

BACKGROUND

Current surgical techniques in treating Giant Cell Tumors (GCT) and low grade chondrosarcomas may include intralesional procedures¹. This intervention may generate cell shedding, seeding, and possible recurrence of these tumors within the surgical bed². In an effort to reduce tumor cell burden, multiple irrigation solutions have been utilized, however there is no consensus as to which solution yields the greatest cell death³. A similar study has shown chlorhexidine irrigation to be effective in the prevention of prosthetic joint infection, but has not been studied against tumor cells⁴. The goal of this study was to determine the effectiveness of commonly used irrigation solutions in these two tumor cell lines.

METHODS

Study Design: In-vitro analysis of the cytotoxicity of different solutions on human GCT (ATCC® TIB-223™) cells and the human Chondrosarcoma cell line (JJ)⁵.

Methods: Cells were exposed to 0.9% saline, sterile water, 70% ethanol, 3% hydrogen peroxide, 0.05% chlorhexidine, and 0.3% povidone iodine for two- and five-minutes. Cell death was evaluated using Lactate dehydrogenase (LDH) Cytotoxicity Detection Kit® (Sigma Aldrich Inc.).

Statistical Analysis: Cytotoxicity of each substance was determined to be either superior or non-superior to non-treatment and inferior or non-inferior to 1% Triton that results in 100% cytotoxicity.

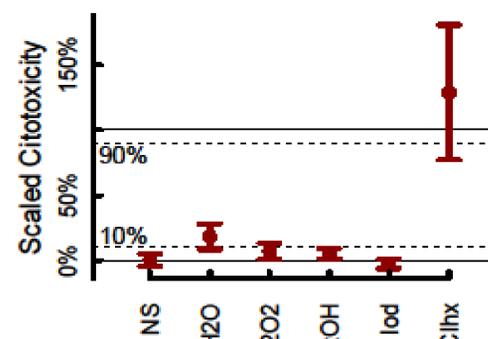
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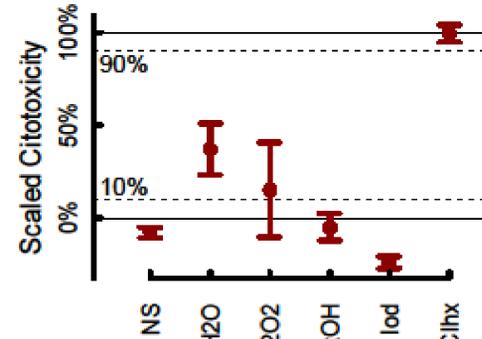
RESULTS

- The 0.05% Chlorhexidine demonstrated superiority to non-treatment in the two and five minute GCT and chondrosarcoma experiments and noninferiority to Triton in the five minute chondrosarcoma and two and five minute GCT experiments
- Sterile water demonstrated superiority to non-treatment in the five minute chondrosarcoma and two minute GCT experiments
- No other solutions demonstrated significant cytotoxic effects on chondrosarcoma or GCT cells in-vitro

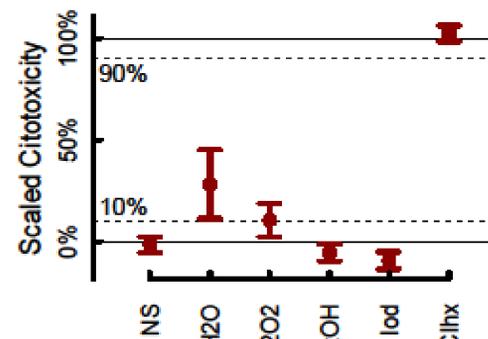
Chondrosarcoma, 2 min



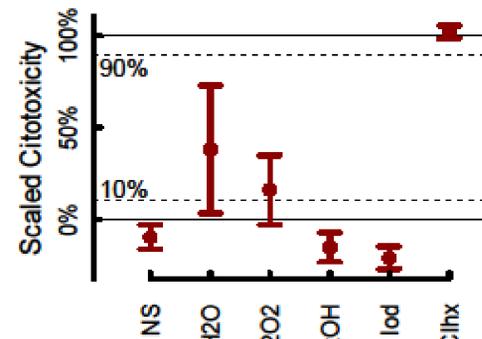
Chondrosarcoma, 5 min



GCT, 2 min



GCT, 5 min



DISCUSSION

- Both sterile water and 0.05% Chlorhexidine demonstrated cytotoxic effects against chondrosarcoma and GCT cells in vitro
- Only 0.05% Chlorhexidine demonstrated superiority to non-treatment in all experiments
- Only 0.05% Chlorhexidine demonstrated non-inferiority to Triton in at least one experiment
- Sterile water demonstrated superiority to non-treatment but did not demonstrate non-inferiority to positive control
- Further clinical evaluation could determine the effectiveness of these solutions intra-operatively

CONCLUSIONS

- 0.05% Chlorhexidine was found to be the most effective solution in lysing chondrosarcoma and GCT cells in-vitro.
- Additional studies are warranted to assess for in vivo safety and efficacy.

ACKNOWLEDGEMENTS

This project was supported by Matthew Thompson M.D., UW Orthopaedics and Sports Medicine., Special thanks to the Fernandes research lab., UW Orthopaedics and Sports Medicine, and Nayak Polissar Ph.D., Mountain-Whisper-Light Statistics.