Characterizing the cytotoxic effects and several antimicrobial phytochemicals of *Argemone mexicana*

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**INTRODUCTION**

Plants naturally produce a robust supply of novel metabolic compounds that can be used to treat a variety of human diseases. From 1981 to 2010, it is estimated that nearly 50% of all cancer drugs originated from natural products [1], many of which were derived from terrestrial plants [2]. Likewise, plants produce many antimicrobial agents, which include a wide variety of natural defense compounds, such as phenolics, terpenoids, alkaloids, polycytylenes, lectins and polypeptides [3].

With the advent of modern antibiotic drugs mainly of bacterial, fungal and synthetic sources, many of these natural plant-derived antibiotic compounds have been left unexplored. Yet with the high number of antibiotic-resistant pathogenic microorganisms, there is a pressing need for the development of new classes of antibiotic drugs (Fig. 1).

**METHODS & RESULTS**

**Figure 2: Extraction Procedure**

Extract Preparation. Whole *Argemone mexicana* plants were separated into leaves, seeds, inner or outer roots and allowed to dry in paper bags at 22°C. 2 grams of each dried sample was homogenized using a mortar and pestle. The powdered sample was then macerated in methanol or hexane using a 1:4 (plant material:solvent) ratio at 200 rpm, 35°C for 48 hours. The mixture was centrifuged at 5,000 x g for 5 minutes, and the supernatant was filtered through a 0.2 μm PTFE membrane. The filtrate was then dried-hydrated, quantified and tested for biological activity.

**Figure 3: Antimicrobial & Anticancer Experiments**

**Figure 4: Chemical Characterization**

**CONCLUSIONS & ON-GOING WORK**

- Outer root methanol extracts possess antimicrobial activity, with greatest effects against gram-positive bacteria (Fig. 3).
- Outer root methanol and seed hexane extracts have inhibitory effects against T84 human colon cancer cells (Fig. 3).
- mRNA levels of c-MYC (oncogene) and APC (tumor suppressor) were quantified.
- Chelerythrine and berberine were found as main antibiotic compounds in the roots and/or leaves of *A. mexicana* (Fig. 4).
- Recent work on synthesizing and testing new berberine and chelerythrine variants can be found at posters #35 and #68.

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