ZellShield®
and Funox®

Cell Culture Protection from Contamination

- ✓ Next generation additives with broad-spectrum activity
- ✓ Complete protection against a wide range of contaminants including mycoplasmas, bacteria and fungi
- ✓ Ready-to-use solutions
- ✓ No cytotoxicity observed
- ✓ Stable

ZellShield®

Next generation additive replacing Pen/Strep

Background

Microbial contamination is a common problem for many cell culture laboratories and has a tremendous impact on the scientific significance, safety, and costs of cell culture work in research and industry. A frequent source of contaminating microorganisms is the use of non-sterile equipment and reagents, or poor aseptic technique, or native tissue preparations.

ZellShield® is an additive for culture media that protects cell cultures from a broad range of common contaminants.

Features

ZellShield® is active against most intracellular and extracellular gram-negative and gram-positive bacteria, mycoplasma, protozoa, fungi, and yeast. It is broad antimicrobial activity allows permanent protection of cell cultures from these contaminants.
The use of old-fashioned antibiotics and antimycotics like penicillin/streptomycin, nystatin, or amphotericin B is no longer required!

The exclusively selected antimicrobial mix contains ciprofloxacin, clindamycin, and natamycin. It shows an extremely low resistance bias. The combined activity of these antibiotics reduces the probability of survival of resistant mutants. Up-to-date, no cytotoxic effects on various treated cell lines and no interference with endotoxin tests have been reported, when used as described.

Description

Recommended Use
ZellShield® can be used to protect permanent cell lines as well as freshly prepared primary cells. The product is not intended for treatment of already contaminated cultures.

Simply add ZellShield® directly to a freshly prepared cell culture or premix with the cell culture medium.
The mix is stable for up to 4 weeks if stored at +2 to +8 °C. When added to cell cultures and incubated at 37 °C, ZellShield® should be refreshed every 7 days to achieve maximum protection.
Applicable in research and industry for cell cultures only. Not recommended for clinical applications.

Content
The easy applicable 100x aqueous solution is sterile-filtered and ready-to-use.

Storage
Shipped on cool packs, must be stored in the dark below -18 °C.

Ordering Information

Catalog Number		
Cat. No. 13-0050	ZellShield®	50 ml
Cat. No. 13-0150	ZellShield®	3 x 50 ml

Funox®

For prevention or elimination of fungal contamination

Background

Fungus and mold spores are ubiquitous and generally infect cultures via an airborne route. Heating and air-conditioning systems are notorious for having high concentrations of spores. Particularly in the spring, the higher bioburden in the air from pollen particles can carry fungal spores into air handling systems and labs on lab personnel's clothes.

In the early stages of contamination, fungi do not typically cause noticeable pH changes in the medium nor toxic effects on mammalian cells. The spores are often hard to detect in cultures. Appropriate preventive action should be taken to avoid the rise of mycelia or an effective treatment as soon as the first signs become apparent.

Features

Funox® is active against most filamentous fungi (e.g. *Aspergillus*, *Penicillium*)[1], and yeast (Fig. 1). Its broad antimicrobial activity allows permanent protection of the cultures from these contaminants.

Funox® is an additive for culture media, which contains natamycin, a naturally occurring antimicrobial agent that protects cell cultures from a broad range of common fungi and yeast contaminants (Recommended Use 1). By following an additional protocol (Recommended Use 2), this product can successfully used to eliminate most fungal species from an already contaminated cell culture.

No cytotoxic effect was detected on various treated cell lines, at different timepoints (Fig. 2).

Description

Recommended Use

The product can be used with permanent cell cultures as well as freshly prepared primary cells. Although Funox® does not affect cell viability of several cell types (Fig. 2), we always recommend to assess the extent of potential cytotoxic effects on particular cell culture types (e.g. sensitive, difficult-to-culture primary cells etc.). Applicable in research and industry for cell cultures only. Not recommended for clinical applications.

Two protocols are available for prevention or elimination of the contaminations:

1) Cell culture media additive for prevention:
Add 1 ml of Funox® to a 500 ml batch of complete, ready-to-use cell culture medium.

2) Cell culture media treatment for elimination:
Add 250 µl of Funox® to 50 ml of freshly prepared, complete cell culture medium. Replace medium of the contaminated cell culture with the Funox® containing full medium by splitting or medium change.

When added to cell cultures and incubated at 37 °C, Funox® should be refreshed every 7 days to achieve maximum protection.

Content

The easily applicable 500 x aqueous solution is sterile-filtered and ready-to-use.

Storage

Shipped on cool packs, must be stored in the dark below -18 °C.

Ordering Information

Catalog Number

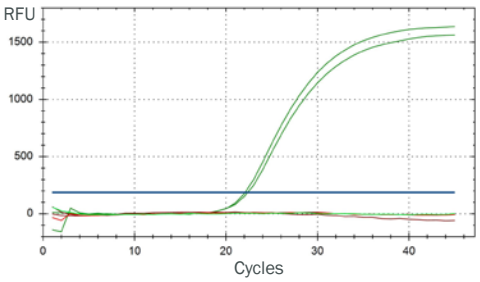
Cat. No. 14-0020	Funox®	20 ml
Cat. No. 14-0060	Funox®	3 x 20 ml

[1] Mattia Antonia; Cerniglia Carl; Baines Janis: Safety evaluation of certain food additives and contaminants - Natamycin (Pimaricin). WHO Food Additives Series, No. 48, Geneva: WHO, 2001, No. 1026 on INCHEM (URL: http://www.inchem.org/documents/jecfa/jecmono/v48je06.htm; last accessed 2023-04-01)

Funox® – Activity and Cytotoxicity Data

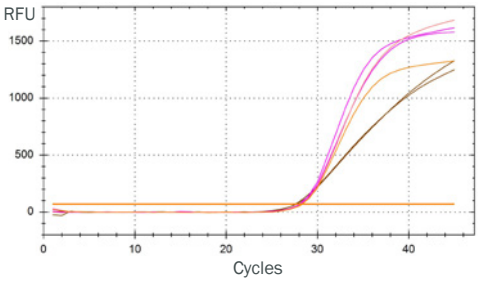
Antifungal efficacy in contaminated cell cultures

Fungal growth over 7 days ± antifungal: target qPCR amplification



C. albicans-contaminated Vero cell culture T0
C. albicans-contaminated Vero cell culture T7
C. albicans-contaminated Vero cell culture + antifungal T0
C. albicans-contaminated Vero cell culture + antifungal T7

qPCR assay validity: internal control amplification

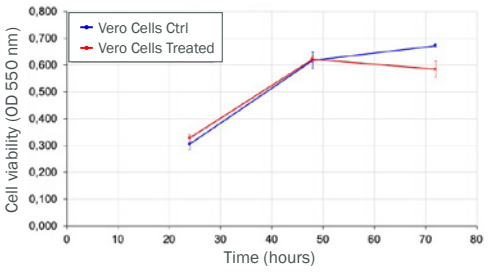


C. albicans-contaminated Vero cell culture T0
C. albicans-contaminated Vero cell culture T7
C. albicans-contaminated Vero cell culture + antifungal T0
C. albicans-contaminated Vero cell culture + antifungal T7

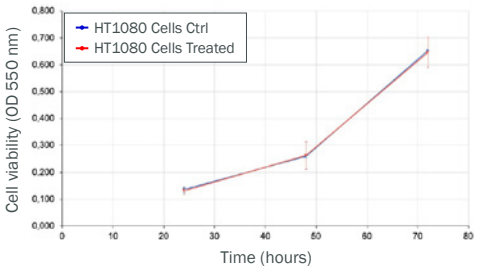
Fig. 1. Detection of fungal DNA in Vero cell culture samples contaminated with *C. albicans* and treated or not with our antifungal reagent (preventive regimen) for 7 days was tested by qPCR with Microsart® ATMP Fungi (Sartorius STEDIM Biotech).
Left, the growth of *C. albicans* in a culture of Vero cells is revealed by the amplification curves of fungal DNA after 7 days from contamination (dark green: *C. albicans*-contaminated Vero cell culture T7). In contrast, the same culture at the time of contamination (lime-green: *C. albicans*-contaminated Vero cell culture T0) showed a flat, below threshold curve, indicating an initial low fungal load. Our preventive antifungal agent added to the culture media blocked such growth of *C. albicans* in the contaminated culture of Vero cells for up to 7 days, as evidenced by flat, below the threshold curves (dark red: *C. albicans*-contaminated Vero cell culture + Antifungal, T7). A similar lack of amplification was obtained with the corresponding control: the same culture at the time of contamination (red: *C. albicans*-contaminated Vero cell culture + Antifungal, T0).
Right, the amplification curves of the internal control target in all the samples from the graph at the left demonstrated the validity of the qPCR assay and excluded any possible PCR inhibitory effect (brown: *C. albicans*-contaminated Vero cell culture T7; orange: *C. albicans*-contaminated Vero cell culture T0; magenta: *C. albicans*-contaminated Vero cell culture + Antifungal, T7; light-salmon: *C. albicans*-contaminated Vero cell culture + Antifungal, T0). Replicates are shown as curves in the same color.

Effect on cell viability of our antifungal agent in antibiotics containing culture media

Vero cells viability with antifungal treatment: time-course



HT1080 cells viability with antifungal treatment: time-course



CHO cells viability with antifungal treatment: time-course

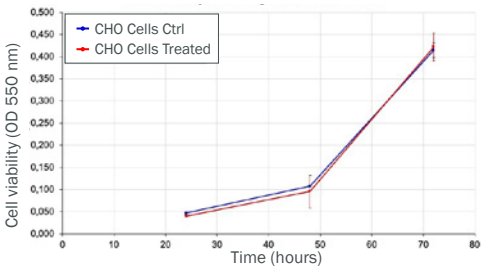


Fig. 2. Cell viability was tested after 24–48–72 hours treatment with the antifungal agent natamycin in antibiotics-containing culture media. Viability of **Vero (A), HT1080 (B)** and **CHO (C)** cell cultures was found to be unaffected by the antifungal, preventive treatment. 72 h treatment of Vero cells led to a minimal reduction of the cell viability of about 13 % compared to the untreated controls (A). Viability was measured by MTT assay and data are mean OD values ± SD, obtained from two replicates.

How to order
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