S.I.TRA.C.
SOCIETÀ ITALIANA TRAPIANTO DI CORNEA

SIBO
Società Italiana Banche degli Occhi

Safety of cornea for transplantation, the role of the Eye-Bank

M. Corneli

BANCA DEGLI OCCHI DELLA REGIONE MARCHE

Florence, 22th February 2018

Let’s think…

If I needed a cornea transplant…

would I be **comfortable** accepting a cornea distributed by Italian Eye-Banks?

Who guarantees the safety of the cornea?

- Every transplant recipient has **safety concerns**.
- Many steps are taken to ensure the **safest transplant possible**.

Who guarantees the safety of the cornea?

- **Tissue safety is regulated** by the Centro Nazionale Trapianti (CNT) through the “Linee guida per il prelievo, la processazione e la distribuzione di tessuti a scopo di trapianto”.
- This agency **routinely inspect** the Eye-Banks for compliance with safety and medical standards.
- In addition, the Eye-Bank **collaborates with cornea specialists**.

The journey of a cornea

STEP 1

- Donor selection
- Excision of the cornea

STEP 2

- Reception of the cornea
- Processing, evaluation and preservation of the cornea
- Distribution of the cornea

STEP 3

- Corneal transplantation
- Patient and cornea evaluation after transplantation

The journey of a cornea

STEP 1

- Donor selection
- Excision of the cornea

- The **clinical and infectious evaluation** of the donor must be carried out on the basis of the **social and pathological anamnesis**, the **physical inspection** (in particular of the **ocular region**) and the results of the **microbiological and serological tests** by the competent personnel.

- The excision of the cornea occurs in a **sterile manner**, following the **ocular surgical procedures**.

The journey of a cornea

STEP 2

- **Reception of the cornea**
- Processing, evaluation and preservation of the cornea
- Distribution of the cornea

- **Verification** of:
  - packaging;
  - flacons;
  - temperature (datalogger or thermometer);
  - documentation.

- **Verification** of:
  - anamnestic suitability;
  - serological suitability (serum preservation).

The journey of a cornea

STEP 2

- Reception of the cornea
- **Processing, evaluation and preservation of the cornea**
- Distribution of the cornea

- **Processing** in a sterile/controlled environment:
  - laminar flow cabinet (class “A”);
  - clean room (at least class “D”).

- **Evaluation** by:
  - slit lamp;
  - specular microscope;
  - inverted microscope.

- **Preservation** under controlled conditions (4°C or 31°C).

The journey of a cornea

STEP 2

- Reception of the cornea
- **Processing, evaluation and preservation of the cornea**
- Distribution of the cornea

- During the process every suitable tissue undergoes **3 microbiological tests** during:
  - hypothermic storage;
  - after 7 days of organ culture storage;
  - at the end of organ culture storage.

- Microbiological tests performed with:
  - blood culture device;
  - light scattering device.

- Aerobic/anaerobic bacteria and fungi.

The journey of a cornea

STEP 2

- Reception of the cornea
- Processing, evaluation and preservation of the cornea
- **Distribution of the cornea**

- **Suitability verification** of:
  - donor anamnesis;
  - donor serological tests;
  - tissue evaluation;
  - tissue microbiological tests.

- Tissue and receiver **matching**:
  - age (average difference around 10 years);
  - pathology;
  - surgical technique (T, LK, PK, DSAEK, PDEK e DMEK).

The journey of a cornea

STEP 3

- Corneal transplantation
- Patient and cornea evaluation after transplantation

- The transplantation of the cornea occurs in a **sterile manner**, following the **ocular surgical procedures**.
- **Microbiological tests** are performed on the corneal and scleral **residual tissue**.
- The patient and the cornea are evaluated after transplantation in order **to exclude adverse events**.
- A **follow-up form** is filled out and sent to the Eye-Bank to give information about the **fate of the cornea**.

How to ensure the safety of the cornea?

Traceability and biovigilance

- The clinical **use of tissues and cells** of human origin provides major **benefits for recipients**.
- Like any product of human origin, **their use is not free of risks**, which can be serious.
- **A robust system is required**, capable of placing, locating and identifying the cells and tissues at any point in the process, from donation to recipient, **to ensure rapid intervention**.
- **This prevents damage or potential risk** when the quality and safety of the donated tissues and cells are compromised.

Adversity

- Serious adverse **reaction**:
  - **unwanted reaction** on the donor or on the patient.
- Serious adverse **event**:
  - **negative event** along the 3 steps.

Adversity - America

354.930	Transplants in 7 years
494	Adverse reactions (**0,14%**)
319	Primary graft failure (**0,09%**)
99	Endophthalmitis (**0,03%**)
66	Keratitis (**0,02%**)

319	Primary graft failure
180	EK (**56%**)
135	PK (**42%**)
4	ALK (**2%**)

Year							
2007						28	5.9
2008						35	7.3
2014	47,530	86	17.9	49	10.3	35	7.3
Total	354,930	494	13.9	319	9	165	4.6

*Number of corneal grafts performed in the United States from 2009 to 2014. Data for 2007 and 2008 include procedures performed both domestically and internationally.
†Total ARs is inclusive of cases reported with PGF (n = 319), endophthalmitis and keratitis (n = 165), scleral graft infection (n = 1), donor corneal dystrophy or degeneration (n = 2), donor corneal refractive surgery (n = 2), donor-to-host transmission of systemic infection (n = 3), iritis (n = 1), and residual stromal edema posttransplant (n = 1).
‡Per 10,000 grafts.
AR, adverse reaction.

Adversity - America

TABLE 2. Endophthalmitis and Keratitis Cases From 2007 to 2014: Incidence and Associated Procedure Type

	2007	2013	2014	Total	Incidence*
Endophthalmitis					
All cases	5	26	16	99	2.8
Fungal cases	2	16	9	49	1.4
Keratitis					
All cases	3	9	19	66	1.8
Fungal cases	2	4	13	34	0.9
All infections					
All cases	8	35	35	165	4.6
Fungal cases	4	20	22	83	2.3
EK grafts†	14,159	,987	25,965	164,563	
EK-related infections	2	24	28	104	6.3
Fungal cases	2	17	18	57	4.1
PK grafts†	34,806	,954	19,294	195,859	
PK-related infections	6	11	7	56	2.8
Fungal cases	2	3	4	24	1.2
ALK grafts†	950	951	914	7517	
ALK-related infections	0	0	0	2	2.7
Fungal cases	0	0	0	2	2.7
KPro†	—	223	260	1615	
KPro-related infections	0	0	0	2	12.4
Fungal cases	0	0	0	0	0
Scleral graft–related infections	0	0	0	1	—
Fungal cases	0	0	0	0	—

EK includes descemet stripping EK.
*Per 10,000 grafts.
†Number of corneal grafts performed in the Unit s performed both domestically and internationally.
DMEK, descemet membrane EK.

165 Endophthalmitis Keratitis

104 EK (**63%**)

56 PK (**34%**)

3 ALK (**2%**)

2 Keratoprosthesis (**1%**)

Adversity - America

TABLE 3. Spectrum of Organisms Isolated in Endophthalmitis Cases 2007 to 2014*

Genus of Isolate	Number (% of Culture-Positive Cases)	Species	Number (% of Culture-Positive Cases)
Fungus/yeast	53 (65)	*Candida* species	53 (65)
Gram positive	27 (33)	*Enterococcus* species	11 (13)
		Streptococcus species	9 (11)
		Staphylococcus species	4 (5)
		Clostridium perfringens	2 (2)
		Gram-positive cocci	1 (1)
		Hemophilus influenza	1 (1)
Gram negative	2 (2)	*Achromobacter* species	1 (1)
		Escherichia coli species	1 (1)
	Total = 82 isolates		Total = 82 isolates

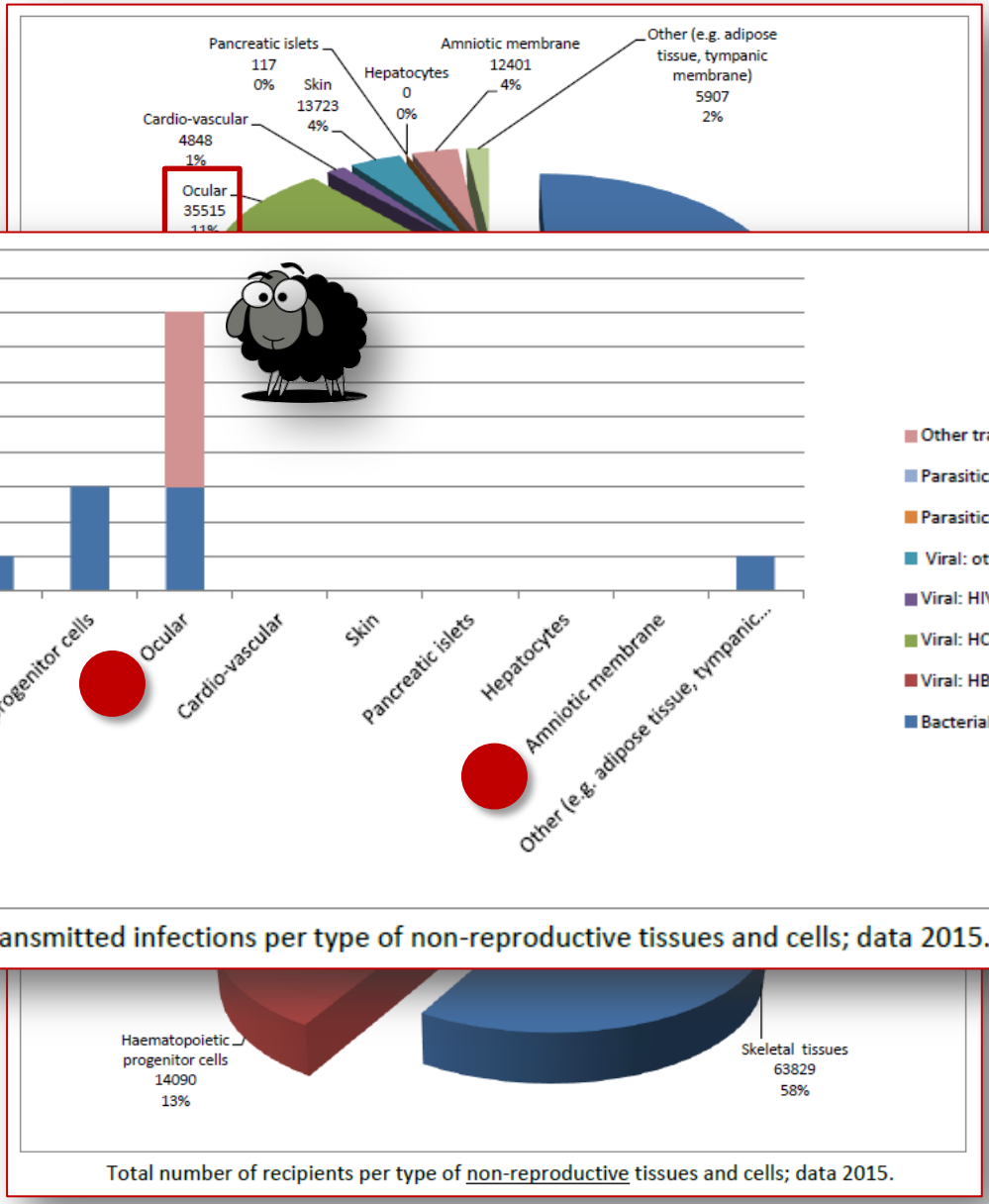
*Of the 99 endophthalmitis cases, culture was positive in 77 cases, no growth observed in 10 cases, culture not performed in 10 cases, and unable to obtain follow-up information from surgeon in 2 cases.

TABLE 4. Spectrum of Organisms Isolated in Infectious Keratitis Cases, 2007 to 2014*

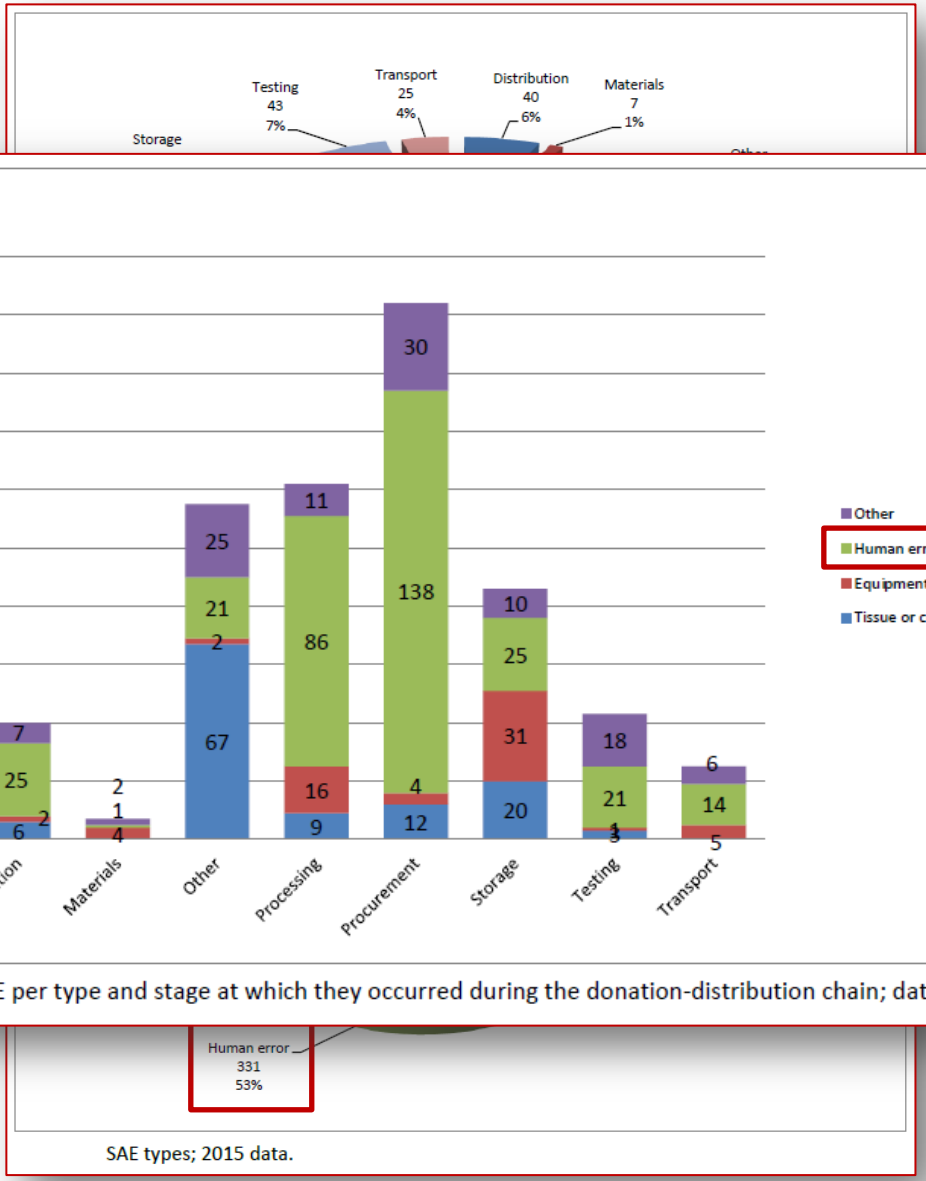
Genus of Isolate	Number (% of Culture-Positive Cases)	Species	Number (% of Culture-Positive Cases)
Fungus/yeast	34 (81)	*Candida* species	34 (81)
Herpes virus	3 (7)	*Herpes simplex* virus	3 (7)
Gram positive	2 (5)	*Mycobacterium chelonae*	1 (2)
		Staphylococcus species	1 (2)
Gram negative	3 (7)	*Achromobacter* species	1 (2)
		Escherichia coli	1 (2)
		Pseudomonas aeruginosa	1 (2)
	Total = 42 isolates		Total = 42 isolates

*Of the 66 infectious keratitis cases, culture was positive in 42 cases, not performed in 15 cases, no growth observed in 8 cases, and unable to obtain follow-up information from surgeon in 1 case.

Adversity - Europe (SA-Reaction)

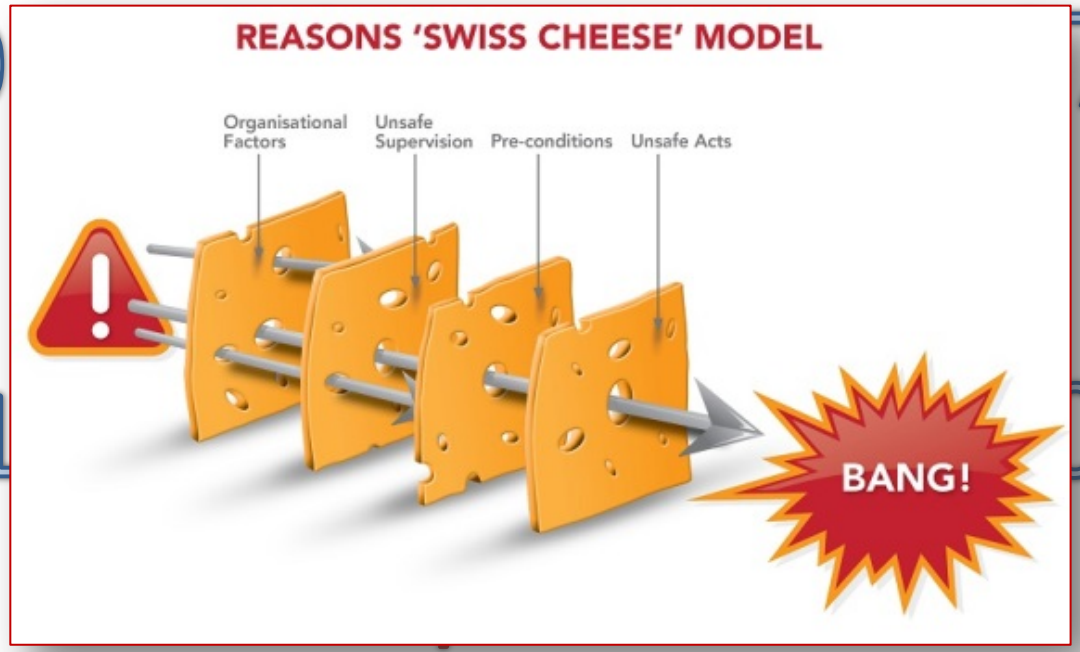


Adversity - Europe (SA-Event)



Adversity - Italy

TYPE	N°	STEP	DESCRIPTION
Adverse event	2	Transportation	Spilling of the transporting medium
Adverse event	1	Processing	Incorrect labeling during internal process
Adverse event	1	Verification	Incongruent serological tests between classical and NAT methods
Adverse reaction	1	Transplantation	Primary graft failure (EK)



Let’s answer…