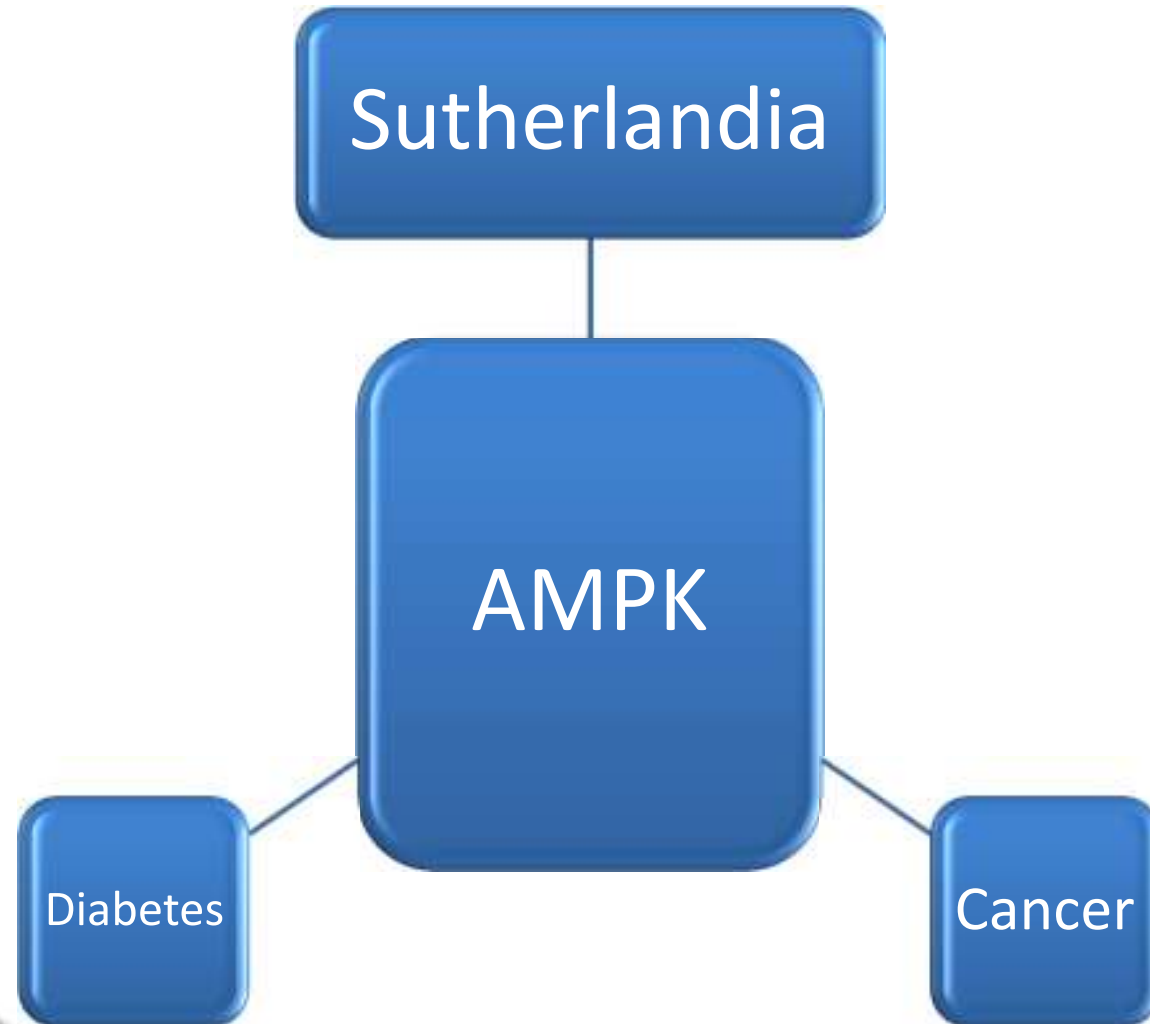


A hot water extract of *Sutherlandia frutescens* var. *microphylla* activates the cellular metabolic regulator - adenosine monophosphate (AMP) - activated protein kinase (AMPK).

Dr Carl Albrecht: Head of Research CANSA
Nelspruit, 4th June 2013



One minute presentation



Cancer affects us all...

Many medicinal uses

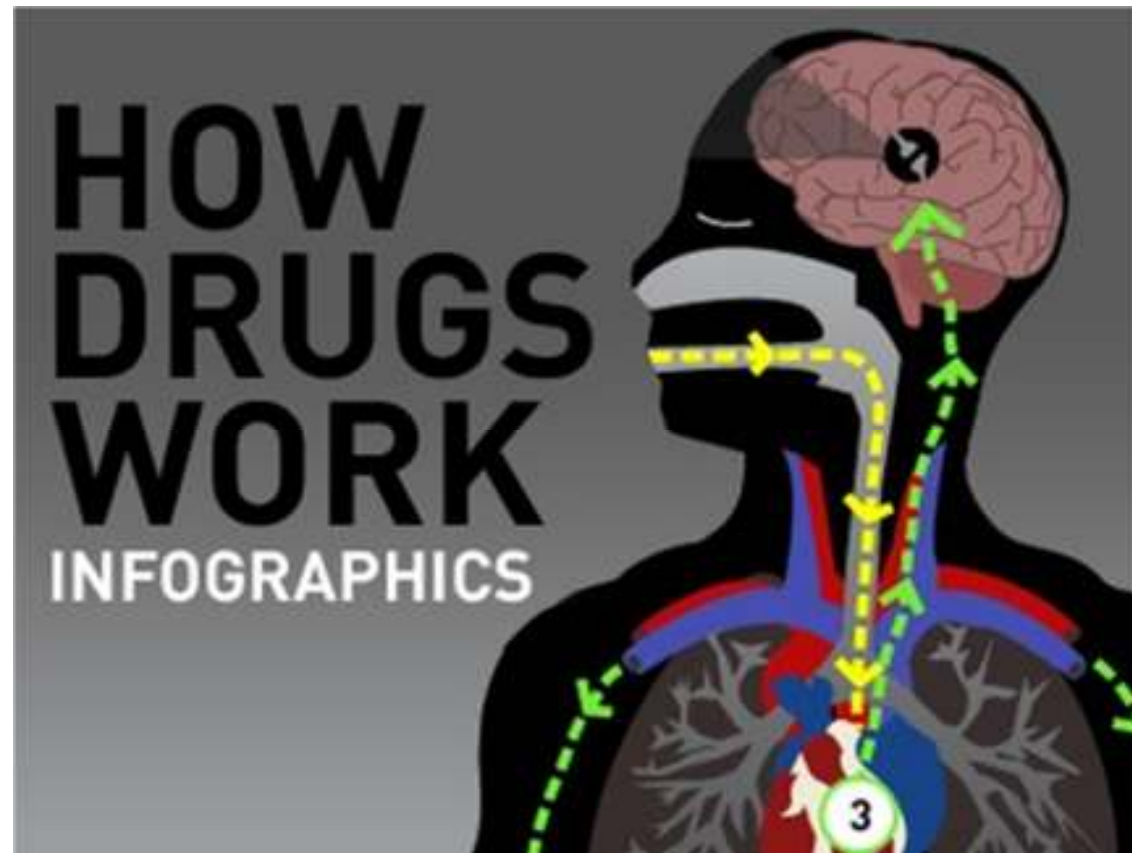


Stomach problems
Internal cancers
Colds
Influenza
Chicken pox
Diabetes
Varicose veins
Piles
Inflammation
Liver problems
Backache
Stress related ailments
Shock
Trauma
Fits
Severe depression
Appetite stimulation
Anti-cachexia



Cancer affects us all...

What could the mode of action be?



Cancer affects us all...

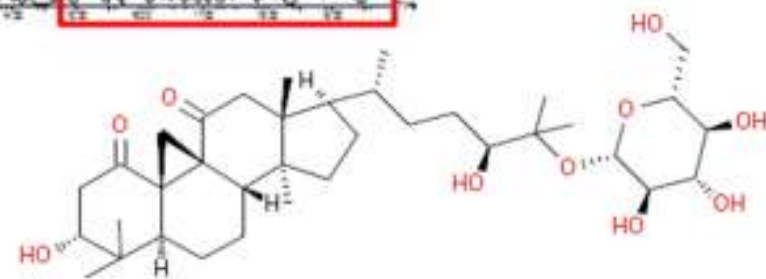
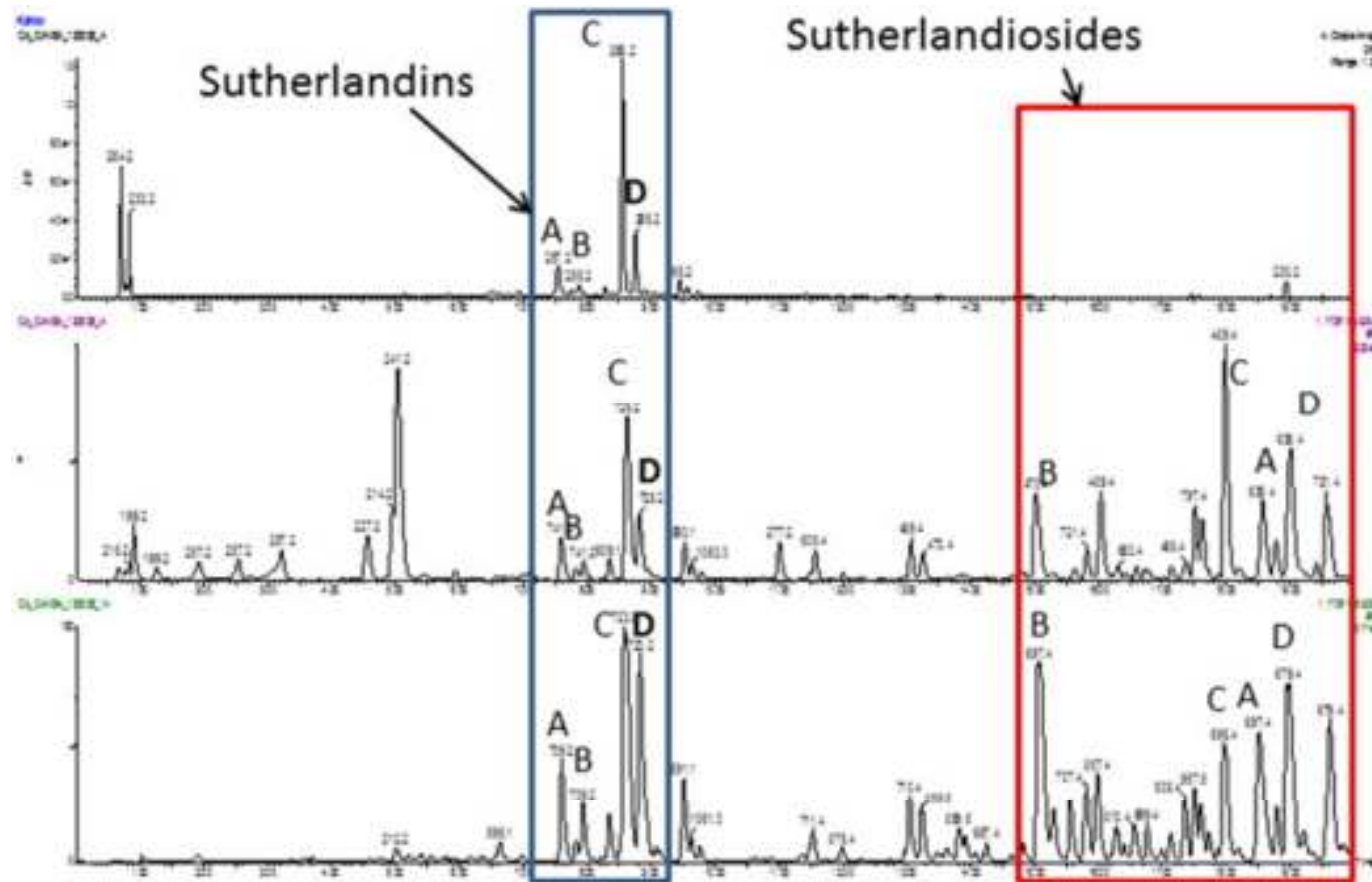
What we need to know

- For any substance to be taken seriously as a drug, we need to know the following about it:
 - ✓ 1. Chemistry
 - ✓ 2. Metabolomics
 - 3. Pharmacokinetics
 - 4. Pharmacodynamics
 - ✓ 5. Safety
 - 6. Toxicology



Cancer affects us all...

Modern chemistry of Sutherlandia

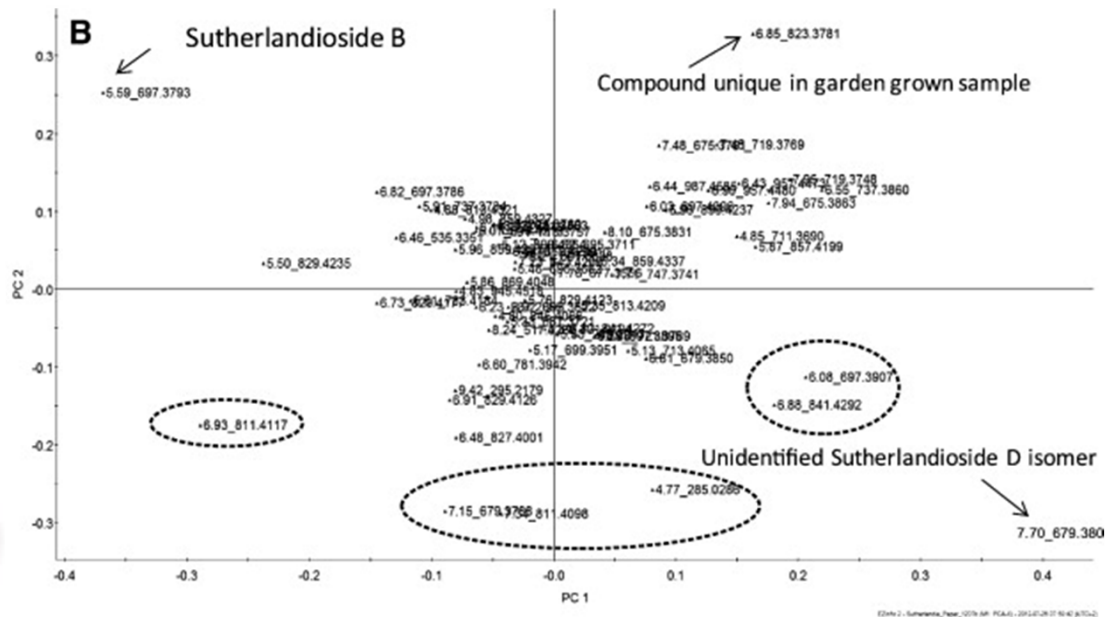
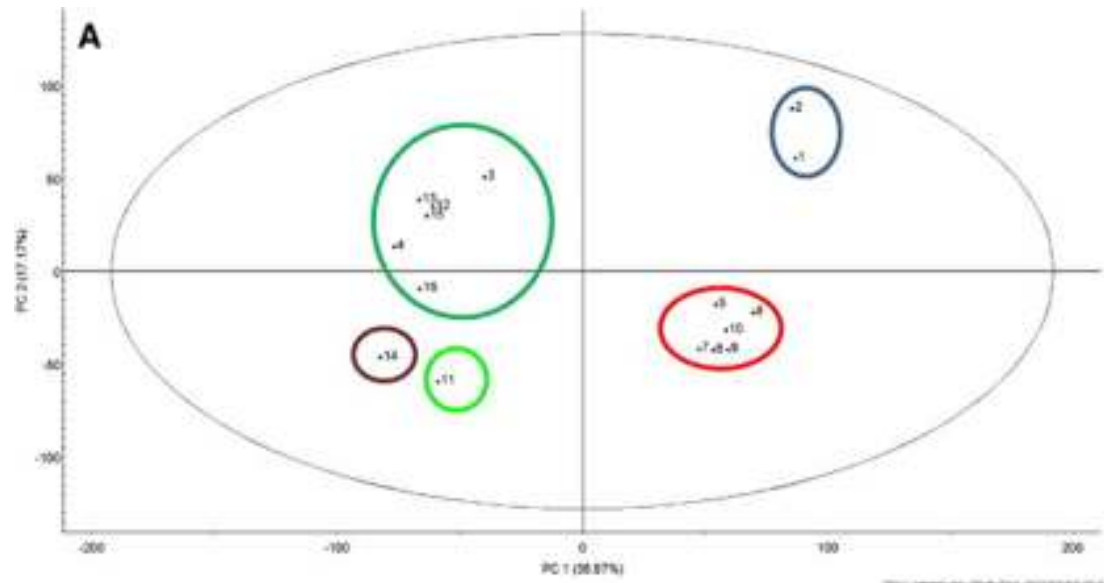


SU-1



Cancer affects us all...

Metabolomics of Sutherlandia

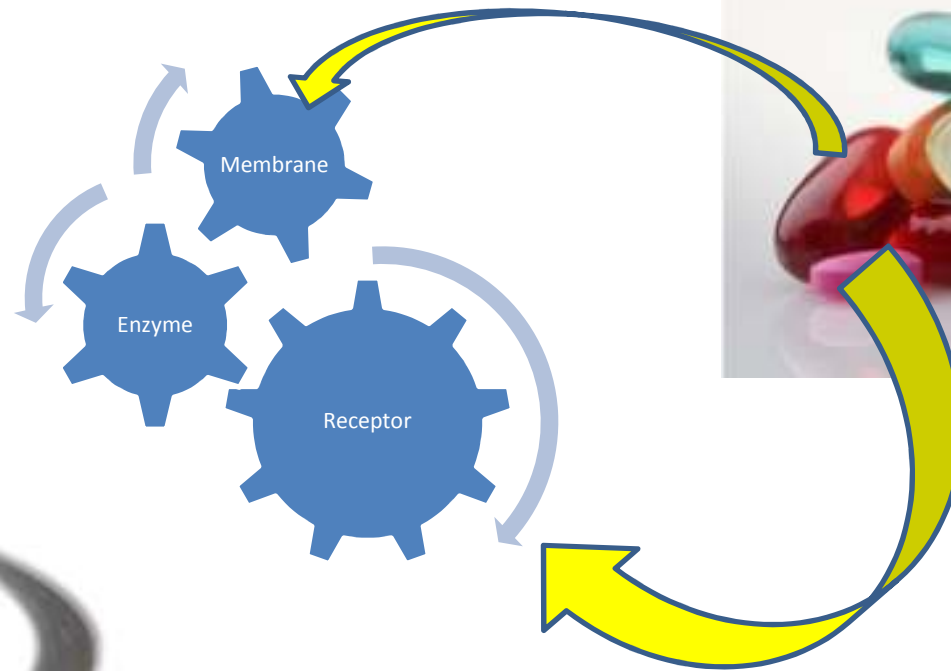


Cancer affects us all...

(Data: Sutherlandia_2018_MP_PCA) - 2018-08-10 10:42:05

What is pharmacodynamics?

- It is the science that describes how a drug works at the molecular, cellular and organ levels.



Cancer affects us all...

What could the target of Sutherlandia be?



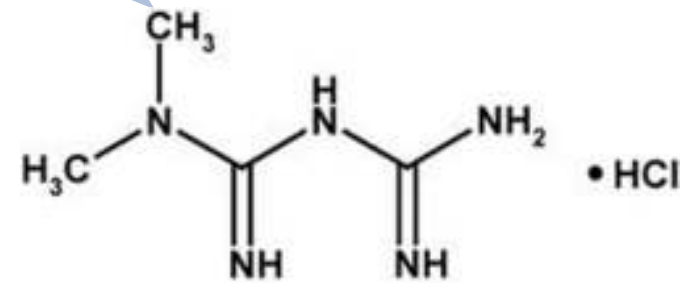
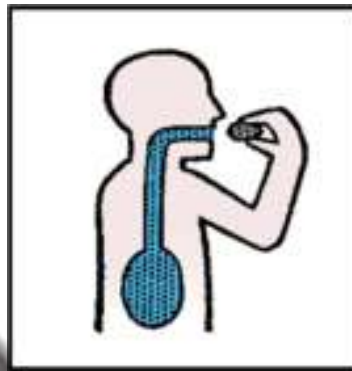
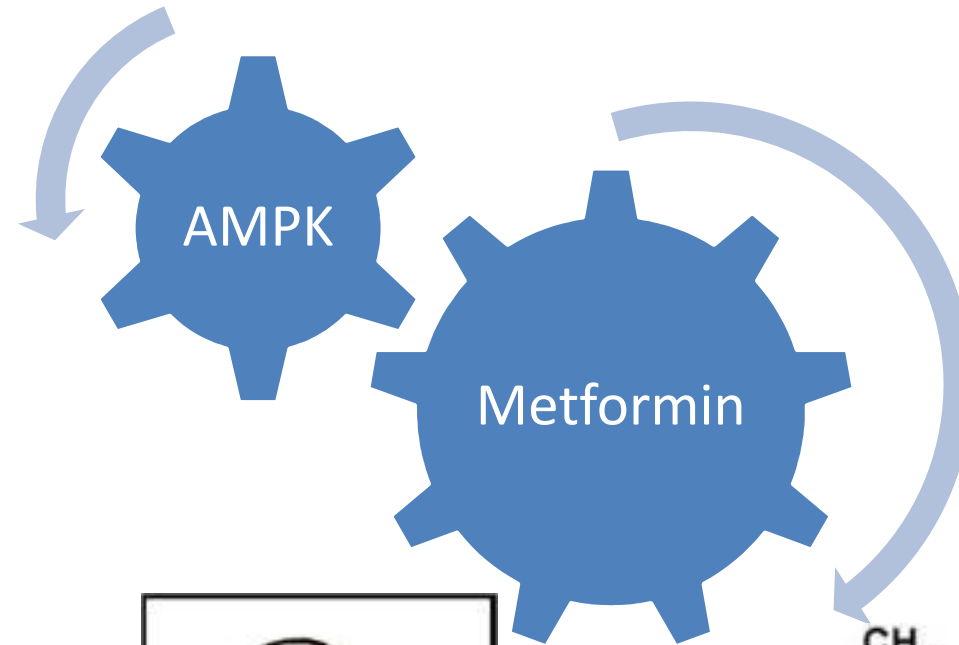
CANCER

DIABETES



Cancer affects us all...

How is diabetes treated?

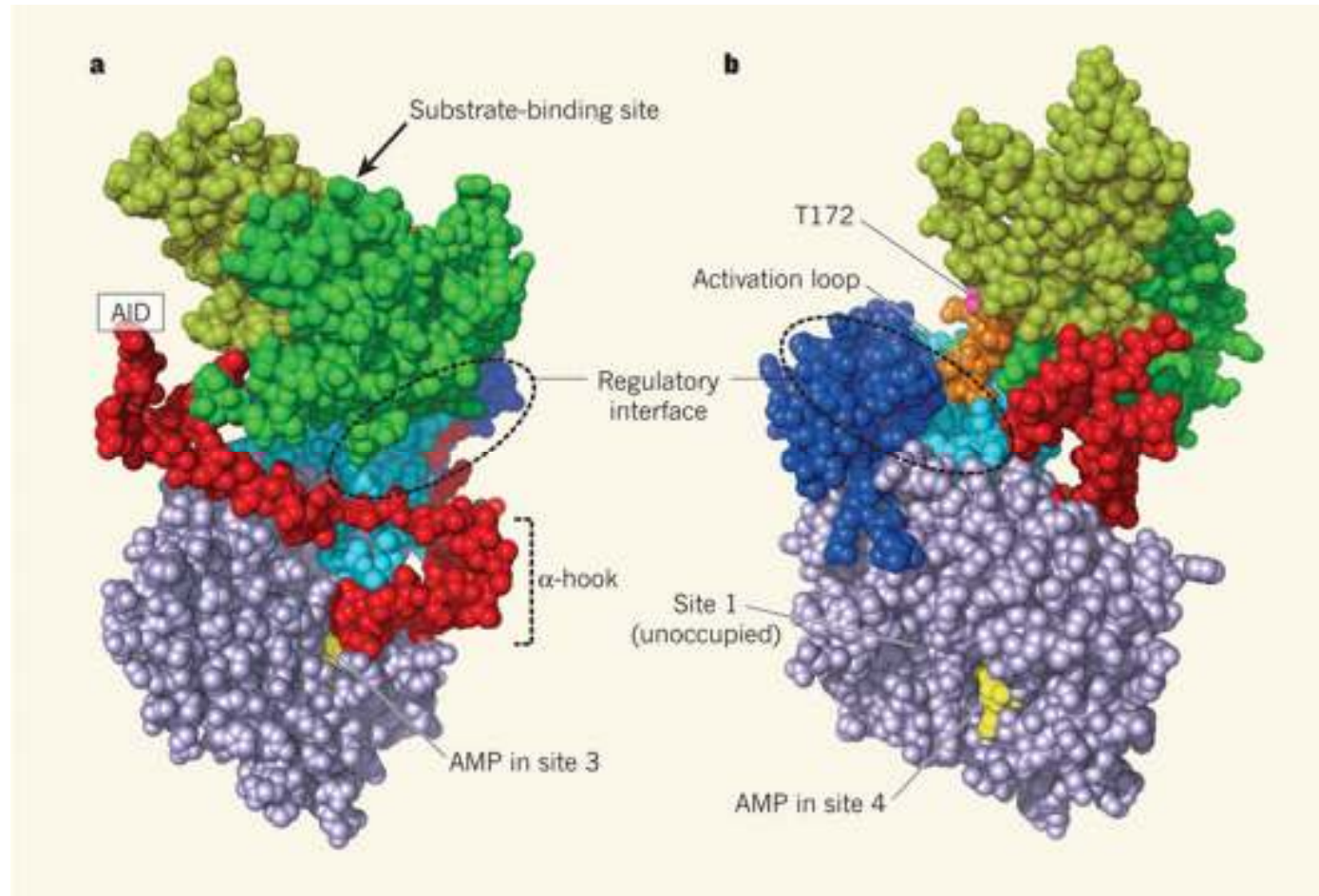


Metformin Hydrochloride



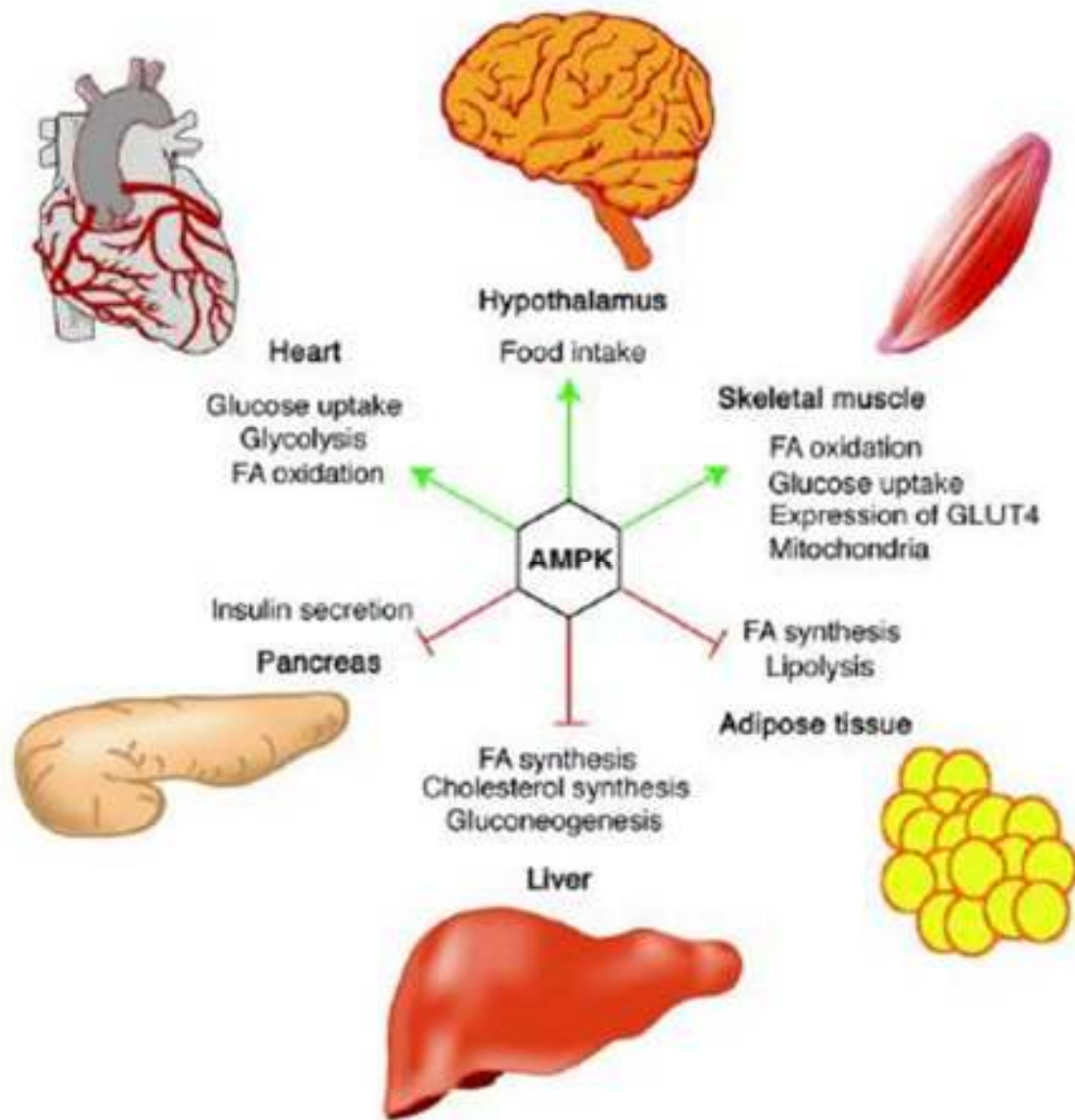
Cancer affects us all...

What does AMPK do?

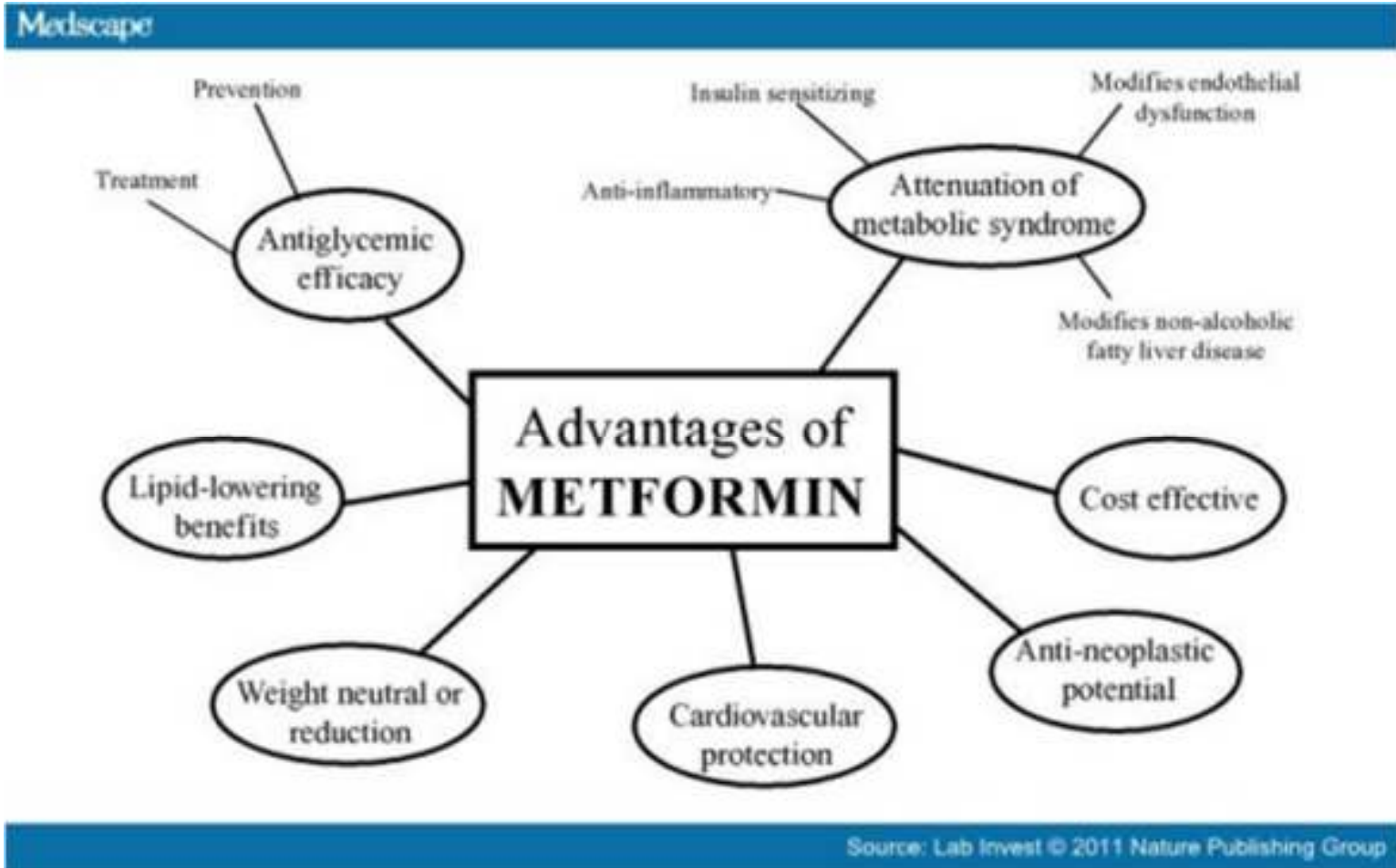


Cancer affects us all...

Physiological mode of action

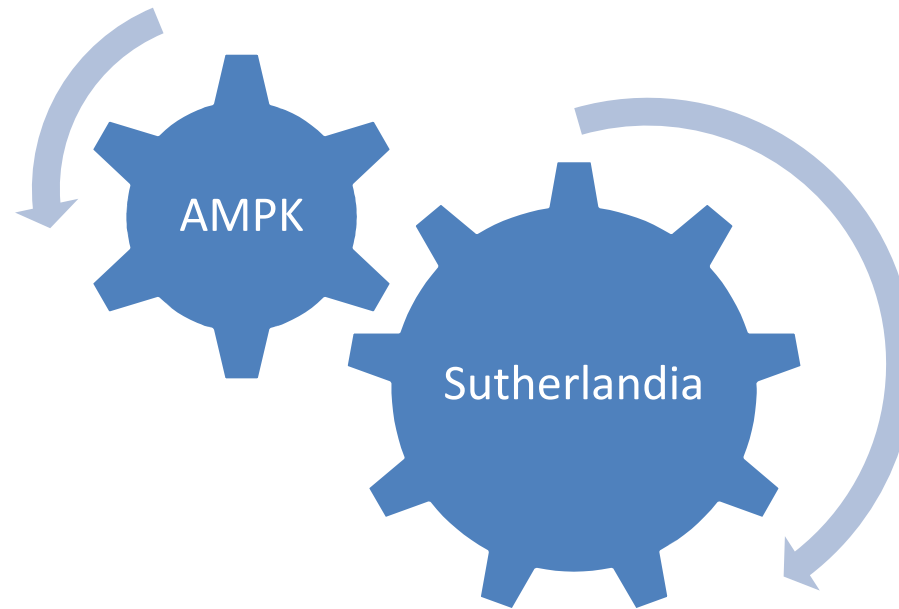


What does metformin do?



Cancer affects us all...

Could Sutherlandia stimulate AMPK?



Cancer affects us all...

AMPK recognised for diabetes and cancer

- [Biochem Pharmacol.](#) 2013 Jun 6
- **AMP-activated Protein Kinase: a target for old drugs against diabetes and cancer.**
- [Russo GL](#), [Russo M](#), [Ungaro P](#).
- **Source**
- Institute of Food Sciences, National Research Council, 83100, Avellino, Italy. Electronic address: ggrusso@isa.cnr.it.
- **Abstract**
- The AMP-activated protein kinase (AMPK) is considered a key checkpoint to ensure energy balance in both cells and organisms. AMPK is an $\alpha\beta\gamma$ heterotrimer controlled by allosteric regulation by AMP, ADP and ATP, auto-inhibitory features and phosphorylation, with the threonine-172 phosphorylation on the catalytic α -subunit by LKB1, CaMKK β or Tak1 being essential for its fully activation. AMPK acts as a protective response to energy stress in numerous systems, but it is also a key player in diabetes and related metabolic diseases and cancer. Pharmacological activation of AMPK by metformin or other compounds holds a considerable potential to reverse the metabolic abnormalities associated with type 2 diabetes. In cancer, correction of the dysregulated metabolic pathway LKB1/AMPK/mTORC1 can lower the Warburg effect, suggesting AMPK as a potential target for cancer prevention and/or treatment. In this commentary, we review recent findings that support the role and function of AMPK in normal and pathological conditions. We also discuss how the activation of AMPK by naturally occurring compounds could help to prevent the development of numerous chronic diseases contributing in such a way to the well-being of aging population.

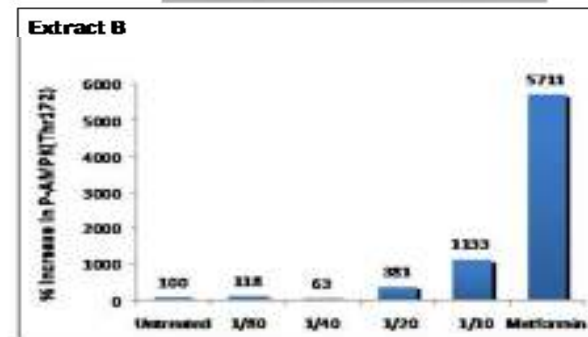
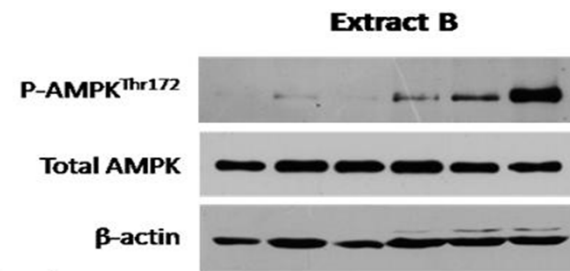
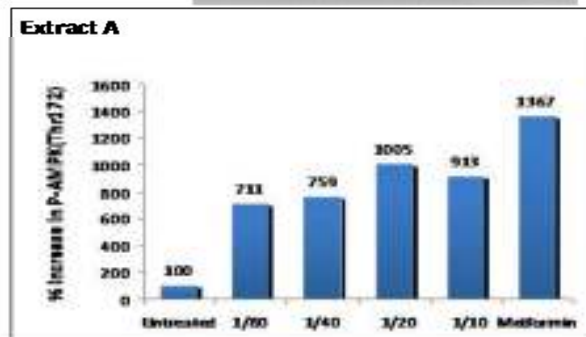
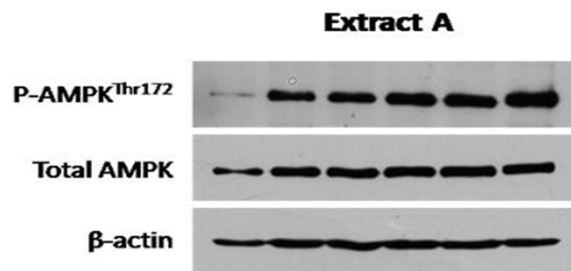


Cancer affects us all...

Sutherlandia extracts stimulate AMPK

S. var. microphylla

S. var. incana



S. var. microphylla is about 400% more active than S. var. incana in terms of stimulating AMPK



Cancer affects us all...

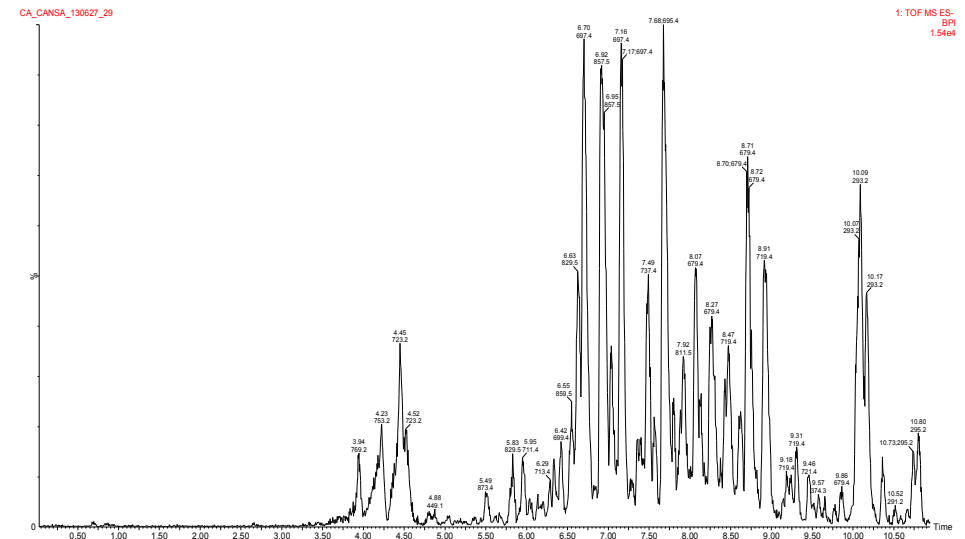
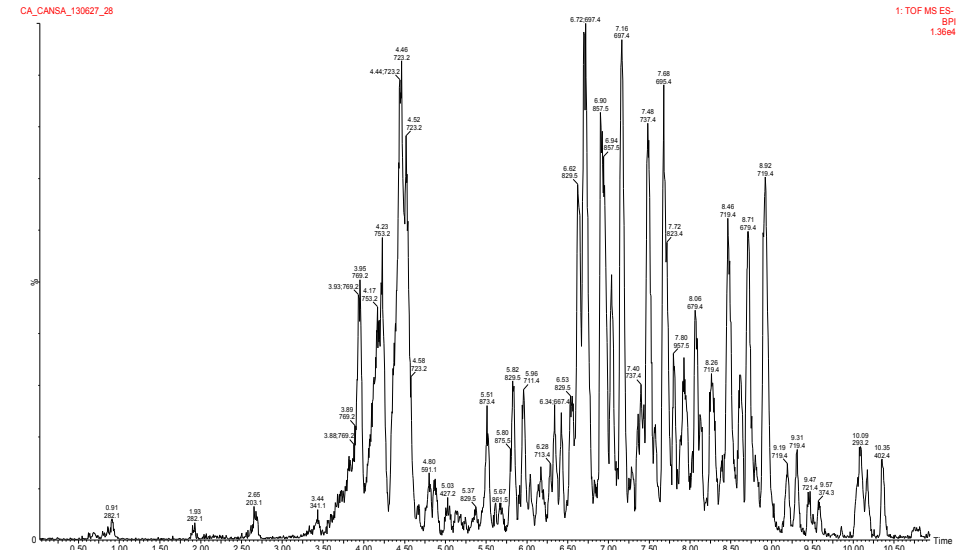
AMPK agonists

- ✓ **Exercise**
- ✓ **Avidicin D (Triterpenoid)**
- ✓ **Berberine**
- ✓ **Genistein**
- ✓ **EGCG**
- ✓ **Capsaicin**
- ✓ **Nicotine**
- ✓ **Apigenin**
- ✓ **Carnosol**
- ✓ **Metformin**
- ✓ **Sutherlandia (Flavonoids?, triterpenoids?, both?)**



Cancer affects us all...

Isolating Sutherlandia flavonoids and triterpenoids



Research • Educate • Support

Cancer affects us all...

Conclusions

1. A hot water, dried leaf extract of *Sutherlandia frutescens* var. *microphylla* stimulates the phosphorylation of threonine - 172 in the enzyme AMPK in MCF-7 cancer cells.
2. This effect is only abrogated at a dilution of 1/80 of a 1 g dried leaf powder in 100 ml water extract.
3. *Sutherlandia* var. *microphylla* was about 10-times more active than *Sutherlandia* var. *incana*.
4. Experiments are underway to determine whether AMPK is stimulated by *Sutherlandia* flavonoids or by triterpenoids such as SU1 (*Sutherlandiosides*), or a mixture of both.



Cancer affects us all...



Thank You