Transfusion Transmitted Bacterial Infection through Platelet Components

A case of bacterial infection caused by *Escherichia coli* in platelet components was published at 2017 the 4th Conference of the Committee on Blood Products of the Pharmaceutical Affairs and Food Sanitation Council held on November 29, 2017.

The Japanese Red Cross Society (JRCS) takes safety measures for blood components for transfusion against bacterial infections. However, bacterial contamination in the blood bag collected from a donor is inevitable, and around 1 case of bacterial infection through platelet components is confirmed every year.

In this relevant case, bacterial infection occurred through platelet components in which no visible abnormalities were noted. Therefore, it is important to observe conditions of patients properly after blood transfusion is started. Should suspected symptoms of infections appear, *discontinue blood transfusion* immediately and take appropriate measures.

**Visible abnormalities may occur due to bacterial growth in platelet components contaminated with bacteria. Check if there are any visible abnormalities to the components before blood transfusion. When any visible abnormalities are noted, do not use the components and contact medical representatives of the Red Cross Blood Center.**

### Case Summary

**[Patient]**
A girl younger than 10 years of age

**[Primary disease]**
For relapse of acute myeloid leukemia, allogeneic bone marrow transplantation was performed.

**[Blood component involved]**
Irradiated Platelet Concentrate, Leukocytes Reduced (Ir-PC-LR) (Day 4 after blood collection)

**[Clinical course]**

- Approximately 1 month earlier: Bone marrow transplantation was performed. 3 days earlier from transfusion: Administration of cefozopran was initiated to prevent post-transplant infection.
- The day of transfusion:
  - 20 min after starting the transfusion: Shivering and respiratory distress occurred. Transfusion of platelet component was temporarily discontinued.
  - 15 min after resumption of transfusion: Shivering, diarrhea, abdominal pain, fever, and increased heart rate were noted. Vomiting, facial pallor, discoloration of extremities, and diarrhea were observed.
- 4 days after transfusion:
  - Persistent pyrexia, increase in white blood cell count, inflammatory response, and elevated blood liver enzymes were observed. Endotoxin: 5.1 pg/mL (cutoff value: 5.0 pg/mL)
  - Blood culture (i) was performed. Antibiotic was switched to meropenem.
  - Pleural effusion and decreased urine output were observed.
- 1 day after transfusion:
  - The patient got into shock state. Endothelial intubation was performed, and the patient was admitted to ICU.
  - Endotoxin: 64.1 pg/mL
  - Blood culture (ii) was reexamined.
- 5 days after transfusion:
  - Gram-negative rod were detected with blood culture (i) (identified as *Escherichia coli*, which was sensitive to cefozopran and meropenem).
- 7 days after transfusion:
  - Blood culture (ii) was negative.

**[Results of blood component culture and identification of bacterial strain]**

- Results of the suspected component (stored in a refrigerator for approximately 2 weeks at the medical institution)
- Bacterial identification: *Escherichia coli*
  - Endotoxin quantitation: Residual bag, 2,000 pg/mL or more; segment tube, 2.3 pg/mL (cutoff value: 1.0 pg/mL)
  - Homology of the bacterial strain detected with the relevant component and patient-derived strain: No difference was observed between the two (by Pulsed-field gel electrophoresis and multilocus sequence typing [MLST]).
- Tests results for source plasma collected simultaneously:
  - Bacterial isolation/identification: Negative
  - Endotoxin quantitation: 0.5 pg/mL or less

### Transfusion Information

**Transfusion Transmitted Bacterial Infection through Platelet Components**

- A case of bacterial infection caused by *Escherichia coli* in platelet components was published at 2017 the 4th Conference of the Committee on Blood Products of the Pharmaceutical Affairs and Food Sanitation Council held on November 29, 2017.

**The case report was prepared based on “Materials for 2017 the 4th Conference of the Committee on Blood Products of the Pharmaceutical Affairs and Food Sanitation Council”**

### Safety measures for blood components for transfusion against bacterial contamination

**1. Interview at blood donation**

Through interview/screening by a physician, individuals who correspond to any of the following items that suggest possible bacterial infections are ineligible for blood donation.

- Fever, acute disease, physical deconditioning, severe diarrhea accompanied with pyrexia (in such a case, blood cannot be donated for 1 month), under dental treatment, under treatment with antibiotics, wound without epithelialization, pyogenic skin disease, etc.

**2. Skin disinfection**

Venipuncture site is disinfected with alcohol cotton sheets, which are changed for twice, and then disinfected with povidone isodeine-alcohol. Nurses who engage in blood collection receive educational training for this procedure of the skin disinfection.

**3. Diversion of the initial blood flow**

The first 25 mL of blood should be collected separately from the rest of blood collected, because bacteria dwelling in deep layers of the skin and hair follicles may not be eradicated completely by skin disinfection, and these bacteria are concentrated in the first portion of blood flowed after needing at blood collection. This blood collecting method reduced 70% of bacterial contamination.

**4. Leukocyte reduction**

Bacteria such as *Salmonella* and *Fusobacterium* entered into the blood through intestinal tract, etc. may continue to live in leukocytes even after being phagocytosed by them in the blood. At JRCS, 99.95% or more of leukocytes are removed from all of the blood collected.

**5. Limiting shelf life of platelet components**

Even with the measures of 1 to 4, bacterial contamination in blood collected from donors is inevitable at a certain frequency. For this reason, with consideration of bacterial growth, the shelf life of platelet components is determined as 4 days in Japan, including the date of blood collection.

**6. Visual inspection**

Bacterial growth in platelet components may change in their appearance due to clot development. In addition to visual inspection in manufacturing process, visual appearance of platelet components is inspected when they are supplied from blood centers to medical institutions. Platelet components with any abnormalities are not delivered.

### Cases of bacterial infections considered highly associated with platelet components (2009-2016)

<table>
<thead>
<tr>
<th>Year</th>
<th>Symptoms</th>
<th>Detected bacteria</th>
<th>Severity</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Fever, hypotension, chill, shivering, respiratory distress, nausea</td>
<td><em>Serratia marcescens</em></td>
<td>Severe</td>
<td>Recovered</td>
</tr>
<tr>
<td>2011</td>
<td>Chill, shivering, wheezing, peripheral coldness, hypotension</td>
<td><em>Streptococcus agalactiae</em> (Group B <em>Streptococcus</em>)</td>
<td>Severe</td>
<td>Recovered</td>
</tr>
<tr>
<td>2012</td>
<td>Chill, shivering, respiratory distress</td>
<td><em>Streptococcus pyogenes</em> (Group A <em>Streptococcus</em>)</td>
<td>Severe</td>
<td>Recovered</td>
</tr>
<tr>
<td>2013</td>
<td>Precordial pressure sensation, chill, fever</td>
<td><em>Streptococcus equisimilis</em> (Group G <em>Streptococcus</em>)</td>
<td>Severe</td>
<td>Remission</td>
</tr>
<tr>
<td>2015</td>
<td>Fever, chill, tachycardia, hypoxemia, hypotension</td>
<td><em>Escherichia coli</em></td>
<td>Severe</td>
<td>Recovered</td>
</tr>
<tr>
<td>2016</td>
<td>Fever, systemic edema, weight gain, cardiac failure deterioration</td>
<td><em>Staphylococcus aureus</em></td>
<td>Severe</td>
<td>Recovered with sequelae</td>
</tr>
</tbody>
</table>

Issued by: Japanese Red Cross Society

Haemovigilance Information English website

For blood products and transfusion information

Japanese Red Cross Society Haemovigilance Information

For more information, please contact the medical representatives of your local JRC blood center.
Transfusion Transmitted Bacterial Infection through Platelet Components

A case of bacterial infection caused by *Escherichia coli* in platelet components was published at 2017 the 4th Conference of the Committee on Blood Products of the Pharmaceutical Affairs and Food Sanitation Council held on November 29, 2017. The Japanese Red Cross Society (JRCS) takes safety measures for blood components for transfusion against bacterial infections. However, bacterial contamination in the blood bag collected from a donor is inevitable, and around 1 case of bacterial infection through platelet components is confirmed every year.

In this relevant case, bacterial infection occurred through platelet components in which no visible abnormalities were noted. Therefore, it is important to observe conditions of patients properly after blood transfusion is started. Should suspected symptoms of infections appear, discontinue blood transfusion immediately and take appropriate measures.

Visible abnormalities may occur due to bacterial growth in platelet components contaminated with bacteria. Check if there are any visible abnormalities to the components before blood transfusion. When any visible abnormalities are noted, do not use the components and contact medical representatives of the Red Cross Blood Center.

**Case Summary**

- **[Patient]** A girl younger than 10 years of age
- **[Primary disease]** For relapse of acute myeloid leukemia, allogeneic bone marrow transplantation was performed.
- **[Blood component involved]** Irradiated Platelet Concentrate, Leukocytes Reduced (Ir-PC-LR) (Day 4 after blood collection)
- **Volume of transfused platelet component:** 20 mL

**[Clinical course]**

Approximately 1 month earlier: Bone marrow transplantation was initiated to prevent post-transplant infection.

- **The day of transfusion:**
  - 20 min after starting the transfusion: Shivering and respiratory distress occurred.
  - Transfusion of platelet component was temporarily discontinued.
  - Transfusion was resumed after checking of the vital signs.

- **4 days after transfusion:**
  - Persistent pyrexia, increase in white blood cell count, inflammatory response, and elevated blood liver enzymes were observed.
  - Endotoxin: 5.1 pg/mL (cutoff value: 5.0 pg/mL)
  - Blood culture (i) was performed.
  - Antibiotic was switched to meropenem.

- **5 days after transfusion:**
  - Pleural effusion and decreased urine output were observed.

- **1 day after transfusion:**
  - The patient got in shock state. Endothelial intubation was performed, and the patient was admitted to ICU.
  - Endotoxin: 64.1 pg/mL
  - Blood culture (ii) was reexamined.

- **3 days earlier from transfusion:** Administration of cefozopran was initiated to prevent post-transplant infection.

- **Approximately 1 month earlier:** Bone marrow transplantation was performed.

- **1 day after transfusion:**
  - The patient developed cardiopulmonary arrest and was successfully resuscitated.

- **3 days earlier from transfusion:**
  - Administration of cefozopran was initiated to prevent post-transplant infection.

- **Approximately 1 month earlier:** Bone marrow transplantation was performed.

- **7 days after transfusion:**
  - Blood culture (i) negative
  - Blood culture (ii) negative
  - The patient died of multi-organ failure due to septic shock.

**[Results of blood component culture and identification of bacterial strain]**

- **Escherichia coli**: Identified by Pulsed-field gel electrophoresis and multilocus sequence typing (MLST).
- **Bacterial isolation/identification**: Negative
- **Endotoxin quantity**: 0.6 pg/mL or less

**[Blood component culture and identification of bacterial strain]**

- **Results of the suspected component (stored in a refrigerator for approximately 2 weeks at the medical institution)**
  - **Bacterial isolation/identification**: Escherichia coli
  - **Endotoxin quantity**: Residual bag, 2,000 pg/mL or more, segment tube, 2.3 pg/mL (cutoff value: 1.0 pg/mL)
  - **Homology of the bacterial strain detected with the relevant components and patient-derived strain**: No difference was observed between the two (by Pulsed-field gel electrophoresis and multilocus sequence typing [MLST]).
  - **Tests results for source plasma collected simultaneously**
    - **Bacterial isolation/identification**: Negative
    - **Endotoxin quantity**: 0.6 pg/mL or less

**[Blood culture and identification of bacterial strain]**

- **Blood component**
  - **Blood culture (i)**: Gram-negative rod were detected with blood culture (ii) (identified as *Escherichia coli*).
  - **Blood culture (ii)**: Reexamined.

- **7 days after transfusion**: Blood culture (i) negative

**[Laboratory findings except for blood culture]**

- **4 days after transfusion**: Pleural effusion and decreased urine output were observed.
  - **Blood culture (i)** was performed.
  - **Endotoxin**: 5.1 pg/mL (cutoff value: 5.0 pg/mL)
  - **Blood culture (i)** was performed.
  - **Antibiotic** was switched to meropenem.

**[Medical background]**

- **3 days earlier from transfusion**: Administration of cefozopran was initiated to prevent post-transplant infection.

- **Approximately 1 month earlier**: Bone marrow transplantation was performed.

- **1 day after transfusion**: Persistent pyrexia, increase in white blood cell count, inflammatory response, and elevated blood liver enzymes were observed.
  - **Endotoxin**: 5.1 pg/mL (cutoff value: 5.0 pg/mL)
  - **Blood culture (i)** was performed.
  - **Antibiotic** was switched to meropenem.

**[Interview at blood donation]**

- **Venipuncture site** is disinfected with alcohol cotton sheets, which are changed for twice, and then disinfected with povidone iodine-alcohol. Nurses who engage in blood collection receive educational training for this procedure of the skin disinfection.

**[Skin disinfection]**

- **The first 25 mL** of blood should be collected separately from the rest of blood collected, because bacteria dwelling in deep layers of the skin and hair follicles may not be eradicated completely by skin disinfection, and these bacteria are concentrated in the first portion of blood flowed after needing at blood collection. This blood collecting method reduced 70% of bacterial contamination.

**[Diversification of the initial blood flow]**

- **Even with the measures of 1 to 4**, bacterial contamination in blood collected from donors is inevitable at a certain frequency. For this reason, with consideration of bacterial growth, the shelf life of platelet components is determined as 4 days in Japan, including the date of blood collection.

**[Leukocyte reduction]**

- **Bacteria such as Salmonella and Yersinia entered into the blood through intestinal tract, etc. may continue to live in leukocytes even after being phagocytosed by them in the blood. At JRCS, 99.9% or more of leukocytes are removed from all of the blood collected.**

**[Limiting shelf life of platelet components]**

- **Bacterial growth in platelet components may change in their appearance due to clot development. In addition to visual inspection in manufacturing process, visual appearance of platelet components is inspected when they are supplied from blood centers to medical institutions. Platelet components with any abnormalities are not delivered.**

**Cases of bacterial infections considered highly associated with platelet components (2009-2018)**

<table>
<thead>
<tr>
<th>Reported Year</th>
<th>Blood component</th>
<th>Symptoms</th>
<th>Time of onset (after transfusion)</th>
<th>Detected bacteria</th>
<th>Severity</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Ir-PC</td>
<td>Fever, hypotension, chill, shivering, respiratory distress, nausea</td>
<td>approx. 10 min</td>
<td><em>Serratia marcescens</em></td>
<td>Severe</td>
<td>Recovered</td>
</tr>
<tr>
<td>2011</td>
<td>Ir-PC-LR</td>
<td>Chill, shivering, swelling, peripheral coldness, hypotension</td>
<td>approx. 80 min</td>
<td><em>Streptococcus agalactiae</em> (Group B <em>Streptococcus</em>)</td>
<td>Severe</td>
<td>Recovered</td>
</tr>
<tr>
<td>2012</td>
<td>Ir-PC-LR</td>
<td>Chill, shivering, respiratory distress</td>
<td>approx. 165 min</td>
<td><em>Streptococcus pyogenes</em> (Group A <em>Streptococcus</em>), <em>Streptococcus equisimilis</em> (Group G <em>Streptococcus</em>)</td>
<td>Severe</td>
<td>Recovered</td>
</tr>
<tr>
<td>2013</td>
<td>Ir-PC-LR</td>
<td>Precordial pressure sensation, chill, fever</td>
<td>approx. 150 min</td>
<td><em>Streptococcus equisimilis</em> (Group G <em>Streptococcus</em>), <em>Streptococcus pyogenes</em> (Group A <em>Streptococcus</em>)</td>
<td>Severe</td>
<td>Remission</td>
</tr>
<tr>
<td>2015</td>
<td>Ir-PC-LR</td>
<td>Fever, chill, tachycardia, hypoxemia, hypotension</td>
<td>25 min</td>
<td><em>Escherichia coli</em></td>
<td>Severe</td>
<td>Recovered</td>
</tr>
<tr>
<td>2016</td>
<td>Ir-PC-LR</td>
<td>Fever, systemic edema, weight gain, cardiac failure deterioration</td>
<td>Unknown</td>
<td><em>Staphylococcus aureus</em></td>
<td>Severe</td>
<td>Recovered with sequelae</td>
</tr>
</tbody>
</table>

Issued by: *Medical Information Division, Technical Department, Blood Service Headquarters, Japanese Red Cross Society 1-2-1 Shibakoen, Minato-ku, Tokyo 105-0011, Japan*

For blood products and transfusion information

Japanese Red Cross Society

Haemovigilance Information

Japanese Red Cross Society Haemovigilance Information

*For more information, please contact the medical representatives of your local JRC blood center.*

For blood products and transfusion information

Japanese Red Cross Society

Haemovigilance Information

Japanese Red Cross Society Haemovigilance Information

*For more information, please contact the medical representatives of your local JRC blood center.*

*For more information, please contact the medical representatives of your local JRC blood center.*
**Visual inspection of platelet components**

Before supplying blood components for transfusion to medical institutions, the blood centers inspect their appearance, including the presence of aggregates/clots, color, and the presence of swirling. Here are some examples of visible abnormalities in platelet components.

1. **Presence of aggregates/clots**
   - Aggregates/clots may occur due to the growth of contaminating bacteria.
   - Aggregates caused by contamination with Staphylococcus aureus

2. **Discoloration**
   - Discoloration may occur due to the growth of contaminating bacteria.
   - Experimental results of inoculating Streptococcus pneumoniae at 0.1 cell/mL in a fresh platelet component

3. **Presence of swirling**
   - Swirling may disappear due to the growth of contaminating bacteria.

4. **Bacteria isolated from blood components for transfusion with visible abnormalities (2012-2016)**

   From 2012 to 2016, approximately 26 million bags of blood components for transfusion were supplied from JRC blood centers, and visible abnormalities were observed in 537 bags. Sterility tests for these bags detected bacteria in 19 bags (visible abnormalities: 10 bags found at blood centers, 9 bags returned from medical institutions), and all of them were platelet components.

   In addition, the number of platelet components supplied for the same period of time was approximately 4.2 million. For platelet components with visible abnormalities, the incidence of positive sterility test result was approximately 1 in 220,000. These bags were not used for blood transfusion.

   **Breakdown of bacteria identified**

<table>
<thead>
<tr>
<th>Bacterial strains identified (cases)</th>
<th>Visible abnormalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. aureus (11)</td>
<td>Aggregates, clogged blood transfusion set</td>
</tr>
<tr>
<td>E. coli (1)</td>
<td>Swirling negative</td>
</tr>
<tr>
<td>S. pyogenes (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>K. pneumoniae (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>E. faecalis (2)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>E. faecium (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>C. koseri (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>E. cloacae (1)</td>
<td>Aggregates and air bubbles</td>
</tr>
<tr>
<td>Group G hemolytic streptococci (1)</td>
<td>Aggregates</td>
</tr>
</tbody>
</table>

5. **To Health Care Professionals at medical institutions**

   - When TTBI is suspected, keep the residual blood component bag properly* and contact the medical representatives of your local JRC blood center.
   - **Bacterial culture of residual blood component bag will be conducted at the medical institute when aseptic specimen collection is available.**
   - In case of suspicious TTBI, please provide the residual blood component bag for investigation of causes.3)

   **Storing residual blood component bags**

   Tighten clamp of the transfusion set and return it to the transfusion department. Then, seal the top and bottom of the drip tube with a tube sealer (if there is no tube sealer, ligate properly with forceps, etc.), put the bags in a plastic bag, and store it clean in a refrigerator (not in a freezer).

6. **Bacteria isolated from blood components for transfusion with visible abnormalities (2012-2016)**

<table>
<thead>
<tr>
<th>Bacterial strains identified (cases)</th>
<th>Visible abnormalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. aureus (11)</td>
<td>Aggregates, clogged blood transfusion set</td>
</tr>
<tr>
<td>E. coli (1)</td>
<td>Swirling negative</td>
</tr>
<tr>
<td>S. pyogenes (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>K. pneumoniae (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>E. faecalis (2)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>E. faecium (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>C. koseri (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>E. cloacae (1)</td>
<td>Aggregates and air bubbles</td>
</tr>
<tr>
<td>Group G hemolytic streptococci (1)</td>
<td>Aggregates</td>
</tr>
</tbody>
</table>

**Risks of bacterial infection through platelet components**

- There are one or more transfusion transmitted bacterial infusion (TTBI) cases confirmed a year among approximately 800,000 bags of platelet components which are prepared and supplied by JRCs.
- As mentioned above, the incidence of positive sterility test result in platelet components with visible abnormalities was approximately 1 in 220,000. These bags were not used for blood transfusion.

**Precautions for blood transfusion**

1. Since administration of transfusion blood components may cause endotoxin shock or sepsis due to contaminated bacteria, etc., patients should be observed carefully. If any symptoms appear, discontinue blood infusion and provide appropriate treatment while blood of patients are cultured*.

2. Before blood transfusion, visual inspection (presence of aggregates/clots, discoloration, presence of swirling, etc.) of the components should be conducted.2) Do not use the components when there are any visible abnormalities.

3. During blood transfusion, observe the state of patients appropriately. Close monitoring of the transfused patient is essential at least for the first 5 min, then observe again approximately 15 min later.2) Patients should be under regular visual observation after completion of the transfusion, because severe symptoms may occur caused by bacterial infection.

4. Prepare for emergency treatment in case of adverse transfusion reactions.

5. Blood transfusion involves risks of adverse transfusion reactions due to alloimmunization or viral infection. Therefore, it should be performed only when there is no alternative treatment and when effectiveness of blood transfusion is considered to outweigh its risk.

6. When blood transfusion is performed, its necessity and risks of infection/adverse transfusion reactions, etc. must be explained to patients or family member in writing, and a written informed consent must be obtained.2)

   *Because provision of clinical isolates may be asked when results of blood culture are positive, please keep them.3)

**References**

2) Partial revision of “Guidelines for blood transfusion procedure” and “Guidelines for use of blood products.” (PFSB Notification No. 1112-12, dated November 12, 2014).
3) Partial revision of “Guidelines for lookback studies of blood products” (PFSB Notification No. 0730-3, dated July 30, 2014).
Before supplying blood components for transfusion to medical institutions, the blood centers inspect their appearance, including the presence of aggregates/clots, color, and the presence of swirling. Here are some examples of visible abnormalities in platelet components.

### Presence of aggregates/clots

Aggregates/clots may occur due to the growth of contaminating bacteria.

![Image of aggregates/clots](image)

* Aggregates caused by contamination with Staphylococcus aureus

*There were cases of multiple aggregates that were found before the use of the components at medical institutions, although no aggregates were observed by visual inspection at the time of supply to medical institutions.1*

### Discoloration

Discoloration may occur due to the growth of contaminating bacteria.

![Image of discoloration](image)

**At bacterial inoculation**

Discoloration

**96 hours later**

72 hours after bacterial inoculation, color of the component changed into yellow-green and the bacteria counts reached to $10^8$ cells/mL; 96 hours later, the color changed into green, and swirling disappeared.

Experimental results of inoculating Streptococcus pneumoniae at 0.1 cell/mL in a fresh platelet component

### Presence of swirling

Swirling may disappear due to the growth of contaminating bacteria.

![Image of swirling](image)

**With swirling**

**Without swirling**

A video regarding swirling can be found at [http://www.jrc.or.jp/mr/relate/movie/](http://www.jrc.or.jp/mr/relate/movie/)

Swirling may disappear by pH decrease and conglomeration of platelets due to the growth of contaminating bacteria. However, swirling also disappears when platelet components are stored for a long time or at low temperature.

Visual inspection is a useful method to detect the growth of bacteria that contaminated blood components for transfusion, but in some cases, no visible abnormalities are observed.

### Bacteria isolated from blood components for transfusion with visible abnormalities (2012-2016)

From 2012 to 2016, approximately 26 million bags of blood components for transfusion were supplied from JRC blood centers, and visible abnormalities were observed in 537 bags. Sterility tests for these bags detected bacteria in 19 bags (visible abnormalities: 10 bags found at blood centers, 9 bags returned from medical institutions), and all of them were platelet components.

In addition, the number of platelet components supplied for the same period of time was approximately 4.2 million. For platelet components with visible abnormalities, the incidence of positive sterility test result was approximately 1 in 220,000 units.

<table>
<thead>
<tr>
<th>Bacterial strains identified (cases)</th>
<th>Visible abnormalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. aureus (11)</td>
<td>Aggregates, clotted blood transfusion set</td>
</tr>
<tr>
<td>E. coli (1)</td>
<td>Swirling negative</td>
</tr>
<tr>
<td>S. agalactiae (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>S. pneumoniae (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>L. gasseri (2)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>C. koseri (1)</td>
<td>Aggregates</td>
</tr>
<tr>
<td>Z. fleacae (1)</td>
<td>Aggregates and air bubbles</td>
</tr>
<tr>
<td>Group G hemolytic Streptococcus (1)</td>
<td>Aggregates</td>
</tr>
</tbody>
</table>

Breakdown of bacteria identified

---

### Risks of bacterial infection through platelet components

- There are one or more transfusion transmitted bacterial infusion (TTBI) cases confirmed a year among approximately 800,000 bags of platelet components which are prepared and supplied by JRCS.
- As mentioned above, the incidence of positive sterility test result in platelet components with visible abnormalities was approximately 1 in 220,000. These bags were not used for blood transfusion.

### Precautions for blood transfusion

1. Since administration of transfusion blood components may cause endotoxin shock or septicemia due to contaminated bacteria, etc., patients should be observed carefully. If any symptoms appear, discontinue blood infusion and provide appropriate treatment while blood of patients are cultured.*

2. Before blood transfusion, visual inspection (presence of aggregates/clots, discoloration, presence of swirling, etc.) of the components should be conducted.2) Do not use the components when there are any visible abnormalities.

3. During blood transfusion, observe the state of patients appropriately. Close monitoring of the transfused patient is essential at least for the first 5 min, then observe again approximately 15 min later.5) Patients should be under regular visual observation after completion of the transfusion, because severe symptoms may occur caused by bacterial infection.

4. Prepare for emergency treatment in case of adverse transfusion reactions.

5. Blood transfusion involves risks of adverse transfusion reactions due to alloimmunization or viral infection. Therefore, it should be performed only when there is no alternative treatment and when effectiveness of blood transfusion is considered to outweigh its risk.

6. When blood transfusion is performed, its necessity and risks of infection/adverse transfusion reactions, etc. must be explained to patients or family member in writing, and a written informed consent must be obtained.2)

*Because provision of clinical isolates may be asked when results of blood culture are positive, please keep them.3*

### To Health Care Professionals at medical institutions

- When TTBI is suspected, keep the residual blood component bag properly* and contact the medical representatives of your local JRC blood center.
- Bacterial culture of residual blood component bag will be conducted at the medical institute when aseptic specimen collection is available.
- In case of suspicious TTBI, please provide the residual blood component bag for investigation of causes.3)

*Storing residual blood component bags

Tighten clamp of the transfusion set and return it to the transfusion department. Then, seal the top and bottom of the drip tube with a tube sealer (if there is no tube sealer, ligate properly with forceps, etc.), put the bags in a plastic bag, and store it clean in a refrigerator (not in a freezer).

### References


2) Partial revision of “Guidelines for blood transfusion procedure” and “Guidelines for use of blood products.” (PFSB Notification No. 1112-12, dated November 12, 2014).

3) Partial revision of “Guidelines for lookback studies of blood products” (PFSB Notification No. 0730-3, dated July 30, 2014).