At the division of transplantation center in NCCHD, we have a mission “to save children’s life who have been suffered from severe liver, kidney, small bowel, and pancreas diseases”. And all of our staffs and relative division colleagues do our best for the sick children. We perform living-donor liver transplants (LDLT) for severe cases of liver diseases since 2005. We have liver transplant operation, including cadaveric liver transplantation, nearly 45-50 cases per year, which is the highest case number even by international standards and accounts for a second of all children’s liver transplant cases in Japan (Fig.1). Although cadaver-donor transplants predominate overseas in the case of liver transplants, living-donor transplants have advanced in Japan due to an overwhelming shortage of donors.

The graft survival rate among children is one of the highest in the world, and the 5-year survival rate is 90.6%. The rate of complications for donors is exceptionally low. Furthermore, the surgical procedure of splitting an adult liver in order to match the patient’s weight, allowing for a customized transplant (monosegment graft, hyper-reduced...
(graft), was developed at our center. Only a few institutions in the world can perform this procedure to save neonates and infants.

Nearly 75% of the cases of transplanted children have Biliary atresia (BA) as original liver disease in Japan. However, BA is almost half of the cases in our institution. Metabolic liver disease, Fulminant hepatic failure and others (Hepatoblastoma, Liver cirrhosis etc.) account for rest of them (Fig.2). To perform liver transplant safely for different types of disease, we also collaborate with other professional division's staffs, given that PICU, infection control team, emergency medicine, anesthesiology, endocrinology, gastroenterology, hepatology, neurology, genetics, hematology, radiology, and clinical pathology.

![Pie chart showing liver diseases](image)

**Fig.2** Based liver disease for Liver transplant cases at NCCHD (Nov.2005-Sep.2014)

After liver transplant, children need to be ensure their promoting recuperation. Therefore, we have study these issues with research center in NCCHD.

- Safety of vaccination with immunosuppressant
- Infectious control and monitoring from specific virus (EB virus)
- Cultivation and implant of liver cells
- Split liver transplantation program: First clinical study was applied in Aug 2010.
- Hepatocyte transplantation: First clinical study was applied in Aug 2013.
- Laparoscopic donor hepatectomy: First clinical study was applied in Dec 2013
- Pediatric domino liver transplantation: First clinical study was applied in June 2014

To expand children’s medical alternatives in the future, we are also collaboratively working with our research center.
- Small bowel transplantation
- Hepatocyte transplantation
- Regenerative medicine with ES and iPS cells

For admittance:
First of all, please contact one of the registered guarantors which listed in the Ministry of Foreign Affairs of Japan web site. This guarantor will manage to communication between you and NCCHD and also able to issue the "Visa for Medical Stay" for the patient. Guarantor will contact to NCCHD with basic information by email and phone instead of patient. Further information which listed below should come when this patient is acceptable as LDLT (living-donor liver transplantation) case.

<table>
<thead>
<tr>
<th></th>
<th>Patient</th>
<th>Donor candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral with basic information</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Proof that the patient and donor are related by blood (in principle, within three degrees of kinship)</td>
<td>*</td>
<td></td>
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<tr>
<td>Lab-data (Included HLA typing)</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Record of Operation</td>
<td>*</td>
<td></td>
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<tr>
<td>Pathological specimen</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>full-length photograph</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>X-ray, US echo, CT, MRI etc.</td>
<td>*</td>
<td></td>
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<tr>
<td>Infection record</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Weight and height</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Immunological status (record of vaccination, antibody titer)</td>
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</tbody>
</table>

These informations will be sent to NCCHD by guarantor before the patient and donor candidate is coming to Japan. And this is the outline schedule for LDLT in NCCHD.

Overview of the Treatment Schedule

**Arrival in Japan**
Health check in NCCHD

- Blood test,
- Respiratory function,
- X-ray, CT, MRI and Others

**Hospitalization**

- Approval by Ethics committee in NCCHD
- Recipient 4 weeks~
- Donor 1-3 weeks (Different types of hepatectomy)

**Return back to your home**

- Collaboration with your original doctors
The committee for evaluating transplant compatibility at NCCHD must consider each case based on general biochemical data, an electrocardiogram, chest X-ray, and a respiratory function test of the patient and donor. The case is accepted if they are found to be compatible. A comprehensive exchange of information with the medical institution in your home country must be ensured before the transplant. We will continuously collaborate with your original doctors for better outcome and solution.

Total fee for LDLT in NCCHD is approximately 100,000 USD (7.5 million JPY), if the patients had no surgical/infectious complications. This covers these items.
- Recipient treatment (medical check, operation, medical treatment, nursing care and others in 4 weeks of hospitalization)
- Donor treatment (medical check, operation, medical treatment, nursing care and others in 1 week of hospitalization)

These are roughly estimated with standard case both of recipient and donor. Depend on the condition of recipient and donor, total fee might be upwardly revised.

For your support, we have specific division, “Center for Liaison and Patient Service”. It consists of a pediatrician, nurses and medical social workers. While you’ll have treatment at NCCHD, they’ll collaborate and support you.

Almost children’s age which undergone liver transplant at NCCHD is under 16 years old, and half of them is less than 1 year old (minimum 14 days old). And a few of them are over 20 years old but suffering from their liver disease since they used to be so young. With strong belief that liver transplant brings hope to both of children and their families, we will continue to strive for better solution and better outcome.

Though many transplant expertise retired in Japan. We should strive not only carry on their work, but also their dreams and spirits for Transplantation for sick children. Better survival and quality of life of the child is our goal.
Mureo Kasahara
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Director of Transplantation center

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