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### The anti-proliferative effect of turmeric and rooibos extracts on human Hodgkin lymphoma cells

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# **The Anti-proliferative Effects of Turmeric and Rooibos Extracts on Human Hodgkin Lymphoma Cells**

Emily Kogel

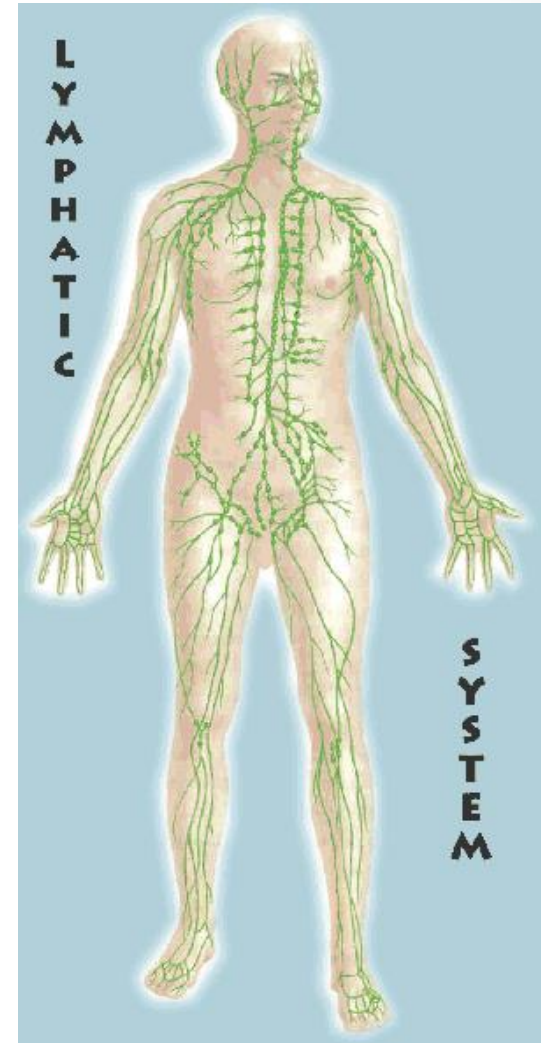
March 29, 2016



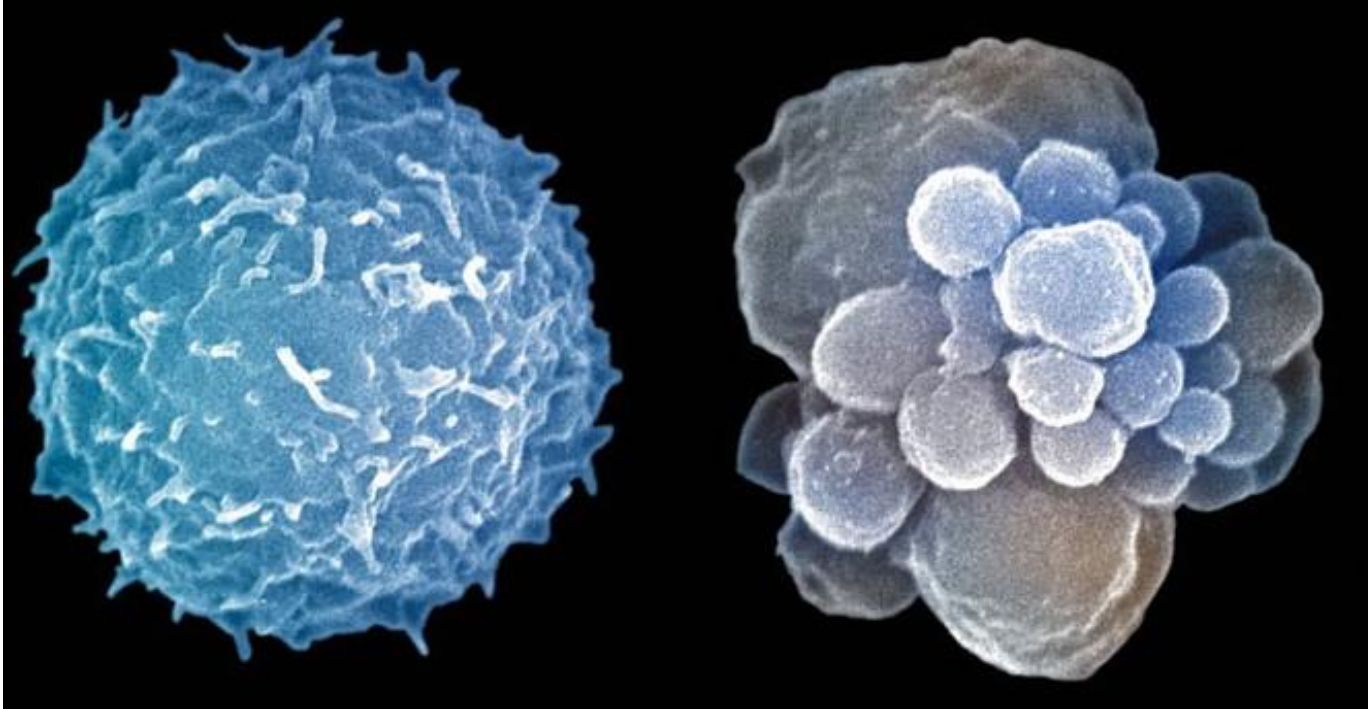
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# Hodgkin Lymphoma

- Immune system support
- Lymph
  - Lymphocytes + other white blood cells
  - Antibodies
  - Nutrients



# Apoptosis



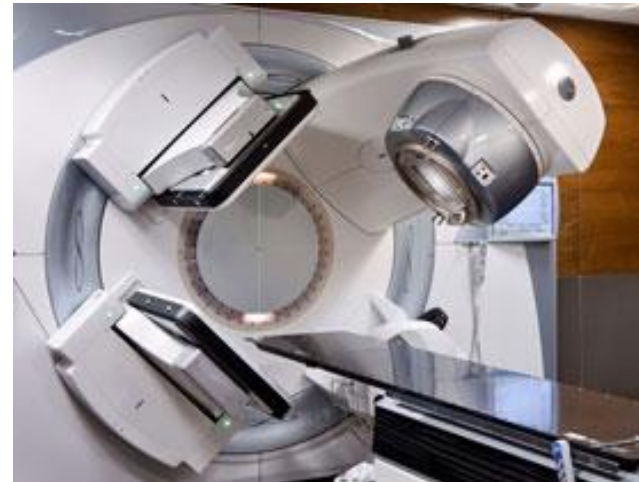
# Cancer Treatment: Options

- Surgery

Hodgkin

Lymphoma:

- Radiation therapy
- Chemotherapy



# Turmeric & Rooibos

- Natural health products - new cancer treatment options?

## Turmeric



- Strong anti-inflammatory agent
- Supports immune system
- Activates intrinsic apoptosis

## Rooibos



- Inhibitor of x-ray-induced cell transformation
- Anti-oxidant activity
- Free-radical scavengers, like flavonoids, induce apoptosis in cancerous cells



# Methods of Extraction

- 3 solvents
- Whole, complex mixture

Hot Water



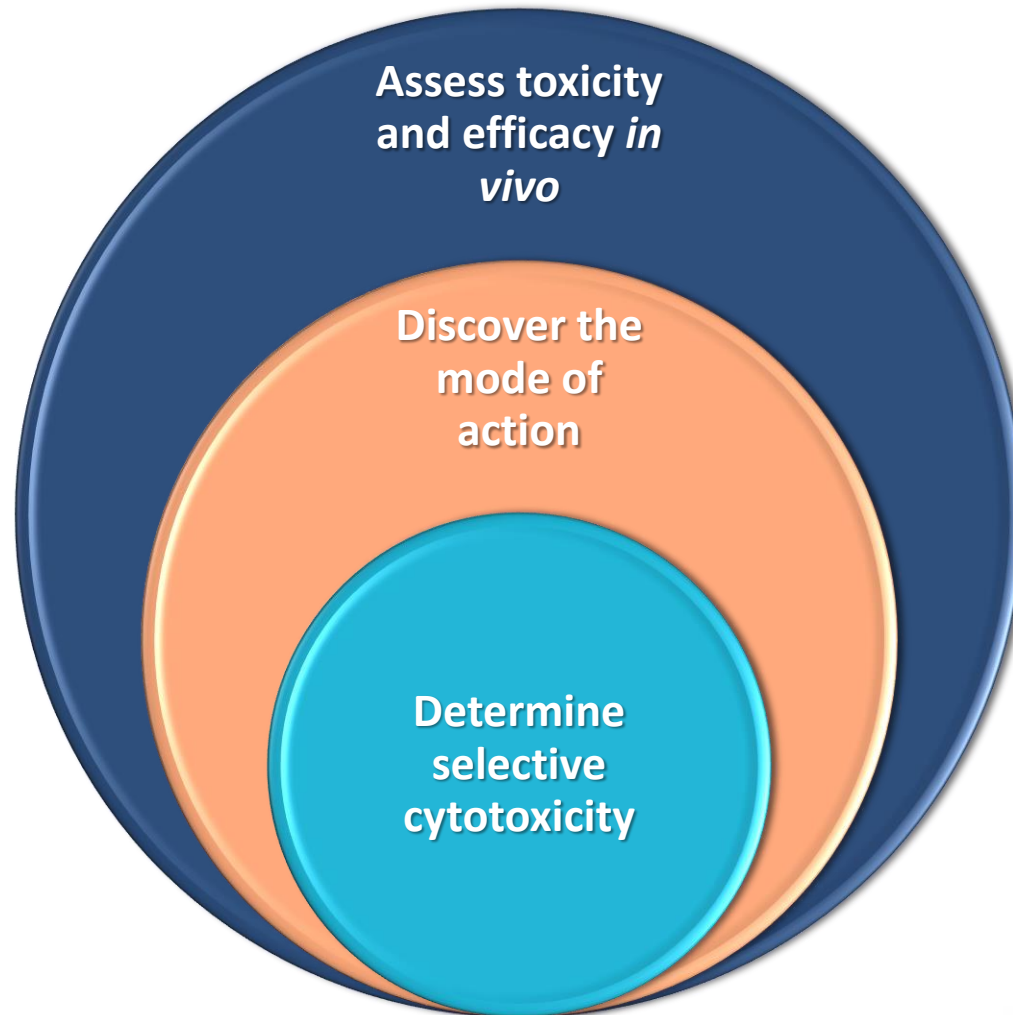
Cold Water




Ethanol



Do the **anti-proliferative properties of turmeric and rooibos extracts** in cancer cells translate to **Hodgkin lymphoma cells**, and if they do, is the mechanism of action **selective**?







Determine  
selective  
cytotoxicity

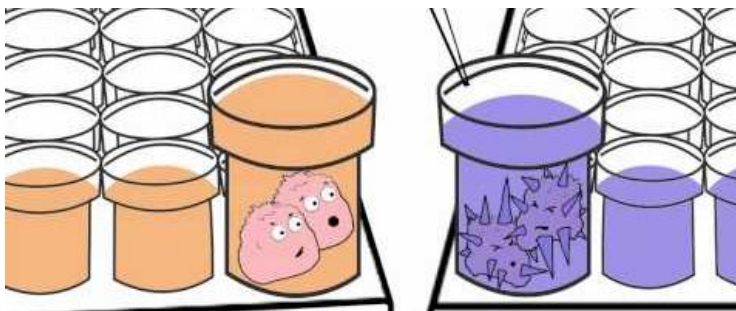
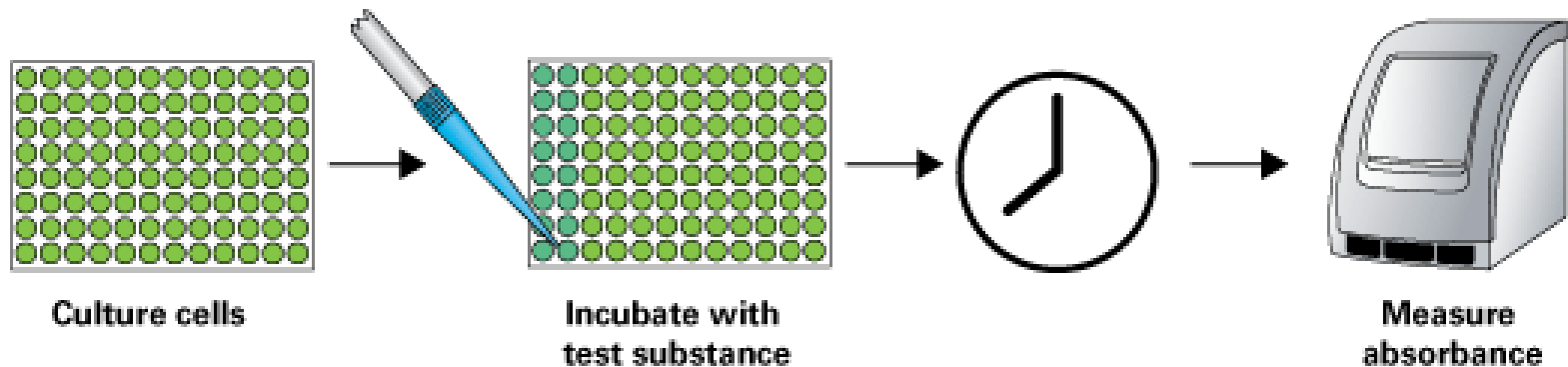
Do the **anti-proliferative properties of turmeric and rooibos extracts** in cancer cells translate to **Hodgkin lymphoma cells**, and if they do, is the mechanism of action **selective**?

## OBJECTIVES

1. Determine if turmeric and rooibos extracts, both individually and in combination, exhibit cytotoxic effects against Hodgkin Lymphoma cells (**WST-1 assay**)
2. Quantify cytotoxicity (**Trypan blue exclusion assay**)
3. Determine permanency of the drugs' effects (**Revival assay**)

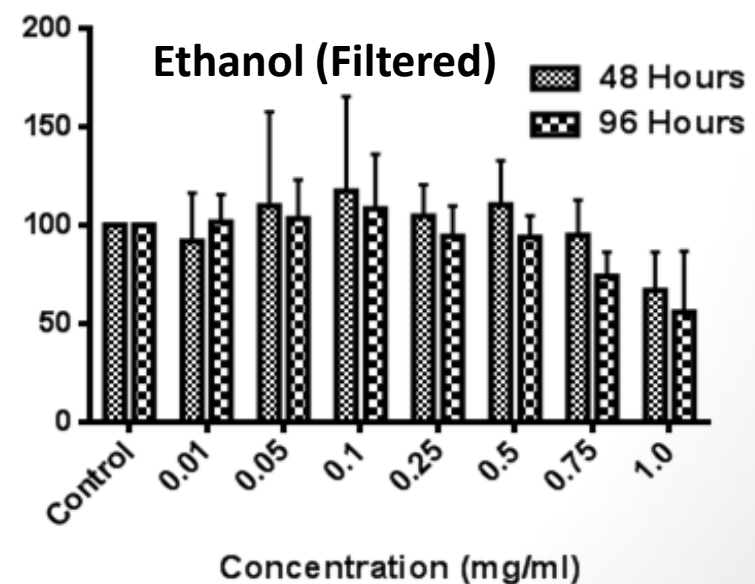
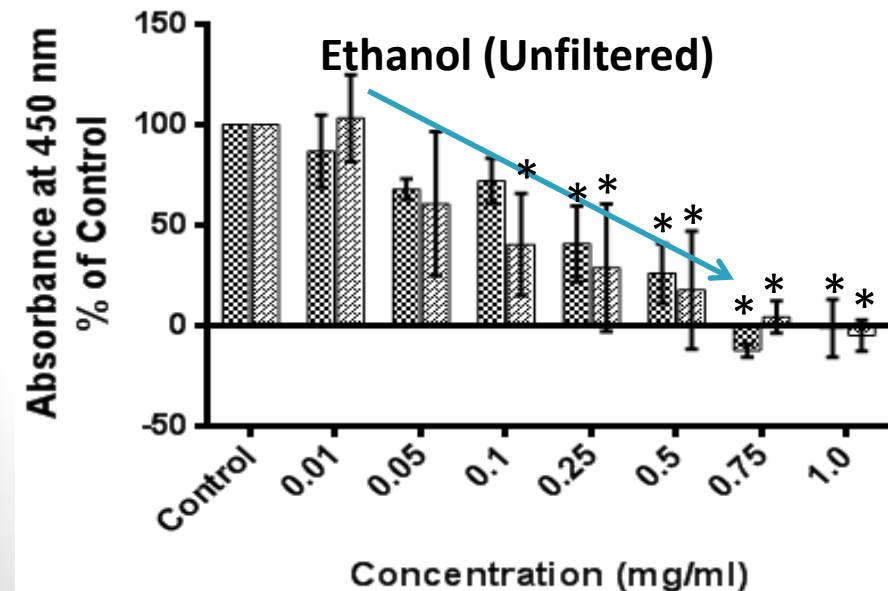
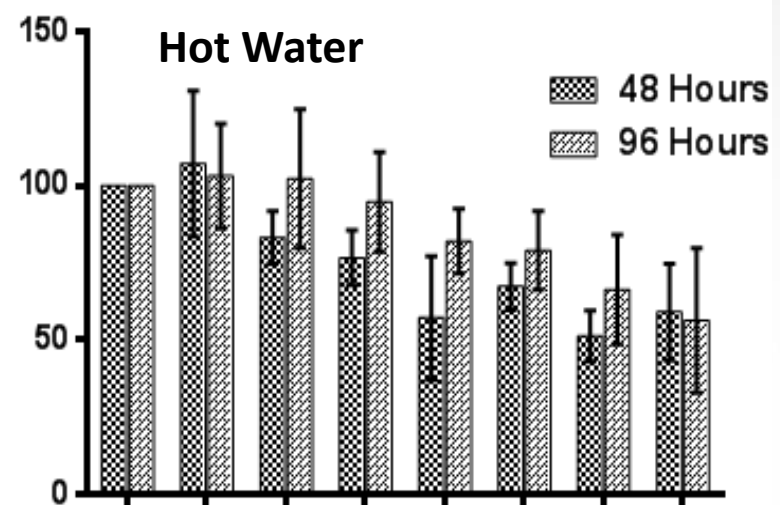
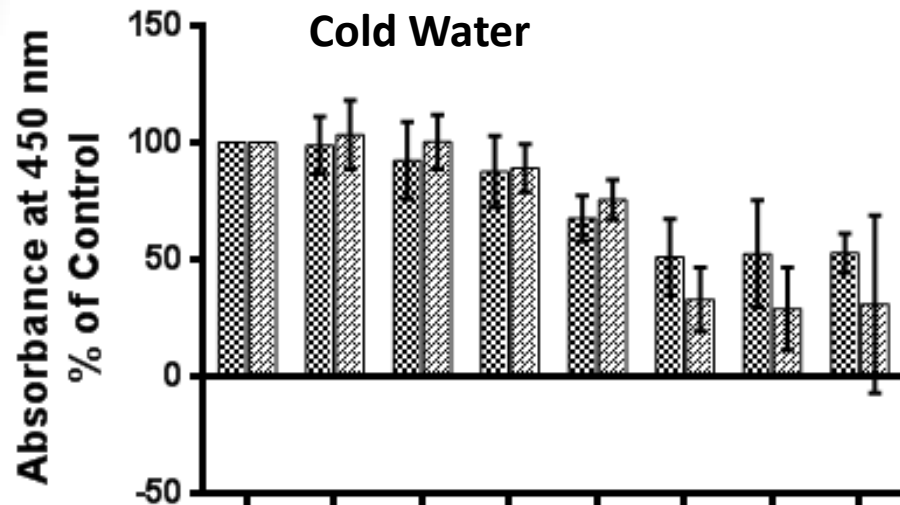
# 1. Determining cytotoxicity

- WST-1 Assay

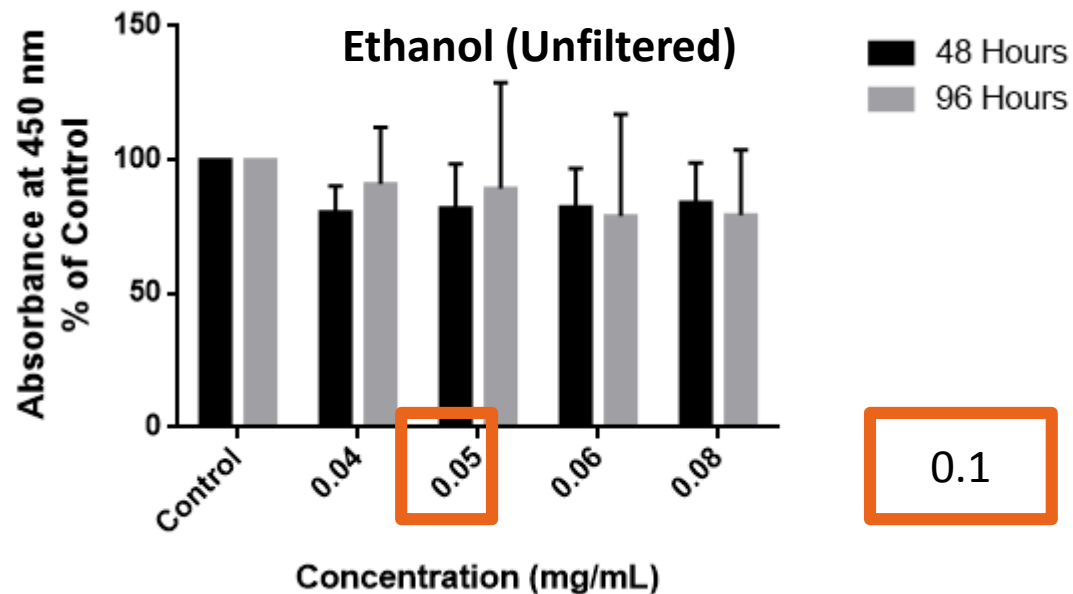
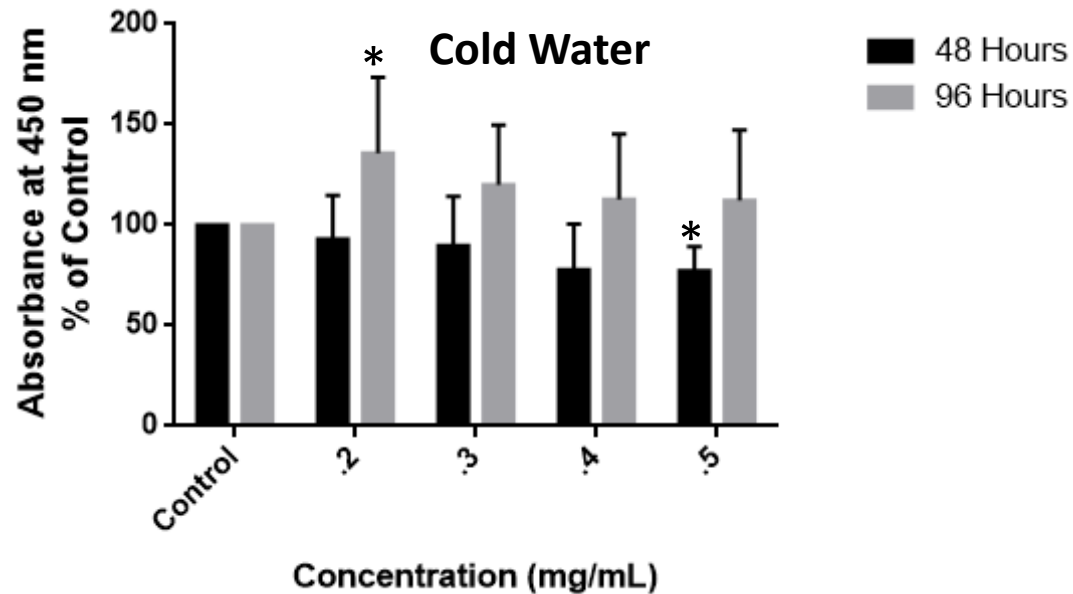


Lower absorbance  
=  
Lower viability

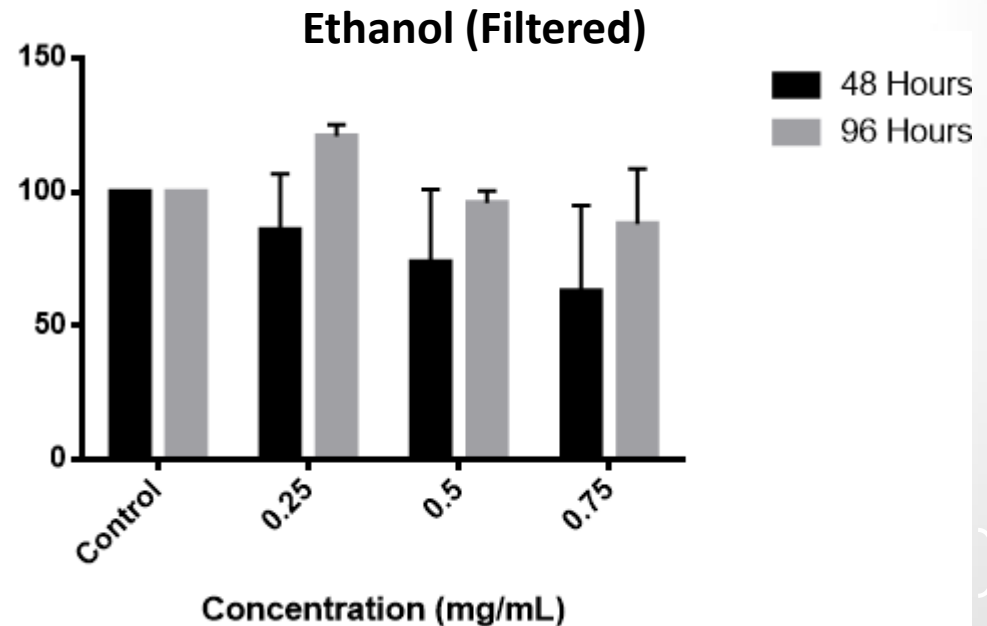
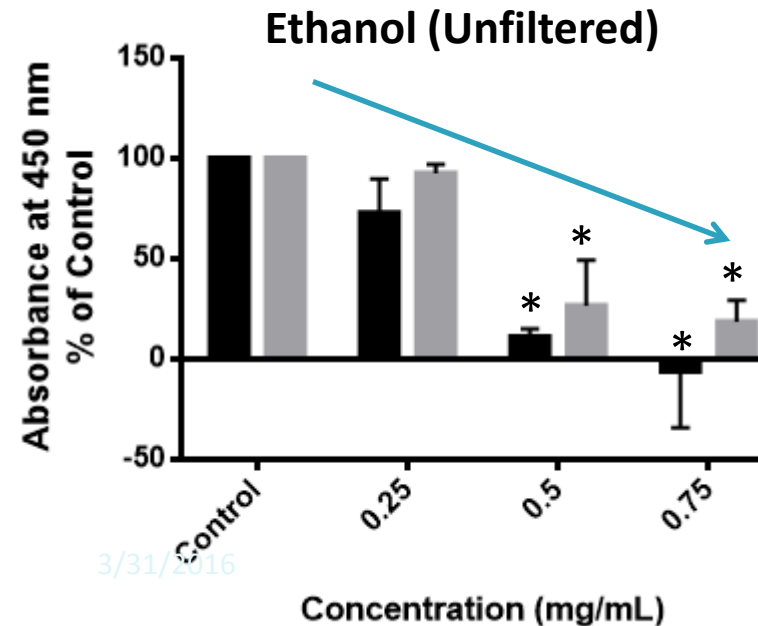
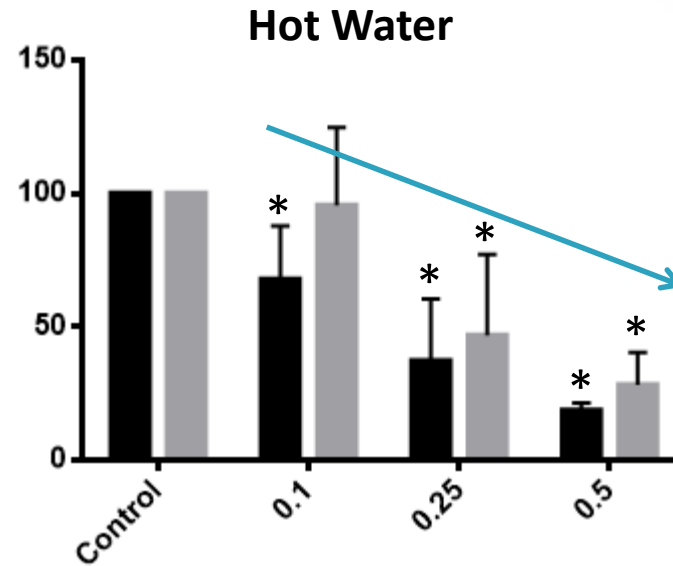
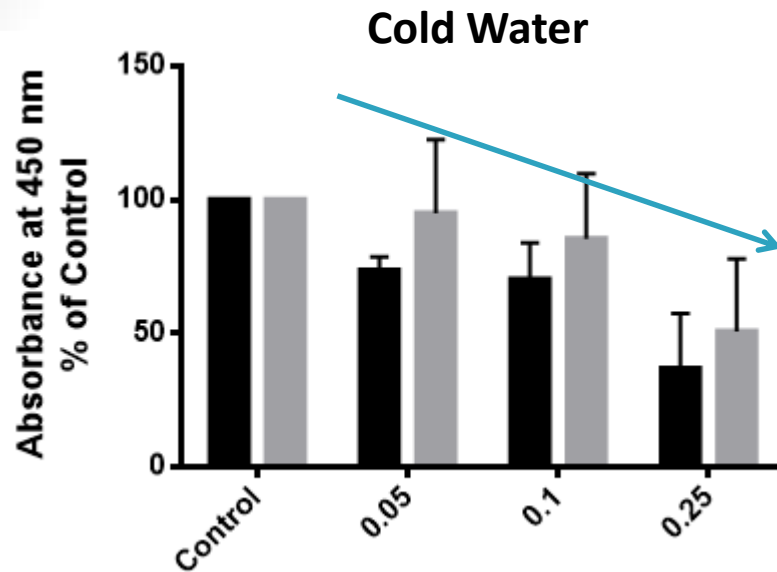
# Cytotoxicity of Turmeric Extracts (KM-H2)



# Cytotoxicity of Turmeric Extracts (KM-H2) - ROUND 2

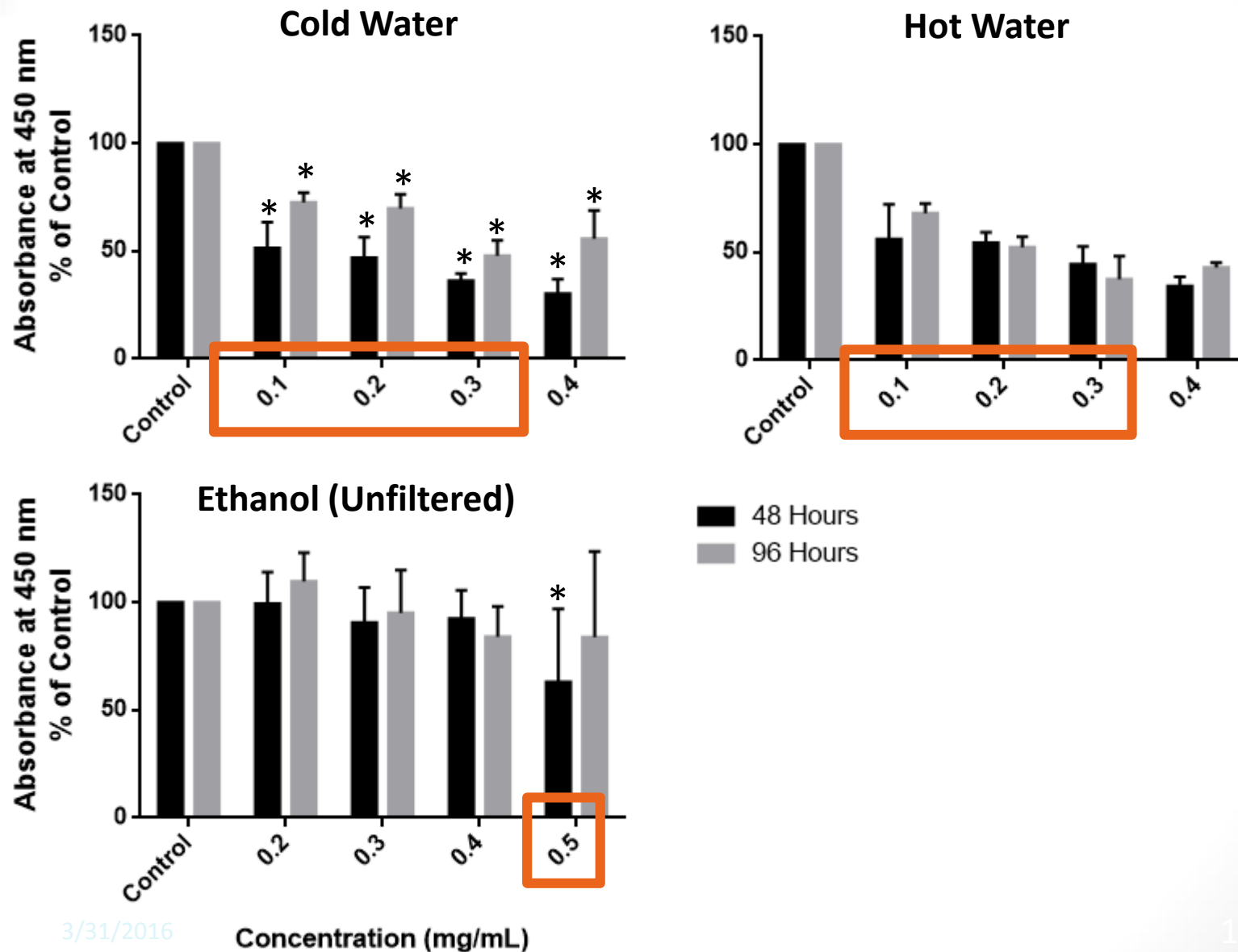


# Cytotoxicity of Rooibos Extracts (KM-H2)



■ 48 Hours  
■ 96 Hours

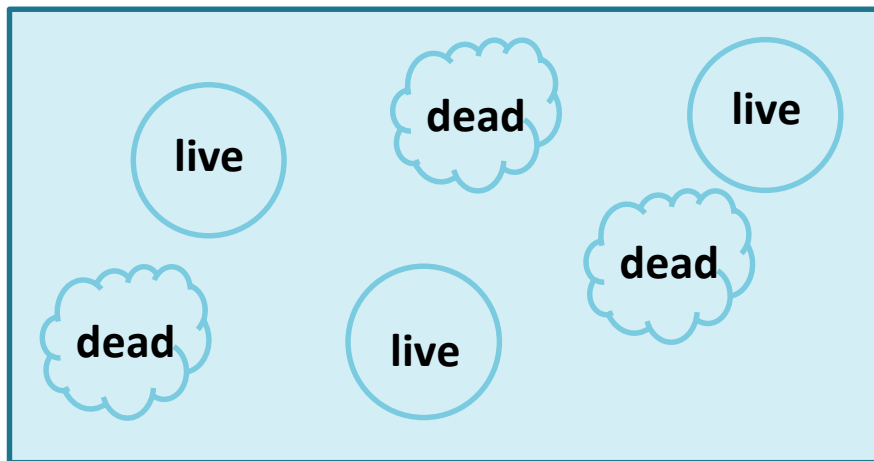
# Cytotoxicity of Rooibos Extracts (KM-H2) – **ROUND 2**





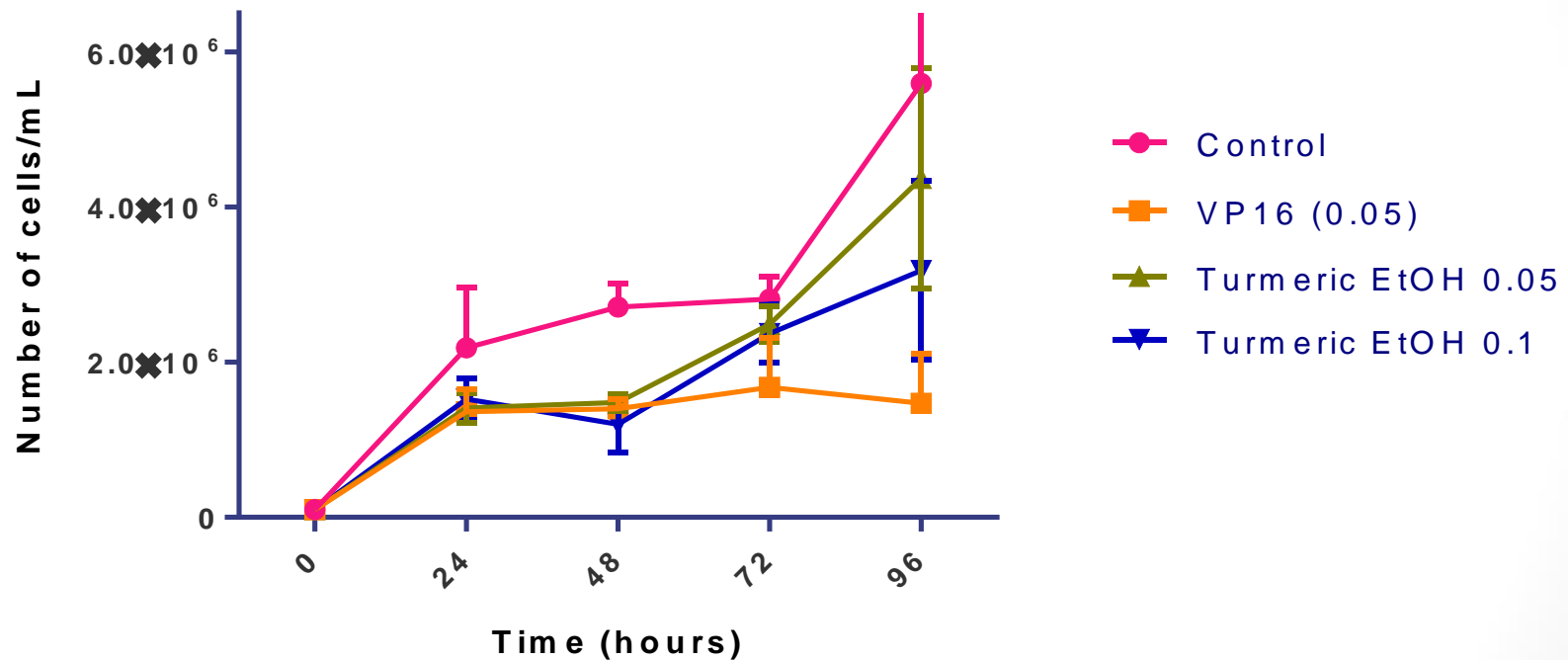
## 2. Quantify cytotoxicity

- Trypan blue exclusion assay



## 2. Quantify cytotoxicity:

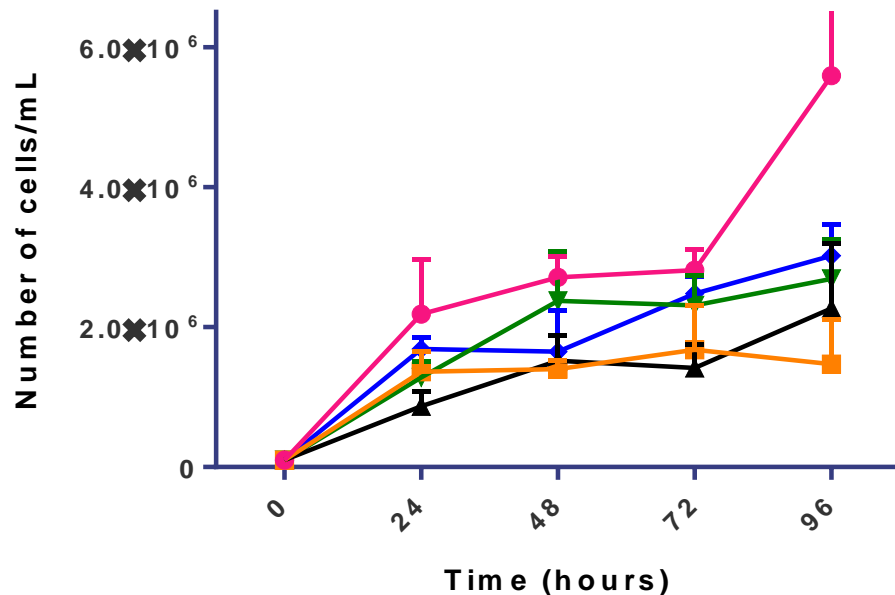
### Effect of ethanolic turmeric extract on the viability of KM-H2 cells



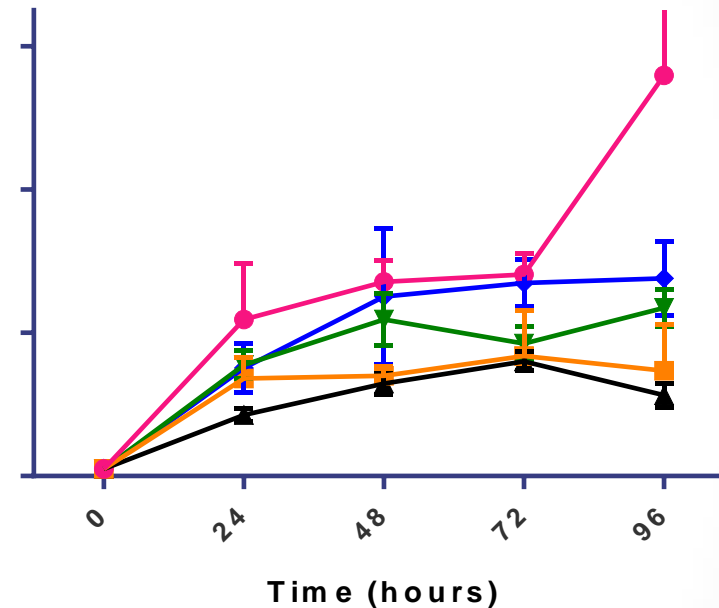
## 2. Quantify cytotoxicity:

### Effect of rooibos extracts on the viability of KM-H2 cells

Cold water rooibos



Hot water rooibos

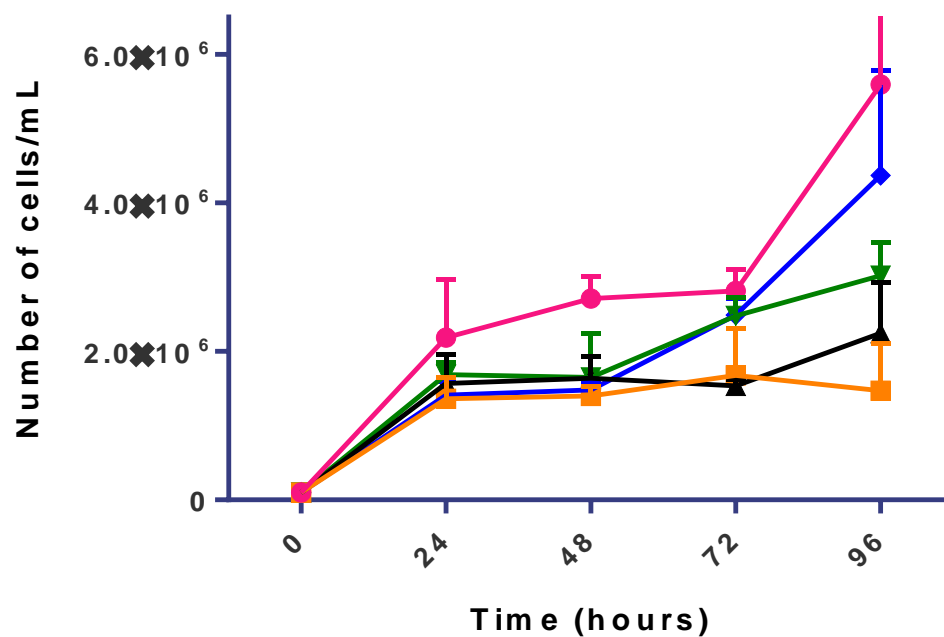


- ◆ Rooibos 0.1
- ▼ Rooibos 0.2
- ▲ Rooibos 0.3
- VP16 (0.05)
- Control

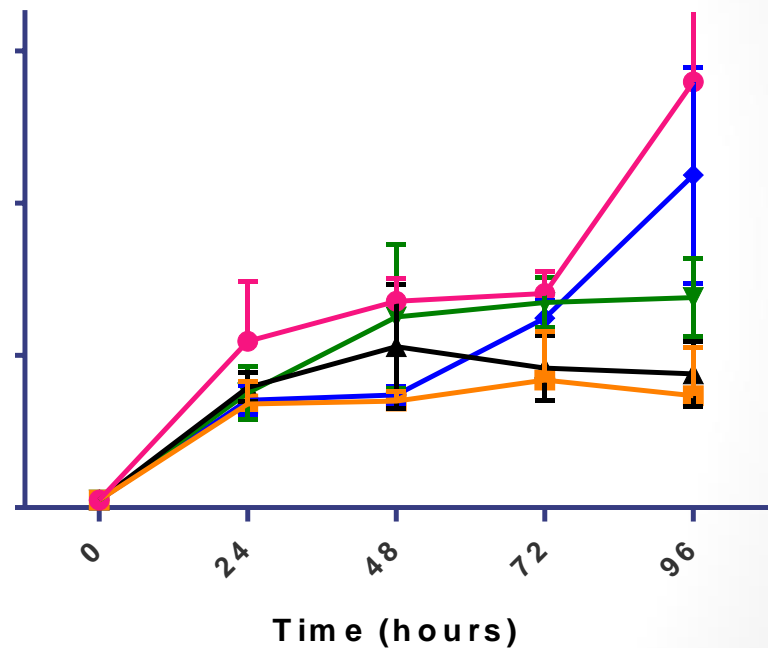
## 2. Quantify cytotoxicity:

### Effect of extracts in combination on the viability of KM-H2 cells

Cold water combination







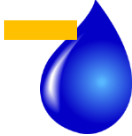









Hot water combination



- ◆ Turmeric EtOH 0.05
- ▼ Rooibos 0.1
- ▲ Turmeric EtOH 0.05 + Rooibos 0.1
- VP16 (0.05)
- Control

### 3. Determine permanency of the drugs' effects

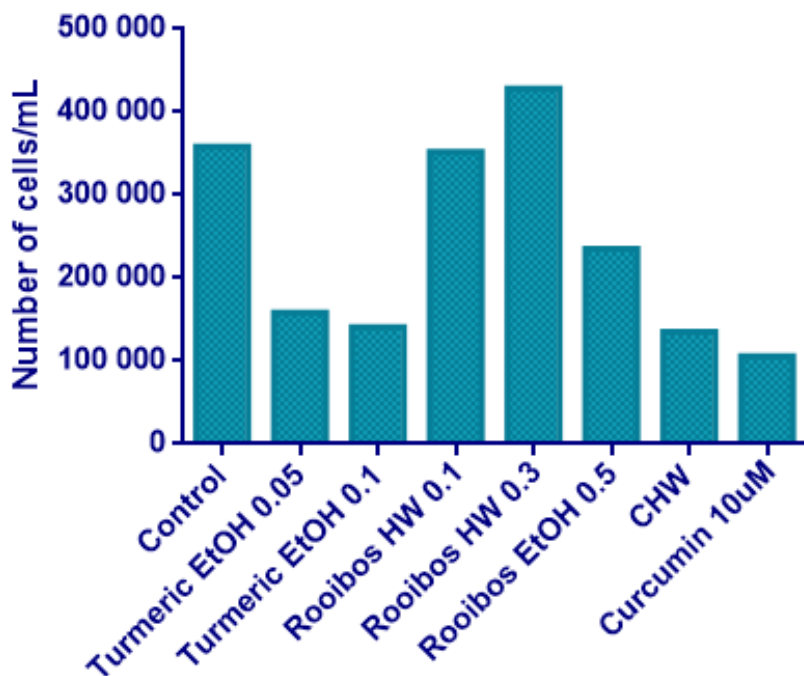
- Revival assay

	<u>48 hours</u>	24h	48h	72h	96h
Ineffective drug/ Control					
Semi-effective drug					
Effective drug					

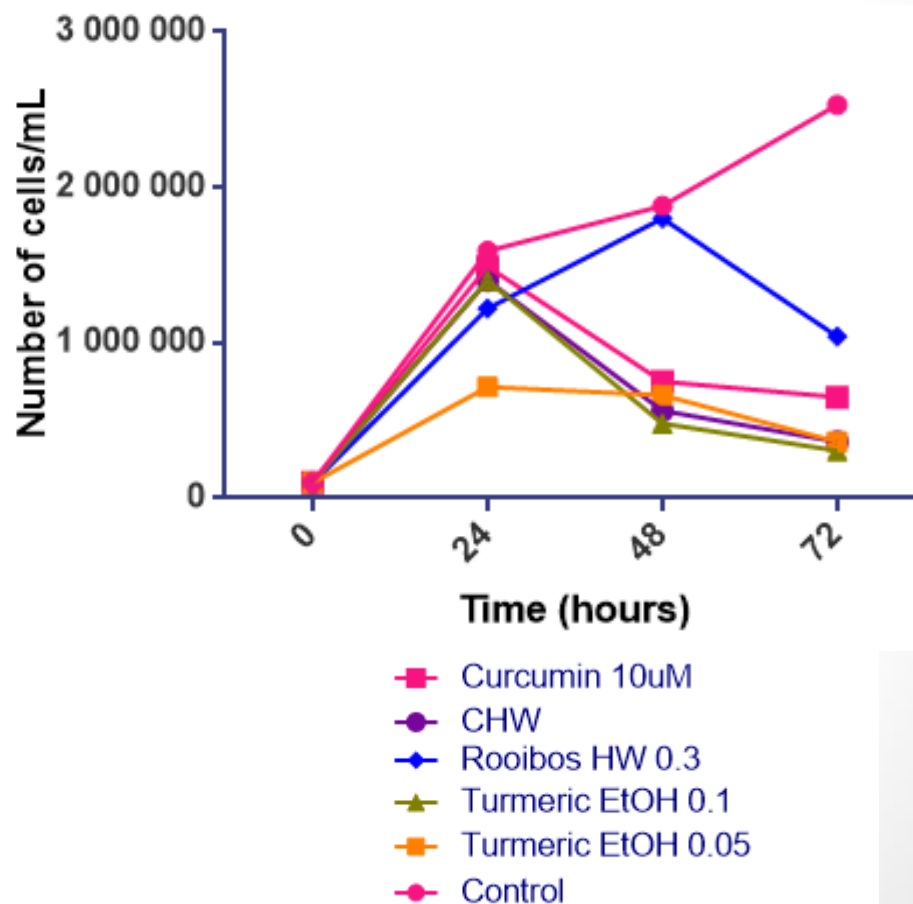
# Growth of KM-H2 cells in various treatment groups:

## PRELIMINARY RESULTS

48 hours (with drug)



24-72 hours (without drug)





# Conclusions

- Turmeric: ethanolic extracts exhibit anti-proliferative effects on Hodgkin lymphoma cells that are likely long-lasting
- Rooibos: hot water extracts show cytotoxicity against Hodgkin lymphoma cells
- A combinatorial effect exists when low doses of ethanolic turmeric and cold/hot water rooibos extracts are used together

These natural health products show potential to be studied further for the development of more effective chemotherapeutic agents.

# Future Work

- Assess selectivity of extracts by studying cytotoxicity in normal lymphocytes
- Evaluate the mode of cell death induction
- Assess toxicity and efficacy alone and in combination in animal models



# Dedication

- Dedicated to the memory of Kevin Couvillon, who lost his battle against Leukaemia in 2010.



# Acknowledgments

- Dr. Pandey
- Members of Dr. Pandey's Lab
- Funding



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Thank you!