

**EXPLORING PLANTS AS MEDICINE:**

**AN *IN VITRO* APPROACH**

INAUGURAL LECTURE

By

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**Abstract**

Plants were the first medicines available to mankind. Archaeological evidence for the use of plants as medicine dates as far back as 60,000 years ago and the first written records are from 5,000 BC. Some of the plants used in that time are still used today, for example the opium poppy, and cannabis. The first pharmaceutical medicine was also derived from the opium poppy in 1804 when the German Friedrich Sertürner isolated morphine from its latex.

Africa has a rich plant biodiversity and long history of medicinal plant use, yet very little thorough research had been done on those plants to further develop them into herbal or pharmaceutical medicines. This field of study has grown significantly over the past two decades and modern scientific techniques have contributed to this growth. *In vitro* bioactivity testing facilitates a relatively fast evaluation of a large number of plant extracts without the ethical concerns associated with animal testing. My research focus over the past 20 years has been the development of an *in vitro* screening platform to perform antidiabetic, anticancer, anti-inflammatory, wound healing and anti-ageing testing of plant, mushroom and seaweed extracts and pure compounds. We have also developed methods to test for potential hepatotoxic and genotoxic effects.

In this lecture, I will explain how we use quantitative, high-throughput fluorescence imaging techniques to test samples for anticancer and antidiabetic activities. First the difference between normal- and cancer cells and how cancer chemotherapy targets those differences, will be explained. The effects of the popular South African medicinal plant *Artemisia afra* (wormwood, wildeals, umhlonyane) and *Anemone nemorosa,* a plant from our Romanian collaborators, will be shared as examples of our anticancer work. It is important to stress that the purpose of this research is not to find alternative cancer therapies but rather to identify plant extracts that may contain new lead compounds for future drug development. Insulin resistance is a hallmark of type 2 diabetes, therefore the biochemical basis of insulin resistance at cellular level will be outlined. Examples of completed antidiabetic studies will include *Sutherlandia frutescens* (cancer bush, kankerbossie) and *Aspalathus linearis* (rooibos). Type 2 diabetes has a multitude of potential drug targets and a plant extract may contain different compounds that exert effects at more than one of these targets, thereby enhancing its activity. Herbal supplements or teas may therefore improve diabetic complications and could be combined with lifestyle changes such as exercise, a healthy diet, weight loss and stress management.

Future work will focus on continuously updating and expanding our *in vitro* screening platform and training facility and research network. The purpose is to address the lack of skills and capacity in exploring Africa’s under researched plant biodiversity for their health benefits.