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Drug Discovery and Development

Our work involves discovery of substances that has potential to manage various diseases. There are currently two major projects that my team in pursuing.

Synthesis and biological investigation of hybrid molecules for the management of malaria.

Cheap anti-malarials like chloroquine are no longer in clinical use due to their ineffectiveness. We are however preparing hybrid molecules through coupling of quinolone pharmacophores and trioxanes motifs since these types of hybrid molecules have been demonstrated to be effective against *Plasmodium sp*, the causative agent of malaria . The effectiveness of these molecules is determined through *in vitro* and *in vivo* antimalarial assays. The safety index of the most promising molecule is determined through a combination of *in vitro* and *in vivo* assays. We believe that this will contribute to identification of dual drugs that can be used to manage malaria. This work is carried out in collaboration with researchers from Jomo Kenyatta University of Agriculture & Technology (JKUAT) and Kenya Medical Research Institute (KEMRI).

Funding for this work has been obtained from JKUAT and National Commission for Science, Technology & Innovation (NACOSTI).

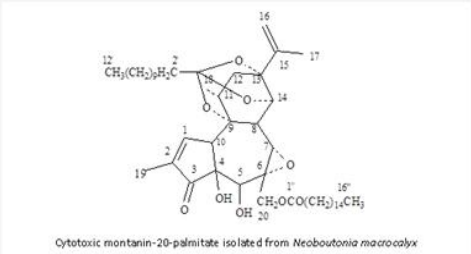
Bioprospecting for antiproliferative (anti-cancer) agents from Natural Products.

Cancer cases continues to triple annually in Kenya. In majority of the cases, these diseases are discovered in late stages. Management of cancer in later stages is very expensive and the conventional methods produce numerous undesirable effects. Natural products have been demonstrated to offer cheaper effective alternatives and most importantly with few or no side effects hence ensuring the patients have improved quality of life. We have collected various plants used in ethnomedicine to manage cancer /tumors. We will determine the efficacy and safety of these extracts with the aim of identifying safe and effective formulations that can be used in the management of cancer. This work is funded jointly by Mount Kenya University (MKU) and KEMRI.

Relevant publications

Kirira PG, Rukunga GM, Wanyonyi AW, Muthaura CN, Mungai GM, Machocho AK, Ndiege IO. Tigliane Diterpenoids from the stem bark of Neoboutonia macrocalyx Pax (Euphorbiaceae). J Nat Prod. 2007 70:842-5.

Muregi FW, **Kirira PG**, Ishih A. A. Novel rational drug Design strategies with potential to revolutionalize malaria chemotherapy. Curr Med Chem 2011, 18: 113-143.



Cytotoxic montanin-20-palmitate isolated from *Neoboutonia macrocalyx*

Various parts of the country where the anti-cancer plants have been collected