Eye Bank Association of Australia and New Zealand

Eye Bank Association of Australia and New Zealand (EBAANZ)
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EBAANZ Medical Advisory Committee Notification:

GUIDANCE ON ORGANISMS OF CONCERN

Purpose

- This document identifies microorganisms that have been cultured from normothermic storage medium.
- Microorganisms that may be of significance to eye banking practice have been assessed for the risk they pose to recipient patients – moderate, high or major.
- Recommendations are made for release of tissue dependant on risk.

Introduction:

Post-operative endophthalmitis and keratitis is an infrequent yet serious complication of corneal transplant surgery. Although few cases are attributable to contamination of the donor tissue, there are cases where bacteria, fungi or viruses have been transmitted from the donor to the recipient.

EBAANZ Medical and Quality Standards Section 12.3.1:

Eye Banks performing microbiological testing of tissue and/or storage medium shall establish and document procedures for these tests in their Policy and Procedures (Quality) Manual.

a. *Microbiological testing in Eye Banks performing the hypothermic storage method is not mandatory for the release of tissue.*
b. *Microbiological testing of the storage medium and transport/thinning medium is mandatory for release of tissue in Eye Banks performing the organ culture storage method.*

Results of such tests shall be interpreted and reported according to a policy and procedure established by the Medical Director and documented in the Policy and Procedures (Quality) Manual.

Any microbiological test performed for eye banking should be validated for the purpose of the test. As per EBAANZ Medical and Quality Standards Section 12.4 the intent of testing is not to demonstrate sterility nor to establish bioburden, but to identify corneas which may present a microbiological risk to the recipient.

Of primary concern to eye banking are those microorganisms that may be transmitted from donor/donor tissue to the recipient. Good decontamination processes that remove microorganisms while also retaining the living viability of the cornea reduces this risk but cannot provide for sterility of the tissue. In contrast, contamination during eye bank processing (e.g. from the facility, instruments or operator) and transmission to the recipient is not a significant factor and has not been reported in the literature. However, this should still be assessed for its possible impact to the quality and safety of tissue for transplant (See EBAANZ Medical and Quality Standards Section 12.4)

The microorganisms listed in Table 1 have:

I. been detected in organ culture media in Australian Eye Banks
II. may be rarely isolated but are of potentially high risk.

The risk profiles proposed for the organisms in Table 1 are based on three factors:

- How ‘virulent/pathogenic’ is the microorganism?

- Is the microorganism intrinsically resistant to routine antimicrobials?
- Is the microorganism covered in routine post-operative care?

Key Considerations for Table 1:

1. Risk determination definitions if organism is cultured:

    1.1. Med (Medium):
    A medium risk to the patient if an adverse event occurs as a direct result of the cultured organism. Medium risk organisms generally have good therapeutic options and patient outcomes in cases of ocular infection.

    1.2. High:
    A high risk to the patient if an adverse event occurs as a direct result of the cultured organism. High risk organisms generally have limited therapeutic options and worse patient outcomes in cases of ocular infection.

    1.3. Major:
    A major risk to the patient if an adverse event occurs as a direct result of the cultured organism. Major risk organisms have complex therapeutic options and poor patient outcomes in cases of ocular infection.

    Potentially, any microorganism in organ culture media poses a medium-to-high risk to graft recipients. However, in a review of cases where patients received corneas stored in contaminated (culture-positive) media, few developed symptoms of surgical site infection (1).

2. To determine risk, it is recommended where possible to speciated microorganisms. If release of tissue is being considered antimicrobial sensitivities should be tested.

3. Consider that risk differs depending on transplant type. For example, diagnosis and treatment of interface keratitis is complicated by a deep stromal location that precludes access for microbial examination and topical drug penetration. Medications may have limited penetration to the deep cornea and fail to reach a therapeutic concentration at the site of infection (2). The presented risk analysis does not take account of such specific scenarios.

4. The realised risk of a specific organism to a specific recipient will differ depending on various patient factors such as the use of contact lenses, ocular surface disease, eyelids problems, ocular surgery, immunodeficiency, and steroid treatment (3). Thus, in all cases where microbial contamination has been detected, consultation should occur between the eye bank, medical director, the treating surgeon and the patient (where appropriate) to determine the appropriate and safe release of that tissue for transplant.

5. The recommended prophylaxis for intra-ocular procedures varies dependent on surgeon preference and local hospital/surgery guidelines. The level of coverage given by routine post-operative prophylaxis with either cefazolin (cephazolin) or chloramphenicol is shown in Table 1.

    5.1. Low coverage = ≥50% of strains resistant to either cefazolin and/or chloramphenicol routine prophylaxis.
    5.2. Medium coverage = 11% to 49% of strains resistant to either cefazolin and/or chloramphenicol routine prophylaxis.
    5.3. High coverage = ≤10% of strains resistant to either cefazolin and/or chloramphenicol routine prophylaxis.
    5.4. Where reported coverage varied between sources, the lowest coverage was used.

6. Although an organism may be covered by prophylactic antimicrobials in the culture medium and postoperative care, these drugs may not prevent the release of bacterial proteins and endotoxins which can activate inflammatory pathways and result in tissue damage (4).

Assessment of Risk:

A qualitative risk matrix is used for Table 1.

Virulence/ Pathogenicity	Intrinsic Resistance	Level of Cover in Routine Post-operative Care*			
		High	Medium	Low	None
Low	No	medium	medium	medium	high
Low	Yes	medium	medium	high	high
Medium	No	medium	high	high	high
Medium	Yes	high	high	high	major
High	No	high	high	major	major
High	Yes	high	major	major	major

* When the coverage by cefazolin and chloramphenicol differs, the lower coverage is used.

Recommendations for release of tissue dependent on risk:

A number of studies have shown that in cases where patients received corneas stored in contaminated (culture-positive) storage media, either hypothermic or organ-cultured, few developed symptoms of surgical site infection during follow-up (1). Thus, the recommendation is made:

Medium risk	Release of tissue acceptable with medical director approval and receiving surgeon acceptance, or as per local eye bank procedures.
High and Major risk	Release of tissue not recommended. May still be released with medical director approval and receiving surgeon acceptance, or as per local eye bank procedures.

Table 1

	Virulence	Intrinsic resistance[1]	Level of cover in routine post-op care[2]		Risk
			cephazolin/ cefazolin	Chloramphenicol	
Gram-positive bacteria					
Bacillus spp.	High (4)	No	Low (5)	High (5)	Major
Staphylococci spp.					
Coagulase Negative Staphylococci	Low (4)	No	Med (6, 7)	Med (6, 7)	Medium
Coagulase Positive Staphylococci (e.g. S. aureus)[a]	High (8)	No (9)	Med (3)	High (5-7)	High
Enterococcus spp	High (10)	Yes (11)	High (12)	High (13)	High
Nocardia spp.[a]	High (14, 15)	Yes (16)	Low (17)	Med (17)	Major
Streptococcus spp.					
Streptococcus pneumoniae[a]	High (18-21)	No	High (22)	High (7, 22)	High
Viridans Streptococci[b]	Low	No	High	High	Medium
Beta-haemolytic Streptococci (e.g. Group A and B)[a]	High (21, 23)	No	High (16, 24)	Med (25)	High
Gram-negative bacteria					
Pseudomonas aeruginosa	High (26)	Yes (9)	Low (7, 22, 27)	Low (7, 22)	Major
Stenotrophomonas maltophilia	Med (3)	Yes (9)	Low (28, 29)	Med (30, 31)	High
Fungi					
Yeasts					
Candida spp.	High	Yes	None		Major
Moulds					
Aspergillus spp.	High	Yes	None		Major
Penicillium spp.	Low	Yes	None		High
Fusarium spp.	High	Yes	None		Major

[1] Organisms with multi-drug intrinsic resistance tend to all have limited ocular therapeutic options which are difficult to administer. These organisms are inherently problematic if they become 'entrenched'.

[2] This may differ depending on each surgeon's practice.

[a] Not yet reported as cultured by ANZ Eye Banks but is of high risk if ever cultured.

[b] Not yet reported as cultured by ANZ Eye Banks but is of med risk if ever cultured.

None = not included in routine prophylaxis.

On behalf of the EBAANZ Medical Advisory Committee.

Regards,

Luke Weinel – EBAANZ Chair

Dr Con Petsoglou – EBAANZ MAC chair

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Version Control and change history

Version	Date	Amendment
V1	**14/09/2022**	
V1.1	**14/09/2022**	Amended *Pseudomonas aeruginosa* virulence from 'Yes' to 'High'.
V2	**28/09/2022**	Grammatical corrections and inclusion of risk analysis. In accordance with risk matrix, Amended *Pseudomonas aeruginosa* from high to major; *Penicillium spp* from major to high; Enterococcus spp from medium to major.