eurofins | EAG Laboratories

APPLICATION NOTE

Next Steps After Receiving a Cytotoxic Result

By Natalie Sutton, B.S.

INTRODUCTION

Biocompatibility assessment protects patients and customers from unforeseen effects from medical devices, consumer products, and materials. Early detection of adverse responses allows companies to rapidly iterate designs to develop safe and high-quality products. However, with some product applications, negative biological responses such as cytotoxicity are inevitable. How a company and CRO approach these results can mean the difference between a product success or failure.

CYTOTOXICITY ASSAYS

At Eurofins EAG Laboratories, we perform our MEM elution cytotoxicity assay according to ISO 10993-5.1 The assessment begins with the submersion of the product in an extraction vehicle (i.e., solvent) to simulate physiological conditions. This allows toxicants that the patient/consumer could be exposed to elute into the vehicle. The vehicle is subsequently placed on an in vitro culture of healthy mammalian cells. The response of the cells, measured by changes in growth, morphology, metabolic activity, and/or viability, to the extract will reveal the toxic risk of the product. Due to the highly sensitive nature of this test model, unexpected cytotoxic results may occur.

WHAT TO DO WITH AN UNEXPECTED RESULT

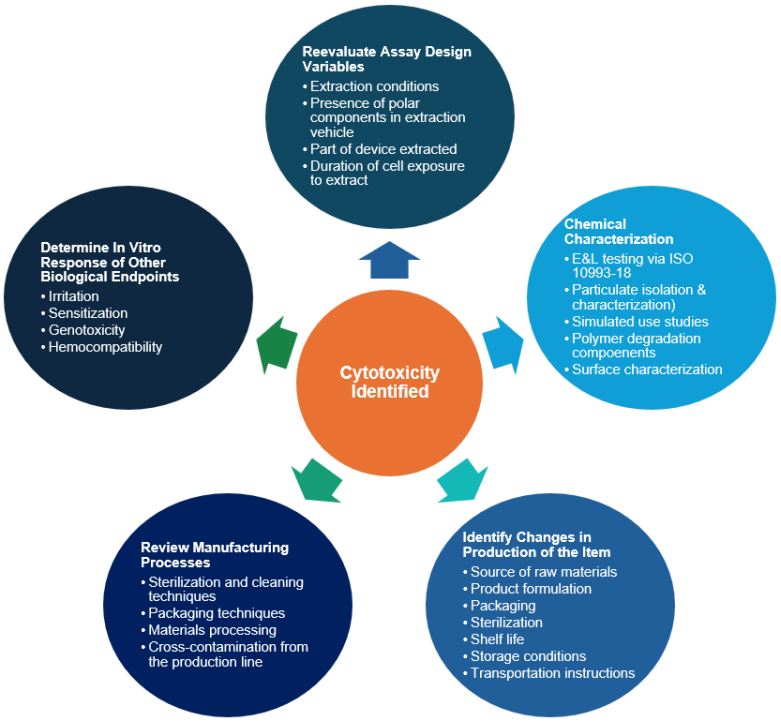
It can be alarming when a product with known components and extensive planning receives a cytotoxic result. Even if the sample was designed with materials marketed to be biocompatible, minor chemical reactions—from production of the raw materials to the packaging or storage of the product—can introduce cytotoxic contaminants. At this point, the product designer can go multiple directions to address the risk associated with a result.

The FDA suggests two approaches when navigating a cytotoxic response.2 Various dilutions of the extract may be tested to determine at what concentration is the extract toxic. This information can then be combined with the clinical relevancy of these concentrations to determine the risk associated with the product. Furthermore, the neat extracts or subsequent dilutions may be tested in parallel to a predicate device to demonstrate equivalency to a commercially marketed device. These approaches help product designers better understand their products.

In addition to learning at what level a product is cytotoxic, gaining a deeper understanding of the physical and chemical properties of the material can pinpoint sources of toxicity. At EAG, we know have the tools and expertise to help you understand your materials - from characterization of extractables and leachables surface analysis.

CONCLUSION

Unexpected results can put a damper on the product development timeline. With Eurofins EAG Laboratories, you can be assured that our team has the tools at hand to help you evaluate your product's safety. In addition to the two approaches outlined in the FDA guidance, one may move forward by evaluating any of the possible directions outlined in our guide below.



REFERENCES

1. ISO 10993-5, Biological evaluation of medical devices — Part 5: Tests for in vitro cytotoxicity

2. FDA (2023). Use of International Standard ISO 10993-1, "Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process"