Anticancer Drug Discovery and Development in Suriname; Studies on Surinamese Medicinal Plants with Antiproliferative and/or Angiosuppressive Characteristics by the Research Group Medicinal Plants

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Introduction
Plant products with medicinal properties have proven to be valuable sources in the treatment of a multitude of ailments. The Research Group Medicinal Plants of the ADEK University of Suriname, South America, is making an ongoing research effort to test and identify the physiological significance and novel chemical structure of bioactive molecules with healing properties; this in preparation for future clinical trials.

Experimental
Methanol extract of plant material was fractionated with an aluminum oxide column. Fractions were tested for physiological activity at ADEK University of Suriname using an isolated organ system. Physiologically active fractions were frozen and shipped to the University of Florida (UF) where they were lyophilized to determine the concentration (40-50 mg/ml), dissolved in Deuterium Oxide (10 μl in 60 μl D₂O) and studied via NMR spectroscopy (Bruker Avance 500 with 5mm TXI probe) for molecular conformation / structural configuration. Molecular weights of potential candidates were determined by High Resolution Mass Spectrometry (HPLC-MS: ESI-MS method) using a dual approach: a HILIC column (Phenomenex LUNA HILIC) for polar compounds and a Reverse Phase column (Phenomenex Onyx Monolithic C₁₈) for semi-polar compounds. Subsequently, samples were either freeze dried or presented in gel aspect. Further fractions was obtained through HPLC using 1 minute intervals and aforementioned columns. Subfractions were screened for physiological activity using the isolated organ system. Positive activity was confirmed in certain sub-fractionated samples and prepared for HPLC-MS and NMR analysis.

Results and Discussion
Initial NMR profiles revealed an interesting group of aromatic compounds, structurally linked to a multitude of carbohydrate candidate molecules. This association was confirmed and the carbohydrate abundance in the sample called for further separation of this particular fraction. Carbohydrate fractionation would allow for a more focused search narrowing down aromatic compounds and their respective carbon structure associations. Post sub-fractionation has confirmed the presence of bio-active molecules in several of the 1 minute intervals. Future research will show whether samples have been sufficiently purified to allow for full NMR analysis.

Conclusions
Fractionation based on carbohydrate separation and collection using HPLC technology is imperative for further progress. Based on the hydrophilic nature of the compound of interest, two approaches are currently being followed focusing on both semi-polar and polar compounds. Fractions were based on 1 minute intervals of eluent coming off HPLC columns (HILIC and RP) and were screened for physiological activity and will subsequently be presented for NMR structural identification. It is to be expected that several molecules will be present still, even after the continued efforts to clean up this extract. Hopefully, negative selection will allow for a sufficient narrowing down to identify the bioactive molecule(s) involved.

Acknowledgements
A word of appreciation to the excellent guidance by faculty and staff of the Advanced Magnetic Resonance Imaging and Spectroscopy (AMRIS) facility at the McKnight Brain Institute (MBI) of the University of Florida. Special thanks to Mr. James Rocca and Dr. Arthur Edison for their expertise and superb guidance.

References