Policy for Self-sufficiency of Plasma-derived Products in Taiwan

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President
Taiwan Blood Services Foundation
Outline

• Taiwan and Taiwan Blood Services Foundation (TBSF)
• Donor recruitment and management
• Recovered plasma
• Quality and safety of plasma
• Plasma contract fractionation
• Optimize the use of IVIg and Albumin
• Prospects of plasma fractionation
Taiwan at A Glance

- Area: 36,000 km²
- Population: 23 million
- Capital: Taipei city
- 6 Metro Cities, 15 cities/counties
- Life Expectancy: 80.2 years old (2015)
  - Male  77.0 years
  - Female 83.6 years
- Infant mortality: 2.5 per 1,000 (2015)
- Maternal mortality: 11.7 per 100,000 (2015)
Ministry of Health and Welfare (MOHW)

Department of Medical Affairs
Taiwan FDA
Taiwan CDC

National Blood Policy Advisory Committee 2005
The Blood Derivative Act Criteria for Blood Donor Selection 2005

Taiwan Blood Services Foundation (TBSF)

Hospitals
Clinics
Taiwan Blood Services Foundation

- 5 Blood Centers
- 13 Blood Stations
- 2 Laboratory Centers

61 Fixed Blood Collection Sites
Some Policy Concerns of Plasma Derived Products

- Sufficient recovered and/or source plasma
- Safe and quality plasma
  - PIC/S GMP
  - NAT screening
- Meet the patients needs by Domestic Plasma
- Fractionation and Affordable costs
<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
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</thead>
</table>
| ?        | Hospital-based paid donor blood bank
Community-based Red Cross paid donor blood bank |
| 1974     | **Taiwan Blood Donation Association established**
(duel system: the existing paid donor system and VNR donor system)                         |
| 1974 - 1990 | **Social Campaign of Voluntary NR Blood Donation**                                                                                   |
| 1987     | **Paid donor prohibited**
Hospital-based and Red Cross paid donor blood banks closed                           |
| 1995     | **National Health Insurance inaugurated; blood, blood components and blood products are fully reimbursed by NHI.**                       |
A Nation-wide Social Campaign in 1974-1990

Advocate Voluntary Non-remunerated Blood Donation and disclosure of the high risks of Paid Donors.

By celebrities, movie stars, singers, musician, politicians, medical society, military units, blood donation association and government (Ministry of Education, Ministry of Defense, Department of Health).
伸出你热情的手，
做個快樂的捐血人！

1990年

台灣血液基金會
Taiwan Blood Services Foundation
捐血是什麼？

只要你身體健康，年滿17，沒有超過85歲，
就可將你最寶貴的血，捐給那些需要血的人！

益己 救人 捐血 快樂

台灣血液基金會

幫助人是快樂的

1995年

1990年
前總統李登輝先生長期支持捐血運動，為首位挽袖捐血的國家元首。

前總統陳水扁先生於91年6月6日響應臺大醫院捐血活動，完成第6次
捐血紀錄。

總統馬英九先生於台北市長任內經常利用午休時間前往市府捐血室
參加「分離式捐血」，目前捐血178次。
Annual Blood Collection Units, 1974-2016

Total blood donation units (WB+PH)
• Since then, blood donation has grown along with advancement in medical care, national health insurance and reached a record high of 2,583,183 units in 2011 and blood donation rate is as high as 8.13%.

• In 1996, one article of Transfusion recognized Taiwan’s blood services as one of the fourteen advanced countries in the world with a single national blood program.

(TRANSFUSION 1996;36: 1019-1032.)
• Blood donation rate (WHO, 2012)
  • High income countries 3.68%
  • Middle income countries 1.17%
  • Low income countries 0.39%

• Taiwan blood donation rate 7.50% (2016)
Increasing Large Volume of Whole Blood Donation

Donations of Whole Blood

Year

- 2011
- 2012
- 2013
- 2014
- 2015
- 2016

Donations

- 250 mL
- 500 mL
Retention of Donor - Facility and Environment

3D wall mural
The Positive Rate of Post-donation Screening Test, 1974-2016

- 1974: ABO、Rh、ALT、STS、HBsAg
- 1988: Anti-HIV
- 1992: Anti-HCV
- 1996: Anti-HTLV, Irregular antibody
- 2007: Bacteria detection for platelets
- 2013: NAT
- 2016: 1.77%
Prevalence of TTIs among Blood Donors (2012)

<table>
<thead>
<tr>
<th>Countries</th>
<th>HIV</th>
<th>HBV</th>
<th>HCV</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-income</td>
<td>0.002%</td>
<td>0.02%</td>
<td>0.02%</td>
</tr>
<tr>
<td></td>
<td>0.0004-0.02%</td>
<td>0.008-0.24%</td>
<td>0.004-0.22%</td>
</tr>
<tr>
<td>Taiwan (2016)</td>
<td>0.003%</td>
<td>0.11%</td>
<td>0.03%</td>
</tr>
<tr>
<td>First-time donors</td>
<td>0.011%</td>
<td>1.17%</td>
<td>0.21%</td>
</tr>
<tr>
<td>Repeat donors</td>
<td>0.002%</td>
<td>0.02%</td>
<td>0.01%</td>
</tr>
<tr>
<td>Middle-income</td>
<td>0.12%</td>
<td>0.64%</td>
<td>0.37%</td>
</tr>
<tr>
<td>Low-income</td>
<td>0.85%</td>
<td>3.59%</td>
<td>1.07%</td>
</tr>
</tbody>
</table>
NAT for HIV, HBV and HCV

- Yield cases of

<table>
<thead>
<tr>
<th>Year</th>
<th>HIV</th>
<th>HBV</th>
<th>HCV</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013/Feb-Dec</td>
<td>3</td>
<td>526</td>
<td>17</td>
</tr>
<tr>
<td>2014</td>
<td>1</td>
<td>502</td>
<td>8</td>
</tr>
<tr>
<td>2015</td>
<td>0</td>
<td>450</td>
<td>18</td>
</tr>
<tr>
<td>2016</td>
<td>1</td>
<td>396</td>
<td>4</td>
</tr>
</tbody>
</table>

- NAT for HIV  Feb 2013 - 2016
  1. 5 ELISA(-) & NAT(+) cases in 6.9 million tests
  2. No transfusion-transmitted HIV infection has been reported

- A total of 27 transfusion-transmitted HIV infections during 1992 - JAN 2013
Milestones of GMP Program in Taiwan

1999
UK MCA Initial contract fractionation agreement with SNBTS

2001
ISO 9001 Consolidation of Laboratory Testing

2005
Australian TGA Integrated Taiwan cGMP Standards Contract fractionation agreement with CSL

2012
ISO 15189

2014
PIC/S GMP Taiwan FDA
Role of the Regulatory Agencies in Taiwan

- **1990**: Set-up QA Unit
- **1997**: Developing QMS (ISO 9000)
- **2001**: Integrated Systems AABB/cGMP
- **2002**: Developing QMS (ISO 9000)
- **2005**: Optimized/Aligned Systems ISO9001/ ISO15189/ PICS GMP
- **2014**: PIC/S Guide to Good Manufacturing Practice for Medicinal Products (Part I & Annexes) (TFDA)

**Criteria for Blood Donor Selection (Dept. of Medical Affairs and CDC)**
- **1997**: Regulations for Establishment of blood donation center
- **2001**: The Plasma Derivatives Act
- **2002**: cGMP guide: Human plasma for fractionation (TFDA)
- **2005**: National Blood Self-sufficiency Policy
Plasma Recovered, Issued for Clinical Use, and Other Utilization, 1983-2016
## Supply of Plasma Derived Products

<table>
<thead>
<tr>
<th>Blood products</th>
<th>Domestic need</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVIg</td>
<td>100%</td>
<td>Low patient need because of NHI reimbursement policy</td>
</tr>
<tr>
<td>Albumin</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Factor 8</td>
<td>4%</td>
<td>NHI reimburse recombinant blood products</td>
</tr>
<tr>
<td>Factor 9</td>
<td>13%</td>
<td></td>
</tr>
</tbody>
</table>
# Indication of IVIg by Taiwan NHI

## National Health Insurance Indication

<table>
<thead>
<tr>
<th>Major IVIg-prescribed Usage</th>
<th>Minor IVIg-prescribed Usage</th>
<th>NHI Not Indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Acquired Hypogammaglobulinemia secondary to Hematological Malignancy</td>
<td>1. Pediatric Immune Thrombocytopenia with life-threatening bleeding or planned surgery</td>
<td>1. Chronic Inflammatory Demyelinating Polyradiculoneuropathy</td>
</tr>
</tbody>
</table>
Projection of IVIg Utilization, 2017-2020, Taiwan

Year


Grams / 1,000 population

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Projection of Plasma Recovered and Issued for Clinical Use

- **Estimated plasma recovered**
- **Plasma issued for clinical use**
Imbalance of Needs of Various Blood Products

- **Albumin**: 380 tons of Plasma; 350 tons (2020 projection)
- **IVIg**: 27 tons (2016); 50 tons (2020 projection)
- **Factor VIII**: <10 tons (96% recombinant product)
- **Factor IX**: <10 tons (87% recombinant product)
- **Plasma Recovered**: 100 tons (2016);
  - 120 tons (2020 projection)
  - 140 tons (2030 projection)
Contract Fractionation of Plasma Derived Products

- Y2000-SNBTS
- Y2007-CSL
- 25-50 Tons per year (2015-2020)
- Surplus of F8 & F9
## Some Strategies by TBSF in 2017-2020

<table>
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<tr>
<th>Strategy</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Decrease WB/Red Cell need</td>
<td>PBM program</td>
</tr>
<tr>
<td>Decrease Albumin need</td>
<td>Management of liver cirrhosis &amp; nephritis: eradicating HBV and HCV by 2030 in Taiwan</td>
</tr>
<tr>
<td>Increase IVIg utilization</td>
<td>TFDA instruction sheet; TNHI reimbursement on off label use; education of clinicians in Immunology, Neurology, Hematology and Pediatrics</td>
</tr>
<tr>
<td>Increase plasma derived FVIII and FIX</td>
<td>TNHI reimbursement policy; Education of clinicians in Hemophilia care</td>
</tr>
</tbody>
</table>
Prospects of Fractionation of Blood products in 2020, Taiwan

A volume of 50,000 liters plasma to be fractionated for blood products based on the utilization of IVIg, some possible options:

1. Continue the current contract fractionation

2. Intermediates from a domestic bulk plasma fractionator and then contract fractionation for final products

3. Chromatography plasma fractionator

4. Membrane electrophoresis fractionator
Thank you for your attention!