Outline of presentation

• Background: Heart Disease
• Introduce: rooibos
• Scientific evidence
• New study on Rooibos & Heart Health
• Rooibos & Skin Health: New study
• Conclusion
CVD is the leading cause of death in South Africa after HIV/AIDS

More South Africans die of CVD than of all the cancers combined

CVD is responsible for almost 1 in 6 deaths (17.3%) in South Africa

215 people die every day from heart disease or strokes

Deaths related to heart and blood vessel diseases are expected to increase by 41% in the next 13 years

Heart and Stroke Foundation South Africa

CVD = Cardiovascular Disease

References: Msemburi et al., 2014
STATS SA, 2015
1. **High blood pressure/ hypertension** is the leading cause of CVD
   - Affects one in three South African adults

2. **Smoking** is the second leading cause of CVD
   - One in five South African adults smoke/have history of smoking

3. **High cholesterol:**
   - One in four adults have high total cholesterol and LDL-cholesterol

4. **Diabetes:**
   - One in 10 adults are diagnosed with diabetes, and almost one in 5 adults has impaired blood glucose control

5. **Physical inactivity & Unhealthy diet:**
   - ~ 30% adults are inactive
   - ~ 25% reported to not eat 400g of fruits & veggies daily
Prevention strategies

• Changes in our lifestyle, i.e. making certain dietary changes

• Focus to include components in our diet with health benefits i.e. phytochemicals

• Phytochemicals: plant components that possess health promoting properties

• "5-a-day concept" now proposed 7-10 servings of fruits & veggies daily

"Research studies over the past decade: link between increased intake of phytochemicals and prevention of lifestyle diseases"
Rooibos: the plant

- **Botanical name:** *Aspalathus linearis*

- **Shrub-like bush**
  - Thin, sharp needle-like leaves
  - Growth height: 1-1.5m natural state

- **Growing demand:** exports increased from 1826 tons in 1999 to over 6000 tons in 2010
From plant to tea pot

1. Harvesting
2. Cutting
3. Heap fermentation
4. Sun drying
5. Packaging

Two types of Rooibos
- Traditional
- Green
Unique solution to South Africa: Rooibos

- Naturally caffeine free
- Low tannin content
- Unique phenolic/antioxidant composition
- Herbal tea can be consumed with milk

Two types of Rooibos

Traditional  Green
Rooibos drying in the sun – photo C von Metzinger
1. Hypertension:

- A study conducted in Sweden found that 30 to 60 minutes after drinking 400 ml (~ 2cups) of Rooibos, the activity of the angiotensin-converting enzyme or ACE is significantly blocked/suppressed.
- This enzyme is believed to be involved in the development of hypertension & heart disease.
- Blood vessels constrict/tighten, blood pressure increases and thus your risk.
- ACE inhibitors are prescribed to treat hypertension and heart disease.

Reference: Persson et al., 2010

Rooibos:

- Proposed that Rooibos action is similar to that of an ACE inhibitor.
- Assist blood vessels to relax and widen, making it easier for blood to flow through.
2. High Cholesterol

• A study conducted in South Africa showed adults at risk for CVD drinking 6 cup of fermented rooibos daily for 6 weeks showed a significantly improved Cholesterol profile

Reference: Marnewick et al., 2011

Rooibos:

• Consuming Rooibos resulted in a decreased Total Cholesterol level (~10%), an increased “good” cholesterol (HDL) and a “decreased bad” cholesterol (LDL)
3. Diabetes/glucose control

- A number of studies from SA, Japan and Taiwan have shown rooibos to decrease blood glucose levels.

Reference: Muller et al., 2012; Francisco et al., 2010

Rooibos:

- Consuming 500 ml of fermented Rooibos resulted in a decreased blood glucose level at 6 hrs after eating a high fat, high carbohydrate breakfast.
4. Unhealthy diet

**Daily recommendation (FAO & WHO):**

- 5-7 portions of fruits & vegetables daily
- Now 7-9 portions recommended
- Minimum of 5 portions: 400g in total, or 5 portions of 80g each of fruits & vegetables

**South Africa**

- We only consume 1.5 portions of fruits and vegetables daily
- Drinking 6 cups of Rooibos daily contributes to our polyphenol intake

**Optimal cup of Rooibos: Polyphenols**

- 1 rooibos tea bag, 180 ml freshly boiled water, steeping for 10 minutes

Reference: Marnewick et al., 2011

Reference: Piek et al., 2019
Summary of Heart disease risk factors:

Scientific studies have shown Rooibos to influence these risk factors for heart disease:

1. Hypertension
2. High cholesterol
3. High blood glucose/diabetes
4. Unhealthy diet
Rooibos ‘Wonder Tea’ Finally Gets Scientific Nod for Cardiac Benefits

The health benefits of Rooibos have been proclaimed for a number of years. Now in the first scientifically validated work on Rooibos and heart disease, researchers in the Cape Peninsula have found that the herbal tea is particularly effective at reducing oxidative damage to lipids, thus helping to prevent or slow down atherosclerosis.

The clinical trial by Dr. Jeannine Marnewick, and her team at the Oxidative Stress Research Centre at the Cape Peninsula University of Technology, also generated the first human safety data in a controlled clinical trial environment, scientifically showing that short-term consumption of Rooibos is safe for the liver and kidneys, while keeping blood pressure and cholesterol levels in a normal range.

The researchers measured the effect of Rooibos by examining two markers which are indicators of oxidative lipid damage, namely conjugated dienes (CDs) and malondialdehyde (MDAs). They found a decrease of nearly 35% in CDs in the blood of the Rooibos-drinking participants and a 50% decrease in MDAs. Oxidative damage in lipids is regarded as an important step in the development of atherosclerosis. CDs are formed during the early stages of oxidation, while MDAs are oxidation end products of polyunsaturated fatty acids that cause damage to protein synthesis and enzyme inactivation in human cells. Patients with coronary artery disease usually have a higher MDA level than normal.

Forty men and women aged between 30 and 60 years, each with two or more risk factors for developing heart disease, participated in the study by drinking six cups of Rooibos per day for six weeks. (The six-cup amount was determined by a trial of green tea consumption in 2003, which increased the antioxidant capacity in the blood of human subjects.)

The tea was brewed for five minutes before drinking, with or without milk and/or sugar. The participants were required to remove other flavonoid-rich foods from their diets to ensure the health effects could be ascribed to Rooibos only.

“We also monitored oxidative stress by measuring the ratio of oxidised vs reduced glutathione (GSH) in the blood. Our results show a significant improvement and therefore decreased risk of heart disease - in the study participants,” explained Dr. Marnewick.

She is preparing to submit the work to an international peer-reviewed journal, and will pursue the research by examining genetic differences between the study participants to ascertain why some people responded differently to Rooibos. In the field of cancer research, she will investigate how the bio-active compounds in Rooibos prevent DNA damage, and how Rooibos impacts on stress levels by measuring changes in cortisol in the blood.

Mientjie Mouton, director of the SA Rooibos Council’s product research portfolio, hopes the results of the study will help increase the relevance of Rooibos as a safe and affordable way to reduce heart disease in SA.

“We are committed to investing in world-class research in order to verify where and how Rooibos is most effective and how people can benefit from this unique South African product,” she said during the launch of the results at the Rooibos Science Cafe in Cape Town.

Head of research of the Cancer Association of SA (Cansa), Prof. Carl Albrecht, also presented 10 years of research done with the Medical Research Council on the anti-cancer properties of Rooibos which was funded by Cansa to the tune of R1m.

“Indications are strong that Rooibos may also have anti-cancer properties due to the raising of GSH which has been shown to protect against cancer. Rooibos doubled the GSH levels in the participants of the heart disease study,” he told Medical Chronicle.

Funding for the heart disease study came from the Cape Peninsula University of Technology, the National Research Foundation, and the SA Rooibos Council.

Reference
Additional Rooibos health benefits

Rooibos does not interfere with the iron status of our blood

1. Healthy males (n=10), single dose fermented rooibos = no effect on iron status, similar to water

2. School children (n=175), two cups of fermented rooibos for 16 weeks = no adverse effects on iron status

3. At risk adults (n=40), 6 cups of fermented rooibos, for 6 weeks = no adverse effects on iron profile

Reference: Marnewick et al., 2014
Rooibos enhances the body’s antioxidant defence system

Redox status:

- Glutathione (GSH): 36% increase after consumption of 6 cups of rooibos
- Oxidized glutathione (GSSG): 30% decrease
- Ratio GSH:GSSG: 46% increase

Marnewick et al., 2011
Consuming rooibos protects the cells against damage induced by oxidative stress

- Malondialdehyde: 54% decrease after consumption of 6 cups of rooibos
- Conjugated dienes: 35% decrease

Marnewick et al., 2011
Less cell damages also leads to less inflammation:

- Inflammation plays an important role in cardiovascular diseases
- Rooibos resulted in a decreased inflammatory response
- Rooibos reduced the levels of pro-inflammatory cytokines (IL-6 & TNFα)
- Aspalathin & nothofagin have anti-inflammatory activity

Ajuwon et al., 2015 & Lee et al., 2015
Consuming Rooibos has a stress-lowering effect:

Analysis of plasma steroid metabolite ratios:

• The cortisol:cortisone ratio was significantly lowered in study males and females

• estimated reduction of 6.7%

• Rooibos favors the inactivation of cortisol

• No significant effects were detected on the cortisol:testosterone or cortisol:DHEA-S ratios

Reference: Schloms et al., 2014
Rooibos provides us with multiple bio-activities:

- Antioxidant
- Anti-inflammatory
- Anti-diabetic
- Modulates cholesterol profile
- Modulates stress

Summary: Rooibos & Heart Health

All this evidence clearly shows/supports the preventive & complementary therapy of Rooibos when considering Cardiovascular Disease!
What’s new in the new Rooibos & Heart health Study

• **Green rooibos** and Fermented rooibos using a water extract equivalent to cup-of-tea

• Oxidative damage to important cellular components (lipids, DNA, proteins)

• Blood pressure monitor

• Inflammation

• Metabolite profiling
Metabolites in: Cardiovascular disease (CVD)

CVDs: complex & diverse diseases

**Metabolomics in hypertension:**
Hypertension - one of the most common CVDs

Salt-sensitive hypertension:
• Several changes in the TCA cycle shown to be responsible

Prehypertension:
• Lyso-phosphatidylcholines levels altered
• Amino acid metabolism altered

The TCA/Krebs cycle is a key metabolic pathway that connects carbohydrate, fat, and protein metabolism.
Metabolites in:
Cardiovascular disease (CVD)

Metabolomics in atherosclerosis:
Atherosclerosis - is the core of almost all CVDs
Shown that the following metabolites are associated with atherosclerosis:
• Docosohexaenoic acid
• Glutamine
• Tyrosine
• Tauro-cholic acid – early detector of plaque formation
• Acylcarnitines (involved in fatty acid oxidation)
  Use them as predictors of atherosclerosis development

Metabolomics in Hyperlipaedemia (high cholesterol):
Changes in acylcarnitines
Changes in fatty acids
β-hydroxybutyrate
Tyrosine
Creatinine

Kordalewska & Markuszewski, 2015
What will the influence of Green and Traditional Rooibos be on these targeted CVDs –linked metabolites in a population of at-risk individuals?

Using metabolomics is specifically important for diseases that develop without showing real symptoms
What’s new in Rooibos and Skin health

Previously:

Thailand,

• 20 women (36-52 yr) applied a rooibos and green tea extract to their skin for 28 days, X2/day

• Reduced wrinkles by 9.9%

Chuarienthong et al. 2010

New study:

• Effect of Rooibos on important skin enzymes such as elastase, collagenase
• Skin structural integrity & elasticity
• If depleted it contributes to skin ageing & wrinkles

Marnewick et al., 2019 (in progress)
“Take home” message:

Scientific results emphasize the relevance of rooibos as a beneficial beverage for consumers – make rooibos part of your day!

To maximize the beneficial effects of rooibos, enjoy it throughout the day.

Funding
Cape Peninsula University of Technology
THRIP – National Research Foundation
South African Rooibos Council
SA Sugar Association
Research uptake: informing the public

Rooibos research update

Investing in Rooibos research

The Board of Trustees of the South African Rooibos Council is committed to the Council’s investment in research. The Council indicates its funding to support research that is associated with the health benefits of Rooibos.

The influence of Rooibos on 256 alcohols

Research conducted by Dr. Jaco Piet Ferreira, Agricultural Research Council, has shown that Rooibos has a positive impact on 256 alcohols.

The potential of Rooibos

Rooibos may help prevent skin cancer, according to researchers at the University of Stellenbosch. The research team found that Rooibos significantly reduced the growth of melanoma cells.

Health and product research project currently being funded by the NRF

Developing objective-quality and sensory parameters for Rooibos

Research conducted by Dr. Pauline Marchand, Agricultural Research Council, has shown that Rooibos has a positive impact on health and product research.

Conclusion

The research conducted by Dr. Marchand has shown that Rooibos has a positive impact on health and product research. Rooibos can help prevent skin cancer and reduce the growth of melanoma cells.

References