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## An Examination of the Cytotoxic Effects of Snake Venom on Human Colon Cancer Cells

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## *An Examination of the Cytotoxic Effects of Snake Venom on Human Colon Cancer Cells*

Biological Sciences, Chemistry

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Snake venom is a complex mixture of enzymes, proteins and other substances with toxic/lethal properties which immobilize and aid in digestion of prey. Venom's biological effects are caused primarily by many proteins found in the venom. Some of these proteins may provide novel leads for drug discovery, with applications to many human diseases. Cancers are characterized by uncontrolled growth and metastatic spread of abnormal cells that commonly results in death; colorectal cancer is the fourth most commonly diagnosed and second most lethal cancer in the United States (2011). Treatment options for colon cancer are limited, depending on the stage of the cancer at diagnosis, illustrating the need for new therapeutics. In this study, the cytotoxicity of *Pseudechis porphyriacus* venom and purified proteins toward Colo205 cancer cells was explored. Previous work showed that the venom contains metalloproteinases (SVMPs), phospholipases A2 (PLA2), three-fingered toxins (3FTxs) and cysteine-rich secretory proteins (CRiSPs); in spite of these components, the venom is only moderately toxic (LD50 ~2.5 mg/kg). Crude *Pseudechis* venom showed potent, dose-dependent toxicity toward Colo205 cells. Fractionation of crude venom via cation-exchange FPLC resulted in 13 prominent peaks, primarily 6 and 14 kDa proteins; peaks 1, 11, 12, 13 were cytotoxic. Purification of the cytotoxic proteins was performed via reverse-phase HPLC. The purified proteins ranged from having no cytotoxic effect to moderate/potent cytotoxic effect on Colo205 cells. Mass spectrometry was used to aid in identification of each purified protein. The need to develop alternative treatments for colorectal cancer is essential, as current options are limited and often have severe side effects, due in part to the sensitivity of the colorectal area to traditional cancer therapies. If apparent anti-cancer effects observed with this venom and its purified proteins are specific, these results may produce leads for novel drug therapies to treat colorectal cancer.