

# CYTOTOXIC POTENTIAL OF WOUND DRESSINGS WITH **ANTIMICROBIAL PROPERTIES**

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## Background

Antimicrobial dressings are often used on chronic wounds to treat infections. However, many antimicrobial substances that are used to kill bacteria and lower bioburden can have toxic side effects for human cells. This could risk slowing down the healing process. In this study, extracts from antimicrobial wound dressings, from different substance classes, were evaluated and compared regarding their cytotoxic potential.

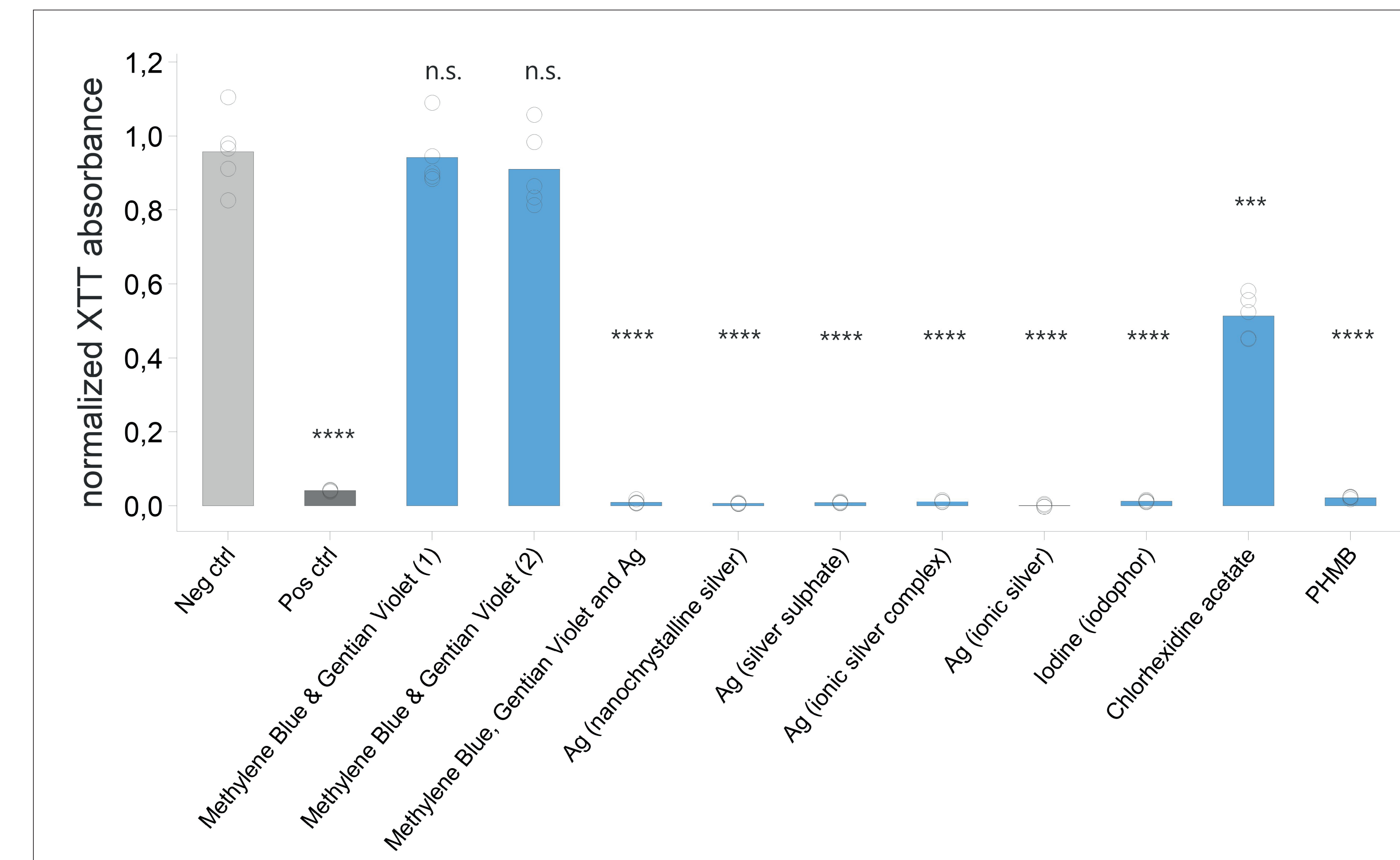
## Methods

Antimicrobial wound dressings were extracted for 24 hours at 37°C in cell culture media according to the ISO standard 10993-12:2021, using an area-based extraction ratio with compensation for differences in respective absorption capacity (absorbed volume/gram dressing). The extracts were evaluated for cytotoxic potential in L929 cells (n=5) after 24 hours of cell contact, using a colorimetric microplate assay (XTT), according to ISO standard 10993-5:2009. Cytotoxic potential of extracts was compared to untreated control, and the model was validated with positive (latex) and negative (polypropylene) controls on each plate. Significance between negative control and different treatment groups was individually calculated using two-sample T-test.

## Conclusion

The current study show that many antimicrobial wound dressings are at risk of leaching cytotoxic substances when they are in an environment that resembles the conditions of a wound. Knowledge about how different antimicrobial substances affects human cell viability can help selecting wound treatment strategies with good risk-benefit balance to promote optimal wound healing.

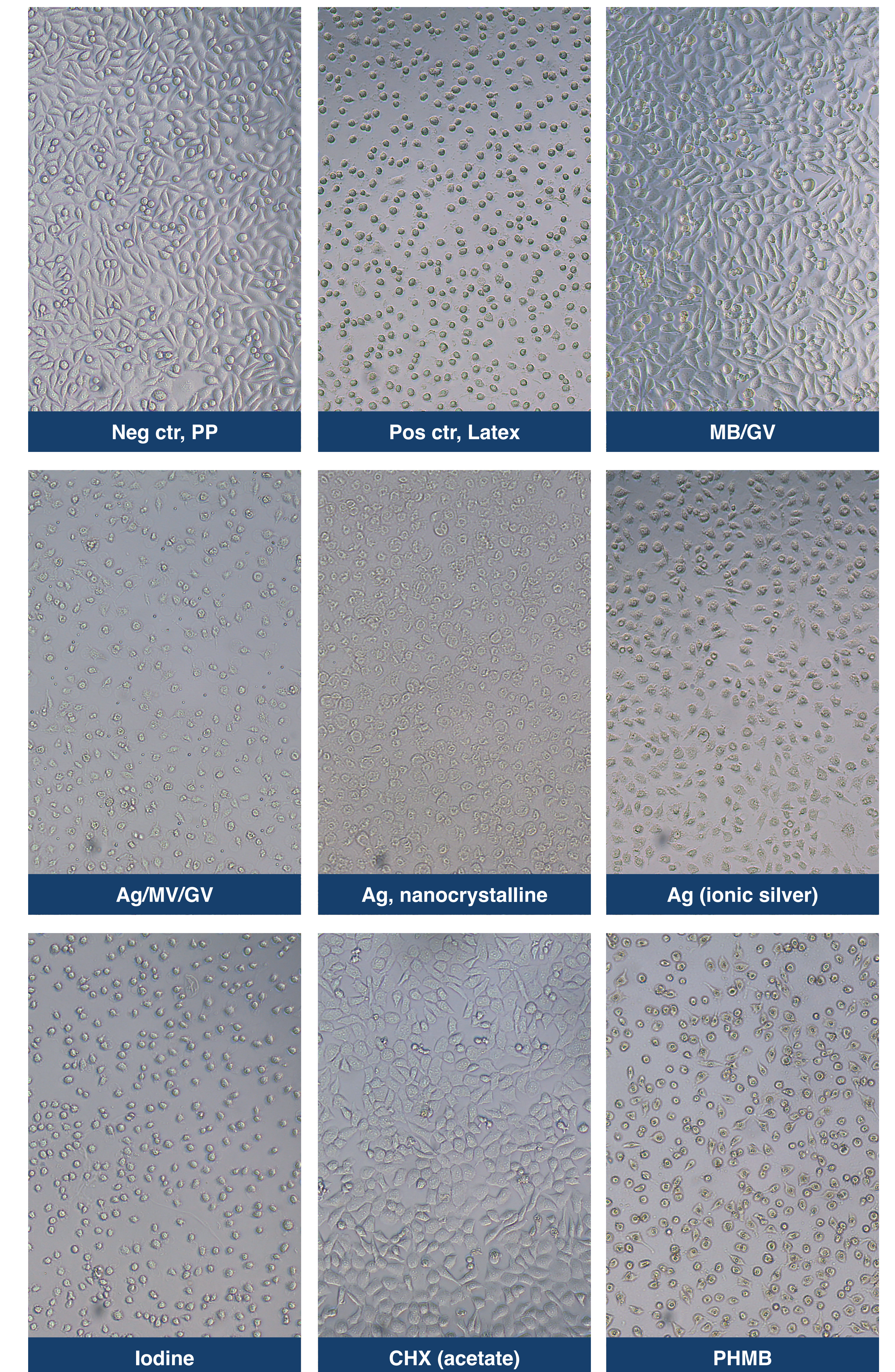
## Results



**Figure 1:** Cell viability, assessed by XTT absorbance, after 24-hour exposure to extracts from different antimicrobial wound dressings\*. Values were normalized to the untreated control (set to 1.0). All dressings tested caused a significant reduction in cell viability, with the exception of the two dressings containing only methylene blue and gentian violet. Statistical comparisons were performed using two-sample t-tests, evaluating each dressing extract individually against the negative control.

Active agent in wound dressing	% viability	Pass / Fail
Methylene Blue & Gentian Violet (1)	85%	Pass
Methylene Blue & Gentian Violet (2)	82%	Pass
Methylene Blue & Gentian Violet and Ag	1%	Fail
Ag (nanocrystalline silver)	1%	Fail
Ag (silver sulphate)	1%	Fail
Ag (ionic silver complex)	1%	Fail
Ag (ionic silver)	0%	Fail
Iodine (iodophor)	3%	Fail
Chlorhexidine acetate	52%	Fail
PHMB	3%	Fail

**Table 1:** Cell viability expressed as a percentage of untreated control cultures. According to ISO 10993-5, a viability greater than 70% is required to classify a material as having non-cytotoxic potential.



**Figure 2:** Microscopic images of L929 cells after 24 hours of exposure to wound dressing extracts. Abbreviations used: MB (Methylene Blue), GV (Gentian Violet), Ag (Silver), CHX (Chlorhexidine).