BEST19

Investigation of Anti-Cancer Properties of Novel Curcumin Derivatives in Leukemia Cells, Multiple Myeloma and DLA Models

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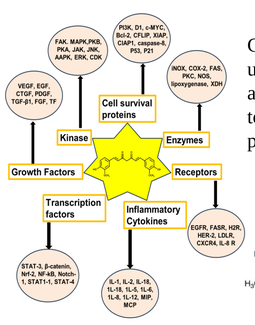
ABSTRACT

In order to overcome curcumin's drawbacks, such as its low bioavailability, lack of stability, and adverse effects from its greater dose, other curcumin compounds are being researched. The goal of this work is to determine the anti-cancer activity of two novel, previously unreported curcumin derivatives, 151A and 143A, on cancer cells.

Following the synthesis of curcumin derivatives 143A and 151A, the cytotoxic activity was evaluated in MOLT4 and HEK cell lines. The impact of 143A and 151A on tumor regression was investigated using a mouse tumor model produced by Daltons Lymphoma Ascites and Multiple Myeloma.

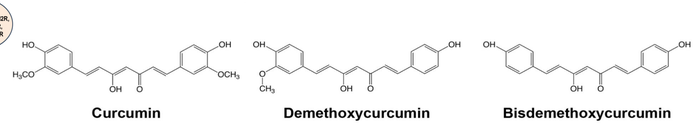
The natural Curcumin derivatives 151A and 143A exhibit potent anti-cancer properties, outperforming curcumin in cytotoxicity. It shows as a promising drug candidate for the treatment for leukemia.

INTRODUCTION



Curcumin is a natural polyphenol compound found in turmeric, a spice commonly used in Indian cuisine. It has been shown to have anti-inflammatory, antioxidant, and anticancer properties. There is evidence to suggest that curcumin has the ability to target multiple signaling pathways involved in cancer development and progression.

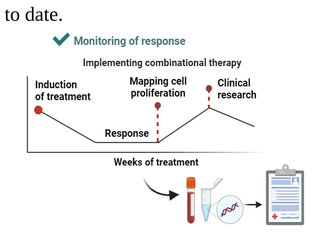
Molecules of Impact: Curcumin Derivatives in Focus



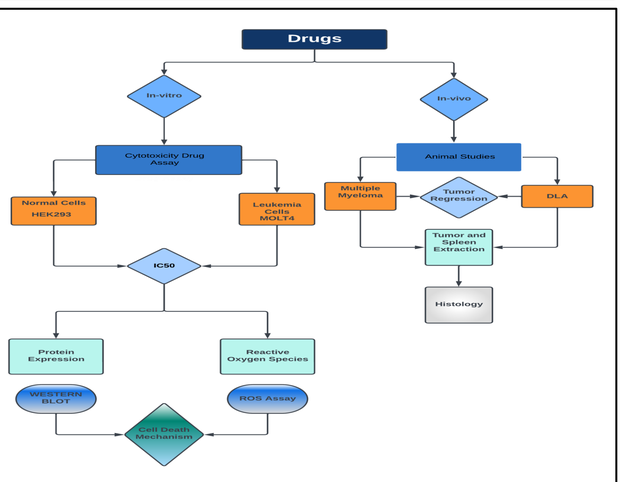
DISCUSSION

The new curcumin derivatives demonstrated exceptional cytotoxicity at nanomolar doses, compared to the parent molecule. In molt4 cell lines, the cytotoxicity assays revealed that 151A and 143A inhibited cell growth in the range of 50–80 nM, which is 100 times more effective than the parent substance curcumin, which was effective in the range of 10-100uM on the majority of cancer cell lines reported to date.

- In MOLTl4 cell line, it revealed that 151A and 143A inhibited cell growth in the range of 50–90nM, which is 100 times more effective than the parent substance curcumin.
- Findings imply that 151A and 143A can be regarded as a promising candidate as an anticancer drug.

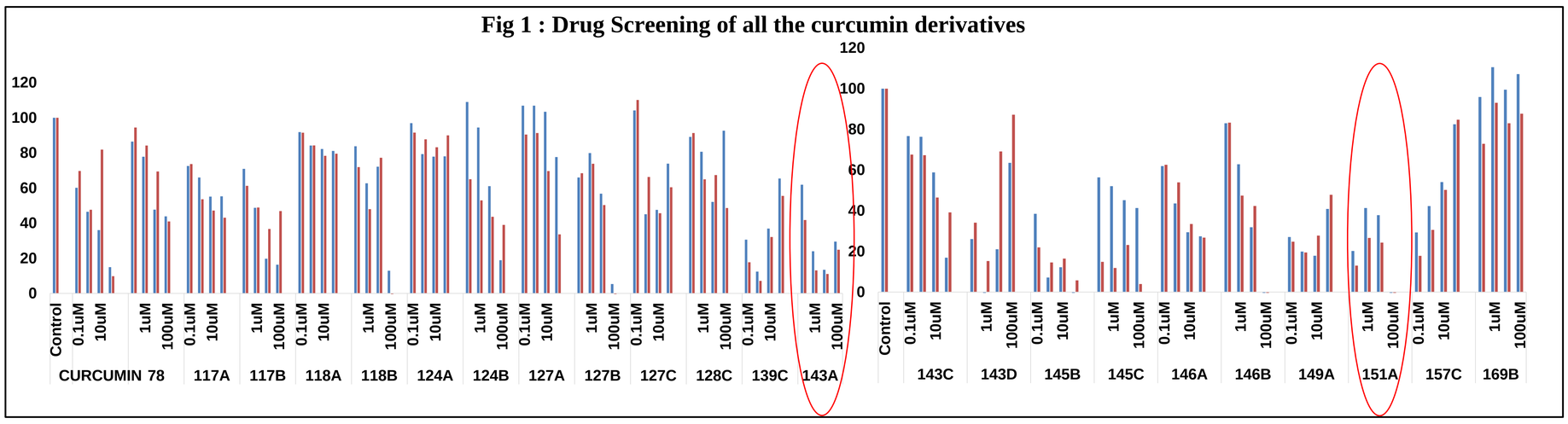


METHODOLOGY



RESULTS

Fig 1 : Drug Screening of all the curcumin derivatives



143A

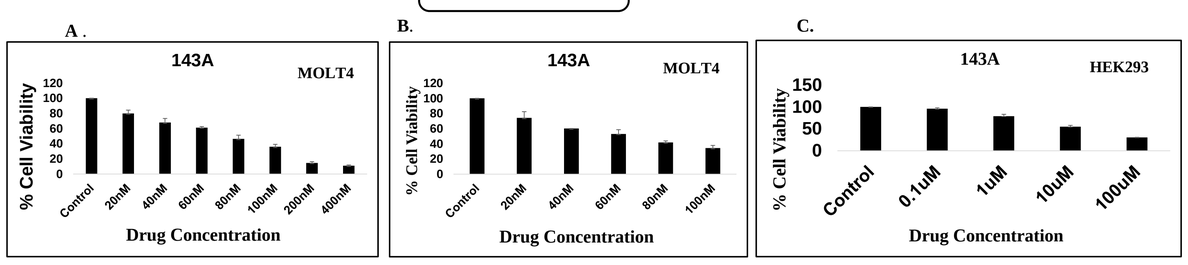
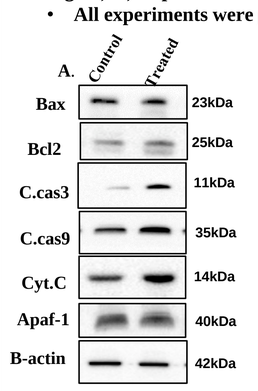


Fig 2:) A) Represents the MTT and B) Resazurin assay performed on MOLT4 cell line. C) MTT assay done on HEK293 cells
- **All experiments were performed in three biological replicates and average value was plotted with ± SD**



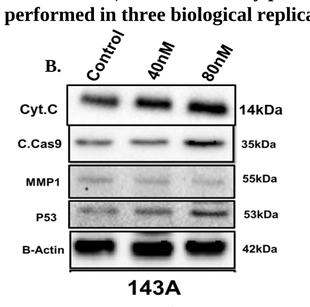
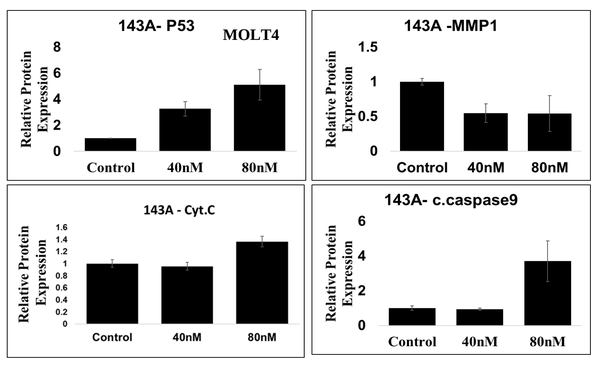
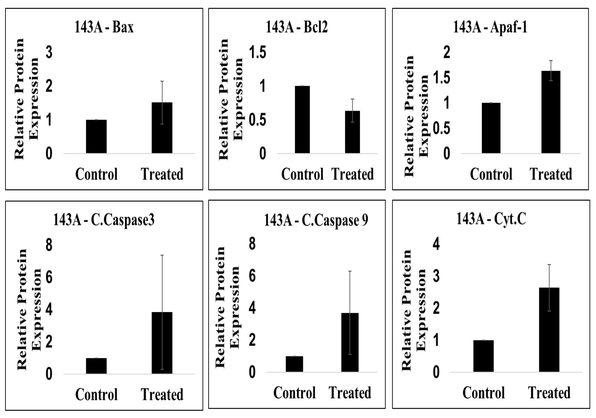


Fig 4: Expression of apoptotic proteins in Animals and MOLT4 cells upon drug treatment.
A) Animal B) MOLT4 Cells





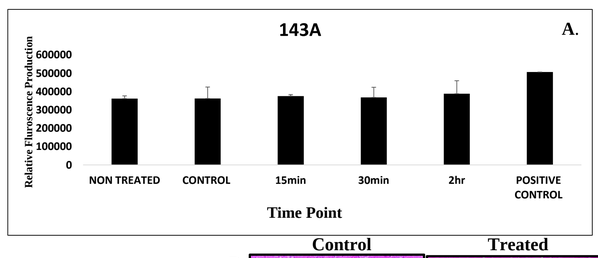


Fig 5: A) ROS Generation & B) H & E staining of the organs to analyze the change in histology
I. Liver
II. Spleen
III. Kidney

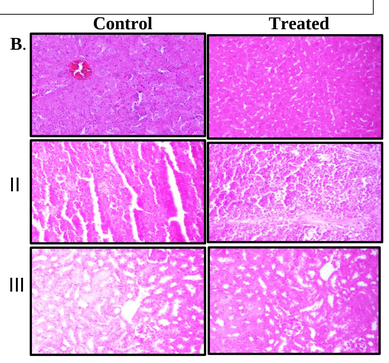
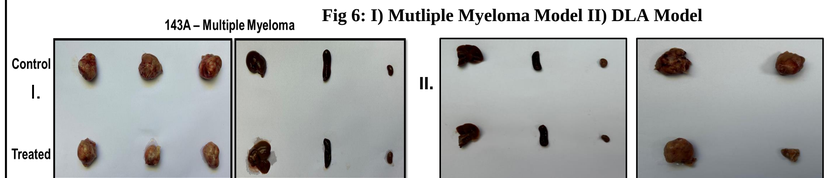
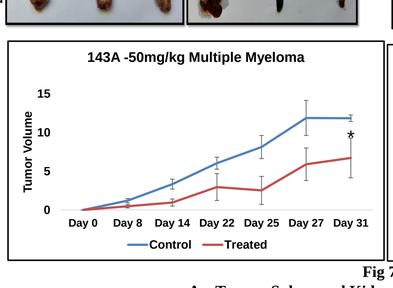
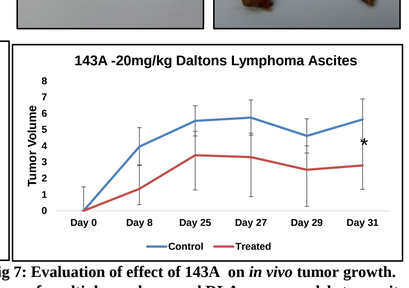


Fig 6: I) Mutliple Myeloma Model II) DLA Model







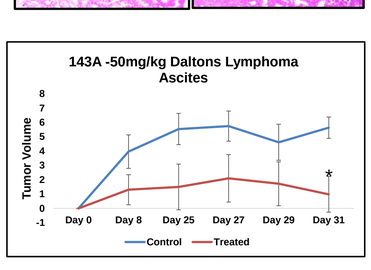
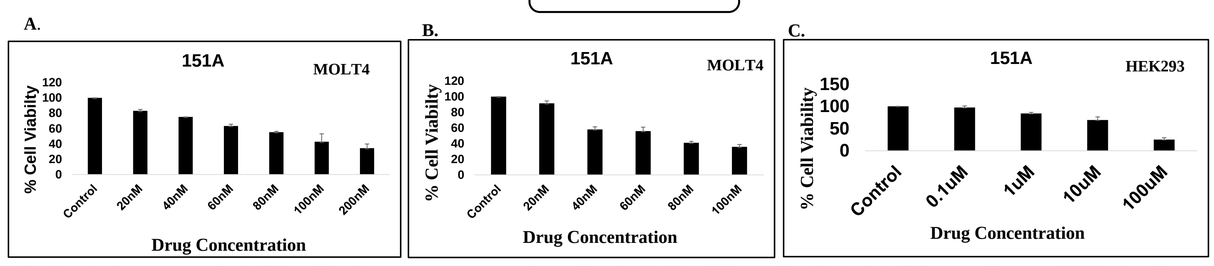


Fig 7: Evaluation of effect of 143A on *in vivo* tumor growth.
A. Tumor, Spleen and Kidney of multiple myeloma and DLA mouse models to monitor the effect of the drugs.
The p value was calculated between control and 143A treated groups, where, *:p value <0.05.

151A



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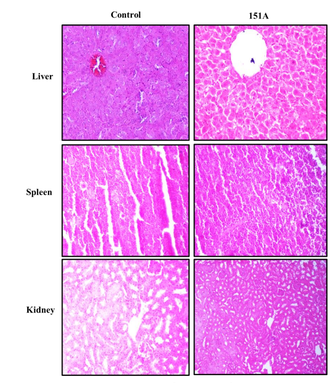

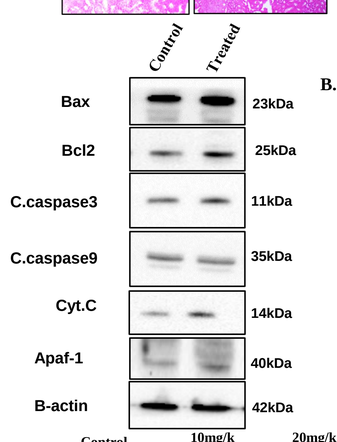

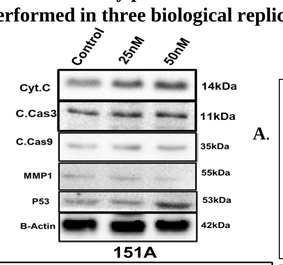

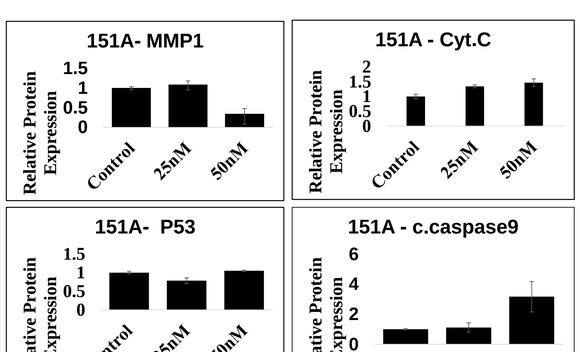

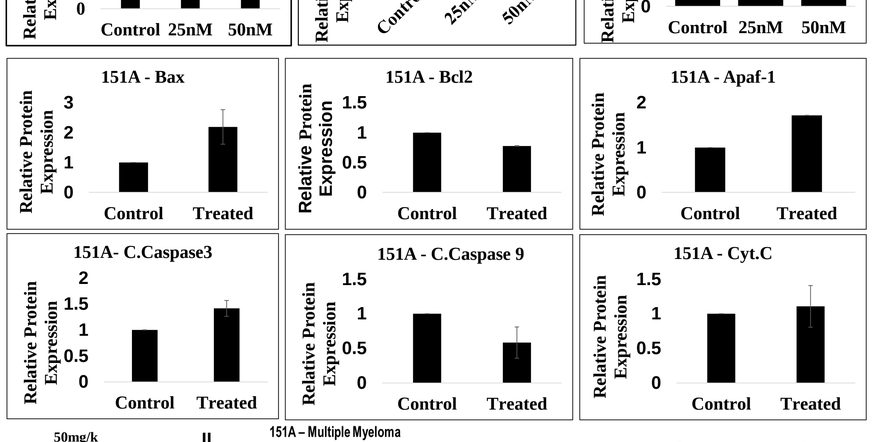

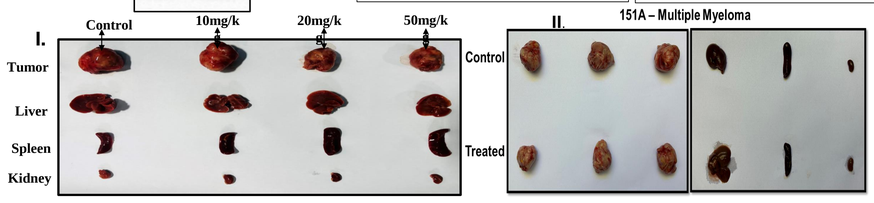

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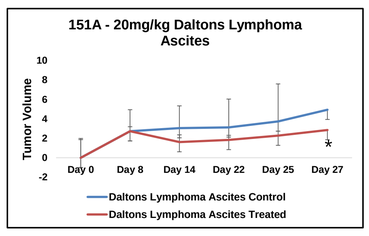
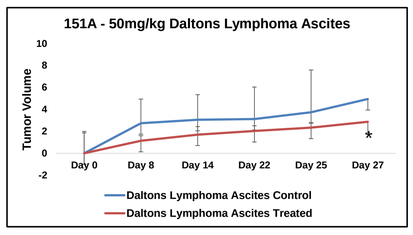
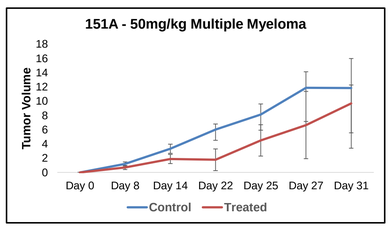
A) Molt4 cells B) Animal western

Fig 8: I) Tumor model of DLA
II) Tumor model of Multiple Myeloma







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ACKNOWLEDGEMENT

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FUTURE WORK

- The drugs that are focused on this study can be developed a lot further for the targeted therapy, to specifically target the unique molecular characteristics of cancer cells.
- Further research is needed to identify new drug targets and develop drugs that are effective against a wider range of cancers.
- Identify effective combinations of drugs and understand how to optimize the timing and dosing of these drugs.

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