.

The scientific program will be wide-ranging and includes diagnostics in childhood malignancy, infectious disease testing, challenges of the neonate and the adolescent to the clinical laboratory, the importance of pharmaceutics, allergy and immunology. Informative interactive sessions with experts during clinical case presentations are also among the offerings. This program will appeal to a wide variety of participants including laboratory physicians, scientists and technologists, as well as practicing clinicians in pediatrics, neonatology, infectious diseases and family medicine.

We have not forgotten the lighter side of conferencing and invite you to take the opportunity to visit the many splendors of Singapore and our neighbouring islands. With the support of the Singapore Tourism Board, we will ensure that you experience the rich cultural diversity and cuisines of the island.

So put these dates in your diary – we look forward to hosting you in Singapore in September 2005!
ICPLM - International Congresses of Pediatric Laboratory Medicine

• 1995 Vancouver, BC, Canada:

“….the International Congresses on Pediatric Laboratory Medicine. These Congresses have been extremely successful, but the field now needs an ongoing association to serve this community of leaders in pediatric medicine.”

Foundation of the International Association of Pediatric Laboratory Medicine (IAPLM)

First President: Jocelyn Hicks
Foundation of the International Association of Pediatric Laboratory Medicine (IAPLM)

“The IAPLM is dedicated to:

• Enhancing the science and practice of pediatric laboratory medicine

• Advancing the interests of pediatric clinical pathologists and scientists through continuing education

• Providing camaraderie and a network among international leaders in laboratory medicine

• Recognizing outstanding contributions to the field”
International Association of Pediatric Laboratory Medicine (IAPLM)

Article 2. Purpose

The purpose for which the Association is formed is to:

a) carry on, without pecuniary gain, a scientific and professional association for the advancement of pediatric laboratory medicine

b) to hold scientific and educational meetings and conferences

c) to disseminate information of professional interest

d) to encourage the development of scientific knowledge and use of improved methods, practices and techniques applied to pediatric laboratory medicine

e) to establish affiliation and/or close liaison with other societies or associations whose programs may be related to pediatric laboratory medicine in the interest of the public.

The association shall operate as a not-for-profit organization and pecuniary benefit shall not incur to any member.
Welcome to the Website of the International Association of Pediatric Laboratory Medicine!

The International Association of Pediatric Laboratory Medicine was founded in 1994 as an outgrowth of the International Congresses on Pediatric Laboratory Medicine. These Congresses have been extremely successful, and it was decided to formalize a professional association to serve the ongoing need of all workers worldwide in the field of pediatric laboratory medicine.
International Association of Pediatric Laboratory Medicine (IAPLM)

• 2005 ICPLM, Singapore

“....the time has come to ensure the continuing work of the Association by folding into a larger organization....”

Proposal to IFCC to establish Task Force Pediatric Laboratory Medicine (TF-PLM)
IFCC Task Force on Pediatric Laboratory Medicine

- Historical Background
- Motivation
- Aims and Goals
- Current status
Why TF Pediatric laboratory medicine?

• Children are not simply small adults – this holds especially true when they become patients. Pediatric patients comprise a group with special problems, also with regards to the results of laboratory investigations.

• Local and regional activities exist in which an exchange of ideas and concepts for the role of the laboratory in the care of children’s health take place, but in general, these activities are not linked to each other.

• In spite of a variety of activities in the past years, reference ranges for laboratory test results are often not very well defined for the pediatric and adolescent population.

• The subject of the Task Force is obviously relevant to large numbers of people – a substantial proportion of our patients are children.

• Especially in pediatric patients, the role of the laboratory is crucial for diagnosis and follow-up, e.g., in metabolic disorders or genetically determined diseases.
Why TF Pediatric laboratory medicine?

**Children are not small adults:**
*Challenges with Neonates*

**1000 g baby**
- Has 80 mL of blood
- 45 mL is plasma
- 1 teaspoon is 4.5 mL

**First week of life**
- 5 to 12 samples taken/day

**Transfusion required**
- If >10% (8 mL) is withdrawn over a 2-3 days period
Children are not small adults: Physiological/Metabolic Changes

Neonate
- Hepatic microsomal enzyme systems, renal and hepatic function are immature

Six months to puberty
- Hepatic microsomal enzyme system has approximately double the activity of the adult

Puberty to adult
- The activity of the system decreases and eventually reaching the same activity as the adults

Pediatric Reference Intervals Need to reflect differences in:
- Organ growth
- Development & physiologic function at different ages
IFCC Task Force on Pediatric Laboratory Medicine

- Historical Background
- Motivation
- Aims and Goals
- Current status
Three overall aims are pursued by the Task Force:

• To coordinate activities worldwide directed towards the establishment of reference ranges for laboratory test results in pediatric patients of all age groups

• To form a sound support basis for the continuation of the International Congresses of Pediatric Laboratory Medicine which have been very successful over the past 25 years

• To create a world wide network of scientists working in laboratories specialized in Pediatric Medicine.
Activities of the TF-PLM:

• Coordinate, promote and develop existing IFCC SD research activities associated with reference ranges. Existing regional groups within IFCC, e.g., the Nordic States (Denmark, Sweden, Norway, Finland and Iceland) are currently engaged in the development of Pediatric Reference values. By close interaction with this group and the IFCC SD, the Task Force will expand these activities to other regions of the world.

• Integrate and eventually merge the Board of the International Association of Pediatric Medicine into the Task Force and continue to motivate the then former members of this Association worldwide to support the activities of the Task Force.

• Establish a concept for the next International Congress of Pediatric Medicine, to be held in 2007 or 2008. As the preferred setting, the Congress will be held in conjunction with an IFCC meeting or a meeting taking place under the auspices of IFCC.

• Regularly publish reports on the progress of the Task Force’s activities and other relevant articles in the field of Pediatric Laboratory Medicine in the IFCC Journal.
IFCC Task Force on Pediatric Laboratory Medicine

Current Status:

• Merger of IAPLM with IFCC TF approved by Executive Board of IAPLM
• Call for Participation in the TF issued
• First members appointed
• ICPLM2008 in preparation
IFCC Task Force on Pediatric Laboratory Medicine

First members appointed

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>City</th>
<th>Country</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member</td>
<td>Lockitch</td>
<td>Vancouver</td>
<td>Canada</td>
<td>North America</td>
</tr>
<tr>
<td>Member</td>
<td>Jones</td>
<td>Dallas</td>
<td>U.S.A.</td>
<td>North America</td>
</tr>
<tr>
<td>Member</td>
<td>Sethi</td>
<td>Singapore</td>
<td>Singapore</td>
<td>Asia</td>
</tr>
<tr>
<td>Member</td>
<td>Coakley</td>
<td>Sydney</td>
<td>Australia</td>
<td>Australia</td>
</tr>
<tr>
<td>Chair</td>
<td>Kohse</td>
<td>Oldenburg</td>
<td>Germany</td>
<td>Europe</td>
</tr>
</tbody>
</table>

Still more members needed!
IFCC Task Force on Pediatric Laboratory Medicine

**Current Status: Pediatric Reference Ranges**

Existing Activities for Pediatric Reference Values:

National Societies of Clinical Chemistry:
• Pediatric and Maternal-Fetal Division, AACC

Regional cooperations of National Societies of Clinical Chemistry:
• NORICHLID

National Societies of Clinical Chemistry in cooperation with National Health Services:
• DGKL / RKI

Commercial laboratories:
• CHILDx (ARUP, in cooperation with the University of Utah)
IFCC Task Force on Pediatric Laboratory Medicine
Project „Pediatric Reference Intervals“:

**What is available?**
Existing literature (examples):


Heil, Kobberstein, Zawta: Reference ranges for adults and children, 2004 (Roche)
Existing Activities for Pediatric Reference Values:

National Societies of Clinical Chemistry:
• Pediatric and Maternal-Fetal Division, AACC

The Pediatric and Maternal-Fetal Division website is designed to provide a forum for the dissemination of information about analytes, methods of analysis, reference ranges for pediatric and maternal-fetal patients. The Division will encourage research in specialized areas of Pediatric, Maternal and Fetal Clinical Chemistry and operate a communications service to provide assistance to clinical chemists and other laboratory scientists with immediate problems in the field of Pediatric and Maternal-Fetal Clinical Chemistry.
Existing Activities for Pediatric Reference Values:
Pediatric and Maternal-Fetal Division, AACC

Pediatric Reference Range Initiative

Request For Your Assistance
A number of interested individuals, along with the Pediatric and Maternal-Fetal (PMF) Division of the American Association of Clinical Chemistry (AACC), have undertaken an initiative to improve pediatric reference ranges. We would like to accomplish this through a number of means, including...

Current Reference Studies, Jan 2006
During the last AACC meeting, the AACC Pediatric and Maternal-Fetal Division held a fruitful meeting to discuss one recurrent issue in pediatric Clinical Biochemistry laboratories: Pediatric Reference Intervals. We canvassed our members through the listserv for any studies being undertaken, both recently published and ongoing. This is a short summary of the responses we received on ongoing studies on the establishment of reference intervals,

The Childx study -- Information of this study can be found on the Childx website.
This group has also recently published reference values for coagulation studies, Flanders, M.M., Crist, R.A., Roberts, W.L., Rodgers, G.M. Pediatric reference intervals for seven common coagulation assays, Clin. Chem., 2005;51:1738-42.

Another response came from one of our members in Turkey. This group is involved with newborn screening, and had published some data about Biotinidase levels and nTSH levels, a collaborative study with Belgium Metabolism lab (PCMA). The reference is A MARKED DIFFERENCE BETWEEN TWO POPULATIONS UNDER MASS SCREENING OF NEONATAL hTSH AND BIOTINIDASE ACTIVITY (English)
-ACCREDIT QUAL ASSUR 7 (11): 498-506 NOV 2002
You can download that from www.tanyalcin.com and it is paper Number4. In addition they have information on GALT (galactosyl transferase ) activity, and you may want to contact Dr Tijen Tanyalcin , MD, PhD at tijen.tanyalcin@ege.edu.tr

There is also a Pediatric Reference range initiative that is ongoing in Canada involving the Caliper group. This is a national initiative and the leaders are Drs K. Adeli, and Dr N. Lepage. Other smaller Canadian studies include the urine reference range project headed by Dr V. Grey, and Dr M. Potter at McMaster University, Hamilton Ontario. They are currently recruiting subjects for developing reference ranges for analytes used in screening for nephrolithiasis, and metabolic screening on random urine collection. Dr Adeli has just completed a study on the Fusion 5.1 and these results have been submitted for publication.

Minutes of July 2005 Meeting
AACC Pediatric Reference Range Initiative

II. Proposed Purpose of the Initiative

Provide pediatric ranges for the common analytes on an accessible website. (electrolytes, glucose, etc)

(This would be geared toward anyone needing pediatric ranges, but specifically we were considering those places that don’t do a lot of pediatrics and just need these ranges occasionally, like predominately adult hospitals.)

Provide a forum for groups working on pediatric reference ranges to interact

(This would hopefully provide a comprehensive list of on-going studies, to prevent duplication of effort, and facilitate interaction between groups working on the same or similar projects.)

Look into also doing Maternal-Fetal reference ranges

Provide support for answering questions related to pediatric reference ranges
February 6, 2006

To Whom it May Concern:

A number of interested individuals, along with the Pediatric and Maternal-Fetal (PMF) Division of the American Association of Clinical Chemistry (AACC), have undertaken an initiative to improve pediatric reference ranges. We would like to accomplish this through a number of means, including: 1) providing information about what groups are currently conducting reference ranges, 2) helping those groups who are interested in performing reference range studies, and 3) providing information regarding pediatric reference ranges in an easily accessible format and location.

As one of the starting points for this initiative, I am collecting information on existing pediatric intervals for common chemistry analytes. I am asking individuals at pediatric institutions to share the pediatric ranges you are currently using for chemistry tests, along with what instrumentation you use. I will be happy to provide the ranges we currently use at Children’s Medical Center of Dallas (CMCD) if you are interested in that information. If it is easier to send all your chemistry ranges, please feel free to do so, however I would like to start by collecting ranges for the following analytes:

- Sodium
- Potassium
- Chloride
- Total CO₂
- Glucose
- BUN
- Creatinine
- Bilirubin
AACC Pediatric Reference Range Initiative

Results of the Initial Meeting.
Common analyte ranges (PMF Division liaison – Patti Jones)

Two ideas:

• Have pediatric institutions send three months worth of data on the specific analyte being worked on.

If possible, specify data from outpatients and elective surgery patients

May need to check on IRB needs, or remove all identifiers other than age and sex

• Collect historical ranges that are currently in use from pediatric institutions

traceability to analyzer may be questionable

ranges validated by years of use and physician acceptance

• Collect a list of current studies, including recently published and ongoing

Define a consensus protocol and approach for designing new studies.
Activities to establish Pediatric Reference Intervals

National Clinical Chemistry Societies:
  • Projekt CALIPER, CSCC

Canadian Laboratory Initiative on Paediatric Reference Interval database

CALIPER
Current gaps in the pediatric reference intervals

A rapid survey of the current literature reveals that there are significant gaps in the availability of age appropriate, and gender-specific reference intervals. Laboratories and clinicians depend, at the present time, on scattered and incomplete data, either published or unpublished.

Comprehensive pediatric reference intervals are only available on a limited number of disease biomarkers, therefore limiting the benefit of using the biomarkers as tools for patient management. Almost all available reference intervals have been determined on Caucasian populations. Because Canada is multiethnic, reference intervals should reflect this state.

Finally, the following statements argue in favor of up-dating reference intervals in Canada.
CALIPER

- First discussed at the 2003 CSCC meeting in St-Sauver, Quebec by the Paediatric Focus group
- First meeting – Toronto, May 2004
- Second meeting – Toronto, March 2005
- Third Meeting – Victoria, CSCC Annual Meeting June 2006
- Needs assessment (Gap analysis) by Clinical Biochemistry fellows
- Funding agencies targeted
- Industry partners invited to participate
Canada-Wide Focus Groups
CALIPER database

- Endocrinology, including Bone Markers
- Nutrition Markers
- Metabolism/Lipids/ Lipoproteins/Diabetes/
  Obesity Biomarkers
- Inborn Errors of metabolism markers
- Cardiac/ Cardiovascular/ Stroke Markers
- Non-plasma/Non-serum markers
- Hematology/ Coagulation markers
Editorial

Pediatric reference intervals: Critical gap analysis and establishment of a national initiative

The last two decades, clinical diagnostic laboratories have witnessed a tremendous increase in the variety of biomarkers and major technology changes. Sensitivity, specificity and predictive values are the major attributes of biomarkers as screening and diagnostic tools as they will provide guidance in groups have been targeted for the CALIPER database: Birth–2 weeks; 2 weeks–6 months; 6–12 months; 1–2 years; 2–5 years; 5–8 years; 8–10 years; 10–14 years; 15–20 years. Sample collection will be performed in various locations, depending on child age. They will include schools, daycares,
PARTICIPANTS

Esa Hämäläinen  HUSLAB, Helsinki, Finland
Lotta Joutsi-Korhonen  HUSLAB, Helsinki, Finland
Isleifur Olafsson  Landspitali Reykjavik, Island
Peter Ridefelt  Akademiska Hospital, Uppsala, Sverige
Lars Mørkrid  Rikshospitalet, Oslo, Norge
Søren Ladebjerg  Århus hospital, Denmark
Nete Hornung  Randers Central Hospital, Denmark
4 Phases:

1) Identification of parameters
2) Extensive literature search
3) Extraction of existing („historical“) data from LIS, statistical analysis
4) Collecting and storage of new samples from selected children
NORICHLID: Scandinavian Initiative for the Establishment of Pediatric Reference Intervals

### Allmän kemi

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Enhet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin</td>
<td>g/L</td>
</tr>
<tr>
<td>Alkaliskt fosfatas</td>
<td>U/L</td>
</tr>
<tr>
<td>ALAT</td>
<td>U/L</td>
</tr>
<tr>
<td>Amylas</td>
<td>U/L</td>
</tr>
<tr>
<td>Amylase, pankreas</td>
<td>U/L</td>
</tr>
<tr>
<td>ASAT</td>
<td>U/L</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>µmol/L</td>
</tr>
<tr>
<td>Calcium</td>
<td>mmol/L</td>
</tr>
<tr>
<td>Calcium joniserat, pH = 7.4</td>
<td>mmol/L</td>
</tr>
<tr>
<td>urea</td>
<td>mmol/L</td>
</tr>
<tr>
<td>kolesterol</td>
<td>mmol/L</td>
</tr>
<tr>
<td>CK</td>
<td>U/L</td>
</tr>
<tr>
<td>kreatinin</td>
<td>µmol/L</td>
</tr>
<tr>
<td>CRP</td>
<td></td>
</tr>
</tbody>
</table>
Åldersuppdelade medianvärden

NORICHLID: Scandinavian Initiative for the Establishment of Pediatric Reference Intervals

<table>
<thead>
<tr>
<th>Kvinnor + män</th>
<th>Antal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 dag</td>
<td>160</td>
</tr>
<tr>
<td>2-6 dagar</td>
<td>239</td>
</tr>
<tr>
<td>7-14 dagar</td>
<td>39</td>
</tr>
<tr>
<td>15-28 dagar</td>
<td>22</td>
</tr>
<tr>
<td>1-12 mån</td>
<td>256</td>
</tr>
<tr>
<td>1-10 år</td>
<td>1499</td>
</tr>
<tr>
<td>10-18 år</td>
<td>2056</td>
</tr>
<tr>
<td>19-20 år</td>
<td>956</td>
</tr>
</tbody>
</table>
Mission of CHILDx
To improve the healthcare of children by working together with pediatric laboratory medicine and other health care professionals in a collaborative, academic, and clinical environment.

Vision of CHILDx
To be the leader in healthcare information and knowledge on pediatric laboratory medicine.

Existing Activities for Pediatric Reference Values:

Commercial laboratories:
• CHILDx (ARUP, in cooperation with the University of Utah)
Children’s Health Improvement through Laboratory Diagnostics (CHILDx) was formed in 1999, sponsored by ARUP Laboratories and the University of Utah Department of Pathology, and includes a National Advisory Committee. CHILDx focuses on the very special and unique challenges of pediatric laboratory medicine. Working in partnership with pediatric health care professionals across the country, CHILDx aspires to improve the health care of children through service, education, and research in pediatric laboratory testing.

**2007 Fall Symposium**
Hosted in Salt Lake City, Utah. For program information, and to register... [Read more.]

**Pediatric Sample Sizes**
CHILDx Advisory Board invited a variety of industry representatives to a mini-symposium to address the challenges related to pediatric sample size... [Read more.]

**Supplemental Newborn Screening**
Information on a supplemental newborn screening project advocated by CHILDx to include metabolic disorders... [Read more.]

**Pediatric Laboratory Medicine Challenges**
A recent special article authored by CHILDx board members examines why lab tests in children are different than in adults. [Read more.]

**Pediatric Reference Interval Projects**
Review studies regarding reference intervals in clinical laboratory tests by ages. Blood and urine samples will be collected from healthy male and female subjects. [Read more.]

**Pediatric Testing Survey**
U.S. laboratory professionals to identify the most important criteria for working with reference labs, and the priorities of various factors related to pediatric testing... [Read more.]
Pediatric Reference Laboratory Testing Survey
May 2002

Areas identified for improvement:

• Turnaround time (14.3% of responses),
• Reference ranges,
• Price,
• One-stop shopping (each 10.7% of responses).
Pediatric Reference Interval Project

Title of Study: Blood and Urine Samples for Pediatric Reference Interval Determinations for Clinical Laboratory Tests

Clinical laboratory testing is generally done by measurement of substances in serum or urine. In order to validate a method for use in the diagnosis of clinical disorders, the hormones or chemical substances must be measured in large normal populations of various ages and both genders. Once the reference intervals for normal subjects are determined, the test can then be used more accurately for the diagnosis of clinical disorders. The purpose of this protocol is to collect both blood and urine specimens from normal subjects for the purpose of determining pediatric reference intervals for a number of clinical laboratory assays.

Length of Study: Indefinite (2-3 years will probably be required)

Number of Subjects: 2,600 for entire study
Commercial Laboratories' Activities for Pediatric Reference Values:

Limitations:

- Age 7 to 17 only
- No statistically representative sampling
Pediatric Reference Interval Project

Serum/Plasma/Urine Tests - 7 to 17 Years

Blood and Urine Samples for Pediatric Reference Interval Determinations for Clinical Laboratory Tests

- Participation Information
- Parental Permission Form
- Assent Form

Clinical laboratory testing is generally done by measurement of substances in serum or urine. In order to validate a method for use in the diagnosis of clinical disorders, the hormones or chemical substances must be measured in large normal populations of various ages and both genders. Once the reference intervals for normal subjects are determined, the test can then be used more accurately for the diagnosis of clinical disorders. The purpose of this protocol is to collect both blood and urine specimens from normal subjects for the purpose of determining pediatric reference intervals for a number of clinical laboratory assays.

Length of Study: Indefinite (2-3 years will probably be required)

Number of Subjects: 2,640 for entire study

Characteristics of Participants: Healthy males and females between the ages of 7 and 17 years who are willing and able to provide both a blood and urine sample.

Subject Groups Excluded: Those with any chronic medical condition

Location of Study: ARUP Laboratories, Salt Lake City, Utah

Analyses:

<table>
<thead>
<tr>
<th>Serum (70)</th>
<th>Plasma (20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin</td>
<td>Alpha-2-antiplasmin</td>
</tr>
<tr>
<td>Aldolase</td>
<td>Anti-thrombin</td>
</tr>
<tr>
<td>Alkaline phosphatase</td>
<td>D-dimer</td>
</tr>
<tr>
<td>Alpha-1-antitrypsin</td>
<td>Factor II</td>
</tr>
</tbody>
</table>
Pediatric Reference intervals:
National Health Service Initiatives:
• USA: National Children`s Study

WHAT IS THE NATIONAL CHILDREN'S STUDY?

The National Children`s Study will examine the effects of environmental influences on the health and development of more than 100,000 children across the United States, following them from before birth until age 21. The goal of the study is to improve the health and well-being of children.
For more information click here.
### National Children's Study: Timeline

#### Projected Timeline (as of February 2008)

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000–Present</td>
<td>Pilot studies/methods development</td>
</tr>
<tr>
<td>2004</td>
<td>Developed Study design and Study plan</td>
</tr>
<tr>
<td>2005–7</td>
<td>Start-up phase for Vanguard Centers, Coordinating Center</td>
</tr>
<tr>
<td>2007</td>
<td>Completion of the Study protocol</td>
</tr>
<tr>
<td>2007</td>
<td>Awarded 22 Study Centers</td>
</tr>
<tr>
<td>2007–8</td>
<td>Protocol reviews and approvals</td>
</tr>
<tr>
<td>2007–8</td>
<td>Start-up phase for additional Study Centers</td>
</tr>
<tr>
<td>2008</td>
<td>Post Request for Proposals for third round of Study Centers</td>
</tr>
<tr>
<td>2008†</td>
<td>Begin the Study at Vanguard Centers</td>
</tr>
<tr>
<td>2009–12*†</td>
<td>Begin the Study at additional Study Centers</td>
</tr>
<tr>
<td>2010*†</td>
<td>First Study results become available</td>
</tr>
<tr>
<td>2013–34*†</td>
<td>Data analysis; publish data; public-use datasets</td>
</tr>
</tbody>
</table>

* Pending funding for FY '09
† Pending OMB approval
# National Children’s Study: Economic Impact

## TABLE 1
Potential Economic Savings From NCS: Median Estimated Reductions

<table>
<thead>
<tr>
<th>Health Outcome</th>
<th>Estimated Cost (2003), Billion $</th>
<th>Age at Diagnosis, y</th>
<th>Results Published</th>
<th>Projected Costs, Billion $ (2006)</th>
<th>Median Estimated Reductions, %</th>
<th>Cost Savings From NCS, Billion $ (2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>136.6</td>
<td>10</td>
<td>2025</td>
<td>149.27</td>
<td>1.00</td>
<td>0.00, 0.00, 7.46, 22.39</td>
</tr>
<tr>
<td>Asthma</td>
<td>14.5</td>
<td>3</td>
<td>2018</td>
<td>15.84</td>
<td>5.00</td>
<td>1.58, 5.55, 9.51, 17.43</td>
</tr>
<tr>
<td>Obesity (excluding diabetes)</td>
<td>46.3</td>
<td>10</td>
<td>2025</td>
<td>50.59</td>
<td>3.00</td>
<td>0.00, 0.00, 7.59, 22.77</td>
</tr>
<tr>
<td>Low birth weight</td>
<td>13.1</td>
<td>0</td>
<td>2015</td>
<td>14.31</td>
<td>5.50</td>
<td>3.94, 7.87, 11.81, 19.68</td>
</tr>
<tr>
<td>Mental retardiation</td>
<td>51.2</td>
<td>6</td>
<td>2021</td>
<td>55.95</td>
<td>3.50</td>
<td>0.00, 7.83, 17.62, 37.21</td>
</tr>
<tr>
<td>Motor vehicle accidents</td>
<td>19.2</td>
<td>18</td>
<td>2033</td>
<td>20.76</td>
<td>0.25</td>
<td>0.00, 0.00, 0.00, 0.36</td>
</tr>
<tr>
<td>Violence</td>
<td>24.3</td>
<td>18</td>
<td>2033</td>
<td>26.55</td>
<td>0.25</td>
<td>0.00, 0.00, 0.00, 0.46</td>
</tr>
<tr>
<td>Mercury exposure</td>
<td>0.8</td>
<td>6</td>
<td>2021</td>
<td>0.87</td>
<td>0.12</td>
<td>0.00, 0.00, 0.01, 0.02</td>
</tr>
<tr>
<td>Nonpersistent pesticide exposure</td>
<td>49.2</td>
<td>6</td>
<td>2021</td>
<td>53.54</td>
<td>0.50</td>
<td>0.00, 1.07, 2.68, 5.35</td>
</tr>
<tr>
<td>Autism</td>
<td>40.6</td>
<td>3</td>
<td>2018</td>
<td>44.36</td>
<td>1.00</td>
<td>0.89, 3.11, 5.32, 9.76</td>
</tr>
<tr>
<td>Total</td>
<td>395.4</td>
<td></td>
<td></td>
<td>432.06</td>
<td></td>
<td>6.41, 25.43, 62.00, 135.44</td>
</tr>
<tr>
<td>Study implementation costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.24, 1.60, 1.92, 2.0</td>
</tr>
<tr>
<td>Net cost savings (excluding medical cost of implementing findings)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.17, 23.83, 60.09, 133.41</td>
</tr>
<tr>
<td>Estimated cost of implementing prevention strategies (20% of net cost savings)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.03, 4.77, 12.02, 26.68</td>
</tr>
<tr>
<td>Net cost savings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.14, 19.06, 48.07, 106.73</td>
</tr>
<tr>
<td>Ratio of net cost savings from improved health outcomes to NCS implementation costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.3, 11.9, 25.1, 52.6</td>
</tr>
</tbody>
</table>

Obtained from Tim Pivetz and Warren Strauss. Battelle Memorial Institute. Published with permission.
Existing Activities for Pediatric Reference Values:
National Health Service Initiatives:
• KIGGS – German Health Survey for Children and Adolescents

KiGGS - The German Health Interview and Examination Survey for Children and Adolescents

By the beginning of the new millennium, no representative data on the health and development of children and adolescents in Germany were available. Therefore the German Federal Ministry of Health commissioned the Robert Koch Institute to design and conduct a nation-wide study into the health of the young generation.

The KiGGS study was designed as a comprehensive, nation-wide, representative interview and examination survey for the age group 0-17 years. Between May 2003 and May 2006, a total of 17,641 participants from 167 communities were enrolled. The data obtained from each study subject include objective measures of physical and mental health as well as parent- or self-reported information regarding the subjective health status, health behaviour, health care utilisation, social and migrant status, living conditions, and environmental determinants of health.

Initial results have been presented at a public symposium held on 25th
KIGGS:

German Health Survey for Children and Adolescents

• Age groups 0 to 18 years
• Estimated number: 16,000 children
• 150 different locations in Germany

Start: May 2003
End: May 2006

Data analysis still in progress,
First results presented in late 2006
First data published in summer of 2007
Kinder- und Jugendgesundheitssurvey 2003-2006
Untersuchungspunkte

KiGGS
Studie zur Gesundheit von Kindern und Jugendlichen in Deutschland
Dachkonzept Laborparameter

Auswertungskonzepte:

- **Nährstoffe**
  - Eisen, VitB12, Folat und Hämatologie
  - VitB12/Folat und Homocystein
  - VitD/Knochenstoffwechsel
  - Fluorid und *Mundhygiene*
  - Fluorid und Knochenstoffwechsel
  - Iod und Schilddrüsenfunktion

- **Metabolische Marker**
  - Ernährungsanamnese und Marker
  - Körperl. Aktivität und Marker
  - Reifestatus und Marker
  - Adipositas, Blutdruck und Marker

- **Endokrine Marker**
  - Assoziation mit Adipositas und Reifestatus
  - Assoziation mit metabol. Markern
  - Schilddrüsenfunktion

Parameter:

- VitB12; Folat in Serum/ Erys;
  - Eisen, Ferritin, sTfR im Serum; Iod im Urin; Fluorid im Urin
  - Rotes BB, HbA1c; Glukose in Serum und Urin; Lipide,
    *Tocopherole*,
    *Carotinoide, Fettsäurespektren* im Serum; Serum-Harnsäure;
    Serum-Homocystein; Serum-Knochenstoffwechsel (Ca, P, AP, PTH);
    Kreatinin im Urin;
  - Schilddrüsenfunktion (TSH, fT3, fT4); Entzündungsmarker (hs-CRP)
    im Serum; *Adipozytokine (Leptin, Adiponektin)* im Serum,
    Sexualsteroide im Urin

*ggf. noch zu bestimmende Parameter*

*Auswertungskonzepte, außerhalb des Labor-Dachkonzeptes*
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Betrifft Altersgruppe</th>
<th>Betrifft Geschlecht</th>
<th>Grenzwertänderung</th>
<th>Datenbasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkalische Phosphatase</td>
<td>1 – 17 Jahre</td>
<td>Männlich und weiblich</td>
<td>Untere Grenzen ↓ Obere Grenzen ↑</td>
<td>KiGGS- Verteilung</td>
</tr>
<tr>
<td>Anorganisches Phosphat</td>
<td>1 – 17 Jahre</td>
<td>Männlich und weiblich</td>
<td>Untere Grenzen ↑ Obere Grenzen ↑</td>
<td>KiGGS- Verteilung</td>
</tr>
<tr>
<td>Kalzium</td>
<td>1 – 17 Jahre</td>
<td>Männlich und weiblich</td>
<td>Obere Grenze ↑</td>
<td>Pretest- Verteilung</td>
</tr>
<tr>
<td>Gesamt-Cholesterin</td>
<td>1 – 17 Jahre</td>
<td>Männlich und weiblich</td>
<td>Obere Grenze ↓ Untere Grenze sinnvoll?</td>
<td>Pretest- Verteilung</td>
</tr>
<tr>
<td>Gesamt-Eiweiß</td>
<td>1 – 17 Jahre</td>
<td>Männlich und weiblich</td>
<td>Untere Grenzen ↑ Obere Grenzen ↑</td>
<td>KiGGS- Verteilung</td>
</tr>
<tr>
<td>Eisen</td>
<td>3 – 17 Jahre</td>
<td>Männlich und weiblich</td>
<td>Untere Grenze ↑ Obere Grenze ↓</td>
<td>KiGGS- Verteilung</td>
</tr>
<tr>
<td>γ- Glutamyltransferase</td>
<td>1 – 17 Jahre</td>
<td>Männlich und weiblich</td>
<td>Obere Grenzen ↓ (Veränderungen variieren) Untere Grenze sinnvoll?</td>
<td>KiGGS- Verteilung</td>
</tr>
<tr>
<td>Glukose im Serum</td>
<td>1 – 17 Jahre</td>
<td>Männlich und weiblich</td>
<td>Obere Grenze ↑</td>
<td>Empfehlung für zufällige nicht-Nüchternentnahme (Thomas 1998)</td>
</tr>
<tr>
<td>Harnsäure</td>
<td>11 – 17 Jahre</td>
<td>Männlich und weiblich</td>
<td>Untere Grenzen sinnvoll? Obere Grenze ↑</td>
<td>KiGGS- Verteilung</td>
</tr>
<tr>
<td>Kalium</td>
<td>1 – 17 Jahre</td>
<td>Männlich und weiblich</td>
<td>Untere Grenze ↑</td>
<td>KiGGS- Verteilung</td>
</tr>
<tr>
<td>HämatoKrit</td>
<td>1 – 3 Jahre</td>
<td>Männlich und weiblich</td>
<td>Untere Grenzen ↓</td>
<td>Pretest- Verteilung</td>
</tr>
</tbody>
</table>
KIGSS: Examples from the first „Baseline“ Publication

Abb. 1: Mittlere Hämoglobin-Konzentration (Mittelwert und 95%-KI) nach Alter und Geschlecht
IFCC Task Force on Pediatric Laboratory Medicine

Current Status: Regular Publications in the IFCC Journal

How to Cite this article: Editorial - 2006 http://www.ifcc.org/ejifcc/vol17no1/170103200600.htm

Editorial:
Add-on tests

During a normal working day it sometimes happens that results of requested tests point the way to the requirement for other tests to be done. For example a raised total cholesterol result indicates that HDL-cholesterol and LDL-cholesterol would also be helpful to the requester; a raised globulin level could indicate that serum protein electrophoresis might also be done; a raised TSH could suggest that free-thyroxine and free-triiodothyronine might be carried out.
ICPLM – SPEAKERS’ ABSTRACTS

The following speakers’ abstracts are from the Xth International Congress of Pediatric Laboratory Medicine held in Singapore, September 2005.

2.1 What’s new in paediatric microbiology?

Campos JM

Department of Laboratory Medicine, Children’s National Medical Center, Washington, DC, USA

The events of the previous decade have been among the most exciting in the annals of paediatric clinical microbiology. Development of laboratory tests featuring rapid, noncultural approaches has been at the heart of the upheaval. This era of technological change began gathering momentum during the 1970s with the introduction of antigen detection assays. This new breed of tests continued to evolve during the 1980s and 1990s into assays which are faster, much simpler and less dependent upon expensive instrumentation than their ancestors.

diagnosis of viral infections in the clinical microbiology laboratory.

2. To discuss the laboratory aspects of emerging pathogens of current interest in paediatrics.

3. To describe recent trends in the spectrum of antimicrobial resistance in Staphylococcus aureus and to illustrate socioeconomic families in developing countries.

H. pylori and non ulcer dyspepsia be treated? What are the indications and goals for therapy?

2.2 Helicobacter pylori - A friend or a foe?

El-Saifi Ahmed, Tayeb Sawsan, Nouh Akram

Microbiology & Pathology Departments, Al Borg Laboratory, Egypt

Helicobacter pylori is prevalent in more than half the population worldwide and most individuals are asymptomatic.

In children, the incidence of Helicobacter pylori ranges from 6-16% in high-income families with access to hygienic food and clean water and 50-70% in low socioeconomic families in developing countries.

Acquisition of H. pylori in childhood seems to be an important
IFCC Task Force on Pediatric Laboratory Medicine

Current Status: Continuation of the ICPLM Series

• Congresses always to be held in the context of an IFCC meeting

• Next venue:

• Brazil 2008
XIth International Congress of Pediatric Laboratory Medicine

“Bringing the Best in Pediatric Laboratory Medicine to the Whole World”

Fortaleza, Brazil
26-28 September 2008

Click Here to Download the FIRST ANNOUNCEMENT

SCIENTIFIC SECRETARIAT
Dr. Klaus P. Kohse
Klinikum Oldenburg gGmbH
Institut für Laboratoriumsdiagnostik und Mikrobiologie
Dr.-Eden-Str. 10, D-26133 Oldenburg - Germany
Phone: +49 441-4032600 - Fax: +49 441 4032597
kohse.klaus@klinikum-oldenburg.de

ORGANIZING SECRETARIAT
MZ CONGRESSI
Via Carlo Farini, 81
20159 Milan - Italy
Phone: +39 0266802323 - Fax +39 026686699
icplm2008@mzcongressi.com

ICPLM Website: www.icplm2008.org
ICPLM 1st Announcement

XI International Congress of Pediatric Laboratory Medicine
Bringing the Best in Pediatric Laboratory Medicine to the Whole World

Fortaleza, Brasil
26-28 de Setembro de 2008

Moderadores:
Silvana Fahel da Fonseca (Brasil)
Sociedade Brasileira de Análises Clínicas
Klaus P. Kohse (Alemanha)
Grupo IFCC de Medicina Laboratorial Pediátrica
International Scientific Advisory Board:

Hassan Azzazy (Egypt)
Nenad Blau (Switzerland)
Layachi Chabraoui (Morocco)
Rémy Couderc (France)
Edgard Delvin (Canada)
Yolanda DeRijke (Netherlands)
Joao Tiago Guimaraes (Portugal)
Nete Hornung (Denmark)
Marzia Pasquali (USA)
Tahir Pillay (South Africa)
Francisco Ramon Bauza (Spain)
Peter Ridefeldt (Sweden)
Nelson LS Tang (Hong Kong)
Umit Turkoglu (Turkey)
Preliminary topics:

- Adolescent medicine and the clinical laboratory
- Advances in gene therapy
- Autoimmune disorders in children
- Bilirubin measurement for neonates
- Diabetes control with continuous glucose monitoring
- Hemoglobinopathies
- HIV in paediatrics: maternal transmission, effects of ARV therapy
- Markers of bone turnover in children
- Mental disorders in teens
- Metabolomics in inborn metabolic disease (IMDs)
- Neonatal screening of inherited metabolic diseases
- Pediatric reference ranges
- Preanalytical issues in Pediatric Laboratory Medicine
- The obesity pandemic
- Testing for common diseases by POCT in resource poor countries
# Preliminary Program: Overview

<table>
<thead>
<tr>
<th>Day 0</th>
<th>Opening and Welcome Reception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Plenary — Diagnosis of genetically determined diseases in children</td>
</tr>
<tr>
<td>Session AM</td>
<td>Acquired and inherited intestinal disorders: The role of the clinical laboratory Screen for inherited diseases</td>
</tr>
<tr>
<td>Session PM</td>
<td>Hemoglobinopathies</td>
</tr>
<tr>
<td>Session PM</td>
<td>Pediatric Reference Intervals</td>
</tr>
<tr>
<td>Day 2</td>
<td>Plenary — Adolescent Medicine</td>
</tr>
<tr>
<td>Session AM</td>
<td>HIV</td>
</tr>
<tr>
<td>Session PM</td>
<td>Challenges for the Pediatric Laboratorian</td>
</tr>
<tr>
<td></td>
<td>Childhood obesity</td>
</tr>
<tr>
<td></td>
<td>Endocrinology</td>
</tr>
</tbody>
</table>

Closing Ceremony
## Preliminary Program - Details

<table>
<thead>
<tr>
<th>Friday, Sep 26</th>
<th>Opening and Welcome Reception</th>
</tr>
</thead>
<tbody>
<tr>
<td>19:00 - 21:00</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>08:30 - 09:15</td>
<td><strong>Plenary Lecture 1</strong></td>
</tr>
<tr>
<td></td>
<td>Diagnosis of genetically determined diseases in children (B. Wilcken,</td>
</tr>
<tr>
<td></td>
<td>Sydney, Australia)</td>
</tr>
<tr>
<td>09:30 - 13:00</td>
<td><strong>Symposium 1</strong></td>
</tr>
<tr>
<td></td>
<td>Acquired and inherited intestinal disorders: The role of the clinical</td>
</tr>
<tr>
<td></td>
<td>laboratory</td>
</tr>
<tr>
<td></td>
<td>Chair: E. Delvin, N.N.</td>
</tr>
<tr>
<td>09:30 - 10:00</td>
<td>Introductory remarks: The development of the intestinal tract (E.</td>
</tr>
<tr>
<td></td>
<td>Delvin, Montreal, Canada)</td>
</tr>
<tr>
<td>10:00 - 11:00</td>
<td>Update of serological tests for intestinal disorders (E. Seidman,</td>
</tr>
<tr>
<td></td>
<td>Montreal, Canada)</td>
</tr>
<tr>
<td>11:00 - 11:15</td>
<td>Health Break</td>
</tr>
<tr>
<td>11:15 - 12:00</td>
<td>Intestinal lipid absorption: A double-edged sword (E. Levy, Montreal,</td>
</tr>
<tr>
<td></td>
<td>Canada)</td>
</tr>
<tr>
<td>12:00 - 13:00</td>
<td>Hydrogen breath test for the diagnosis of carbohydrate malabsorption</td>
</tr>
<tr>
<td></td>
<td>and for diagnosis of bacterial overgrowth (V. L. Sdepanian, Sao Paulo,</td>
</tr>
<tr>
<td></td>
<td>Brazil)</td>
</tr>
<tr>
<td></td>
<td>CSF - screening for neurometabolic diseases (proposed: R. Giugliani,</td>
</tr>
<tr>
<td></td>
<td>Porto Alegre, Brazil)</td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>14:30 - 18:00</td>
<td><strong>Symposium 3</strong>&lt;br&gt;Hemoglobinopathies&lt;br&gt;Chair: L. Chabraoui, N.N.</td>
</tr>
<tr>
<td></td>
<td>Screening for hemoglobinopathies&lt;br&gt;(J. Elion, Paris, France)</td>
</tr>
<tr>
<td></td>
<td>Thalassemias (P. Giordana, Leiden, The Netherlands)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>17:00 - 17:15</td>
<td>Health Break</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 08:30 - 09:15 | Plenary Lecture 2  
Adolescent Medicine: The clinical laboratory between childhood and adult life (N.N.) |
| 09:30 - 13:00  | Symposium 5  
HIV  
Chair: T. Pillay, N.N.  
Symposium 6  
Childhood Obesity  
Chair: M. Pasquali, J. T. Guimaraes |
|            | Update on HIV immunopathology                                           |
|            | HIV and the pregnant female  
(maternal-fetal transmission, breastfeeding, monitoring therapy)  
Metabolic syndrome in teenagers  
(J. T. Guimaraes, Porto, Portugal) |
| 11:00 - 11:15 | Health Break  
HIV testing - flow cytometry, POCT, viral load  
Type 2 diabetes  
Cardiovascular risks  
Other complications of obesity |
**Sunday, Sep 28**

<table>
<thead>
<tr>
<th>Time</th>
<th>Symposium 7</th>
<th>Symposium 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00 - 16:30</td>
<td><strong>Challenges for the pediatric laboratorian</strong></td>
<td><strong>Endocrinology</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: S. Sethi, N.N.</td>
<td>Chair: R. Couderc, N.N.</td>
</tr>
<tr>
<td></td>
<td><strong>Micro-samples - preanalytical issues</strong></td>
<td><strong>Type 1 diabetes</strong></td>
</tr>
<tr>
<td></td>
<td>Neonatal glucose monitoring</td>
<td>Short stature</td>
</tr>
<tr>
<td></td>
<td>Assessing bilirubin (F. Ebbesen, Aalborg, Denmark)</td>
<td>PCOS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Markers of bone turnover</td>
</tr>
<tr>
<td>17:00</td>
<td><strong>Closing Ceremony</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Additional Program Details

<table>
<thead>
<tr>
<th>Poster Session</th>
<th>Social events</th>
</tr>
</thead>
</table>

All IFCC member societies should encourage their individual members to attend ICPLM 2008!
Thank you very much for your attention!