Introduction: Hungarian Institute of Cardiology, Pediatric Heart Centre is the national centre for pediatric cardiology and pediatric cardiac surgery in Hungary. This centre is dedicated to cover the full spectrum of diagnostic and therapeutic modalities for congenital heart disease (CHD) from the newborn period to grown-up congenital age group.

General background: Hungary has a population of 10 millions (June 2002: 10.175.034), there is an average of 95-99.000 (June 2002: 97.047; birth rate: 9.5‰) live births per year. Congenital heart disease comes in about 0.6-0.8% of all deliveries, which makes a rough estimate of cca. 800 new patients with congenital heart problems in every year. According to international surveys two-thirds of that patient population would need a surgical intervention during their lives. The surgery is indicated/necessary within the first six months of life in half of the surgical pool.
The progress of pediatric cardiac surgery over the last two decades has put an emphasis on primary correction at a lower age group. We proudly join in the international trend by performing more complex procedures on smaller and younger patients with excellent results. We also enjoy the help of alternative techniques of interventional cardiology. All this requires team-work and complex approach with the active and complementary participation of all parties involved: surgeons, cardiologists, anaesthetists, neonatologists etc.

**Facilities:** Our new department building was opened in July 2000. A dream of some thirty years has been fulfilled for many members of our team by moving into these new premises. The whole department building is dedicated to pediatric cardiology and pediatric cardiac surgery. The Center is linked to the National Institute of Cardiology. It shares laboratory background, x-ray department and cardiac catheter/angiography laboratory, as well as other diagnostic modalities (e.g. nuclear medicine) with the main institution.

The six-storey building entertains fully equipped units of:

- two operating theatres, with auxiliary and adjoining area
- postoperative intensive care unit with 11 locations (for beds and incubators)
- preoperative intensive care unit, high care facility, 16 beds
- 2 pediatric wards, 20 beds each
- outpatient clinics, ECHO, Holter, ergometry etc. labs
- administrative and waiting areas, on-call rooms, doctors’ offices, consultation and meeting rooms, nursing staff rooms, technical facilities etc.
- 5 rooms are available for mothers’ staying in the hospital

**Working environment:**

- The Centre is embedded in the national specialist institution for adult cardiology, adult cardiac surgery
• We have around-the-clock access to labs, nuclear medicine laboratory
• Pediatric care cover: two university pediatric departments and the largest pediatric hospital in Budapest are in very close vicinity, offering consultation, CT-scan, MRI, postoperative recovery facilities
• The Centre fosters very strong links with Semmelweis Medical University and participates in all its programmes

Staffing and departmental structure
The faculty structure of the centre consists of three horizontal medical groups: pediatric cardiology, cardiac surgery, anaesthesia and intensive care. The centre is headed by a medical director (at present: Dr. A Szatmári MD PhD FESC, Chief of Pediatric Cardiology) who is one of the Deputy Directors of Hungarian Institute of Cardiology (the main institution). The surgical treatment of children with CHD, implies an excellent partnership with teams of pediatric cardiology and anaesthesia.

Pediatric cardiology: (Chief: Dr. A Szatmári MD PhD FESC)
• 8 full-time pediatricians-pediatric cardiologists (the training for pediatric cardiology in Hungary has a two-tier system starting with a full trianing on pediatrics)
• 1 postgraduate trianee in pediatric cardiology
• 1 pediatrician
• 2 trainee in pediatrics
• 1 postgraduate intern/resident

Pediatric cardiac surgery: (Chief: Dr. L Király MD FETCS)
• The unit is headed by a surgeon certified by the European Board of Thoracic and Cardiovascular Surgery (EBTCS) who also possesses international licensure (UK and Europe)
• 4 fully trained cardiac surgeons with Hungarian certificate on cardiac surgery
• 1 postgraduate trianee in cardiac surgery

Anaesthesia and instensive care: (Chief: Dr. E Sápi MD)
• 6 fully trained cardiac anesthetists one of them with EU recognised certificate on anaesthesia; a PhD doctorate and a specialist in paediatrics and anaesthesia
• 1 postgraduate trianee in cardiac anaesthesia
Assistant staff:

- 6 scrub nurses (all of them fully trained)
- 3 anaesthetist’s assistants (all of them fully trained)
- 4 perfusionists (all of them fully trained)
- 1 transfusion nurse
- 4 ODAs

Nursing staff:

- ITU nurses
- Staff nurses

- Auxilliary staff: 2 physiotherapist, 3 echocardiography assistants, dietetician, teacher etc.
- Administrative staff, secretaries etc.
- Security and technical staff
Equipment:

- The two operating rooms are fully equipped with the state-of-the-art surgical equipment (including 3 ECC machines). We also have equipment for mechanical circulatory support: ECMO, Biomedicus-pump. IABP is available in sharing with the main Institution (with separate pediatric size balloons, interfaces) 2 cell-savers available
- The Centre uses 2 fully equipped modern echocardiography machines (Acuson Sequoia, HP Sonos 5000), multi-omniplane transeoesophageal echocardiography probes are also available. Outpatient clinics provide Holter, ergometry etc. facilities. A further echo machine is under purchase
- Cardiac catheter/angiography labs, pacemaker and electrophysiology labs are available in sharing with main Institution

Programs:

- Full range of pediatric cardiology and congenital cardiac surgery from neonatal age to 18 years
- Grown-up congenital cardiology and cardiac surgery
- Interventional cardiology
- Invasive arrhythmia/dysrhythmia evaluation (in cooperation with Weser Hospital, Bremen, Germany)
- ECMO and bridging for transplantation circulatory support
- Pediatric cardiac transplantation (to be started in 2003/4)
- Pediatric pacemaker implantation
- Procurement and banking of allograft cardiac valves and conduits
- Museum of cardiac pathology: entertains a unique collection of 400 malformed hearts spanning over a period of more than thirty years
- Undergraduate (with Semmelweis Medical University, Budapest) and postgraduate medical training in cardiology and in (cardiac) surgery in the national CME scheme
- Specialist training in cardiac surgery, pediatric cardiology and for perfusionists in the National Postgraduate Training Scheme
• Postgraduate specialist training for cardiac surgeons, anaesthetists and intensive care nurses in cooperation with Cardiac Centre in Cluj, Romania and Humana Foundation, Ohio, USA (to be started in 2003/4)

• Participation in PedECSUR International Database

• Research activity

Activity data:

The Centre admits patients 24-hours a day, 365-days a year. Emergency surgery is carried out whenever it is indicated. Currently, 13.5% of overall surgeries are performed on an emergent basis. On-call team consists of two surgeons (one of them at Consultant level), Consultant pediatric cardiologist and Consultant anaesthetist. In-hospital team involves doctors in charge for postoperative ITU and separately for ITU and pediatric wards plus an anaesthetist assistant, scrub nurse, ODA. All of the investigation and therapeutic modalitites are fully available on out-of-hours basis (around the clock).

Full range of pediatric cardiology and pediatric cardiac surgery is performed.

Pediatric cardiology:
### 2002. Difference from previous year

<table>
<thead>
<tr>
<th>Category</th>
<th>2002.</th>
<th>Difference from previous year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital admissions</td>
<td>1198</td>
<td>+5%</td>
</tr>
<tr>
<td>Patients &lt;1y admitted</td>
<td>417</td>
<td>+48%</td>
</tr>
<tr>
<td>Outpatients</td>
<td>5731</td>
<td>+12%</td>
</tr>
<tr>
<td>Outpatients &lt;1y</td>
<td>1208</td>
<td>+11%</td>
</tr>
<tr>
<td>Echocardiography</td>
<td>10278</td>
<td>+5%</td>
</tr>
<tr>
<td>Outpatients</td>
<td>4801</td>
<td>+15%</td>
</tr>
<tr>
<td>Fetal echo</td>
<td>161</td>
<td>-20%</td>
</tr>
<tr>
<td>Transoesophageal echo</td>
<td>397</td>
<td>+74%</td>
</tr>
<tr>
<td>Intraoperative</td>
<td>239</td>
<td>+64%</td>
</tr>
<tr>
<td>In cathlab</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Postop ITU</td>
<td>1201</td>
<td>+17%</td>
</tr>
<tr>
<td>ITU/pediatric wards</td>
<td>3261</td>
<td>+0%</td>
</tr>
<tr>
<td>Cardiac catheter/angiography</td>
<td>447</td>
<td>19%</td>
</tr>
<tr>
<td>Interventional cardiology</td>
<td>220</td>
<td>38%</td>
</tr>
<tr>
<td>Interventions/caths ratio</td>
<td>49</td>
<td>6%</td>
</tr>
<tr>
<td>ASD device closure</td>
<td>68</td>
<td>280%</td>
</tr>
<tr>
<td>Pulmonary valve ballooning</td>
<td>50</td>
<td>41%</td>
</tr>
<tr>
<td>Aortic valve ballooning</td>
<td>24</td>
<td>28%</td>
</tr>
<tr>
<td>PDA closures</td>
<td>31</td>
<td>105%</td>
</tr>
<tr>
<td>Native and postsurgical coarctation ballooning</td>
<td>31</td>
<td>21%</td>
</tr>
<tr>
<td>Rashkind balloon septostomy</td>
<td>15</td>
<td>10%</td>
</tr>
<tr>
<td>Holter-monitoring</td>
<td>296</td>
<td></td>
</tr>
<tr>
<td>Peripheral vessel Doppler studies</td>
<td>115</td>
<td></td>
</tr>
</tbody>
</table>

**Pediatric cardiac surgery:**
• **Neonatal corrective surgery for TGA, TAPVD, IAA/VSD** etc. is routinely carried out by our team with very gratifying results. Overall mortality for these operations (even in the complex group) is below 5%. In 2002 32 arterial switch operations were performed for TGA with no mortality.

• **Modified Norwood-stage I** palliation for HLHS patients started in 2001/2. 18 patients have underwent so far this type of intervention with two operative mortality. To date 4 patients have progressed to the second stage (BDG). We utilize moderate hypothermia with the avoidance of total circulatory arrest, and of cardiac arrest for the stage-I operation.

• **Ross-procedures** started in 2001. To date 47 such operations were performed with a single fatality and no major morbidity.

• **Axillary right thoracotomy** has been introduced for cosmetically appealing approach for simple procedures e.g. ASD, VSD closures, SAS resection, AVD repairs etc.

• **Grown-up congenital cardiac surgery (GUCH):** this is a very important program in our department. The number of GUCH patients is expected to rise with staged operations, conduit replacements, pulmonary valve implantation following TAP repair in ToF, etc. This may lead to an upgrade shift in surgical complexity and severity. We are assigned to receive complex GUCH cases. To date over thirty GUCH patients underwent succesful repair.

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECC procedures</td>
<td>388</td>
</tr>
<tr>
<td>Patients &lt;1y</td>
<td>341</td>
</tr>
<tr>
<td>• ECC patients &lt;1y</td>
<td>278</td>
</tr>
<tr>
<td>Patients &lt;1 month</td>
<td>136</td>
</tr>
<tr>
<td>• ECC patients &lt;1 month</td>
<td>81</td>
</tr>
<tr>
<td>Procedures without ECC</td>
<td>190</td>
</tr>
<tr>
<td><strong>Total number of procedures</strong></td>
<td>578</td>
</tr>
<tr>
<td><strong>Overall mortality</strong></td>
<td>17(2.94%)</td>
</tr>
<tr>
<td><strong>Reoperations for complications</strong></td>
<td>9(1.55%)</td>
</tr>
<tr>
<td>• Arterial switch for TGA</td>
<td>32(0)*</td>
</tr>
<tr>
<td>• TAPVD correction</td>
<td>11(1)*</td>
</tr>
<tr>
<td>• Norwood-I for HLHS</td>
<td>6(1)*</td>
</tr>
<tr>
<td>• IAA/VSD repair</td>
<td>5(0)*</td>
</tr>
</tbody>
</table>
Pediatric Cardiac Centre, Budapest

- Homograft implantation 36
- Pacemaker implantation (no surgical AV block occurred) 11

*operative mortality in brackets

Scientific and research activity, participation in international societies:

- President of the Hungarian Society of Pediatric Cardiologists (Dr. Szatmári)
- Secretary of Interventional Cardiology Working Group, AEPC (Dr. Szatmári)
- Member of the Council of AEPC, (Dr. Szatmári)
- President of the AEPC from 2004 (Dr. Szatmári)
- Fellow of the European Society of Cardiology (FESC) (Dr. Szatmári)
- Presidential Board Member of Hungarian Society of Cardiologists (Dr. Szatmári)
- Presidential Board Member of Hungarian Society of Pediatrics (Dr. Szatmári)
- European Congenital Heart Surgeons’ Foundation Member (Dr. Király)
- Fellow of the European Board of Cardiothoracic Surgeons (FETCS) (Dr. Király)
- Hungarian Society for Cardiac Surgery, Presidential Board Members (Dr. Király, Dr. Hartyánszky,)

International cooperations

- British-Hungarian Intergovernmental Research & Development Cooperation: The Virtual Museum in cooperation with Prof. RH Anderson, Great Ormond Street Hospital, London UK (Dr. Király) R&D numbers 03CC13 and 02CC04, No. GB-41/2003

International Workshop on catheter interventions for congenital Heart diseases, Milano, faculty

Working co-operation with international hospitals

- Birmingham Children’s Hospital, Birmingham, UK
- Wessex Cardiothoracic Centre, Southampton, UK
- University Hospital, Hamburg-Eppendorf, Germany
- Centre Chirurgical Marie-Lannelon, Paris, France
- Groshadern Hospital, München, Germany
- University Hospital Rotterdam, Sophia Children’s Hospital, The Netherlands

National S&D Fund grant winner (Dr. Czeilinger, Dr. Szatmári) in cooperation with Hungarian Academy of Science (SZTAKI)

Number of PhD Degrees: 4

1 October, 2003.
For further information, please contact:

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