

Fruit for the future: what can we expect of soft-fruit?

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Food security has been at the forefront of many agendas.

Matched with this is economic stability and growth.

However health via dietary means has been busier than ever.

For blackcurrant, a minor crop in global terms, there have been several interesting advances with respect to human health

Berries...

- Good nutritional value
- Excellent source of bioactive compounds called polyphenols; Health beneficial effects
- Good source of antioxidants, compounds that *in vitro* are able to scavenge free radicals cause of cell aging and death... However....!!
- Is this what happens in the body??



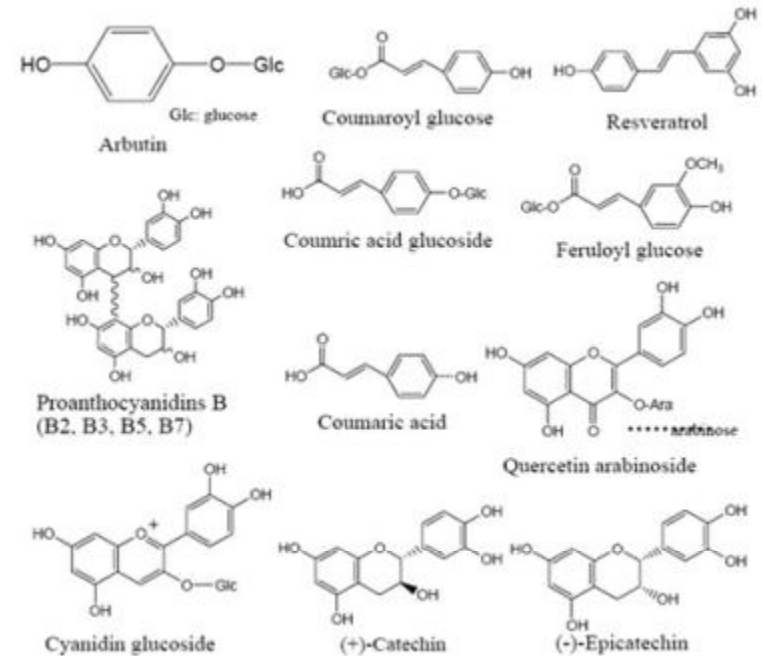
Polyphenols - bioactive compounds

- Polyphenols represent a group of secondary metabolites commonly found in higher plants

- Polyphenols are class of organic chemicals characterized by the presence of phenol structural units

- Due to the diverse biological properties polyphenols are found to be potential candidates for use as a drugs to treat diseases such as:

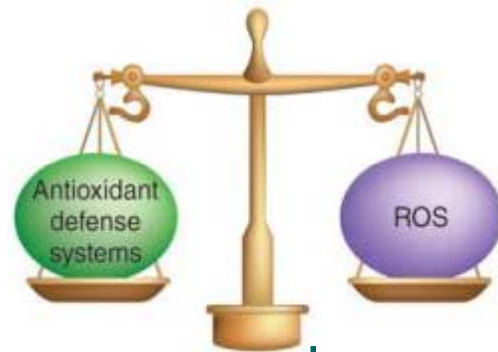
Diabetes types I and II, cardiovascular diseases, cancer, AIDS, bacterial infections, neural disorders



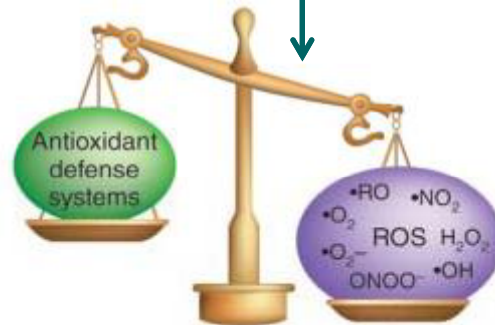
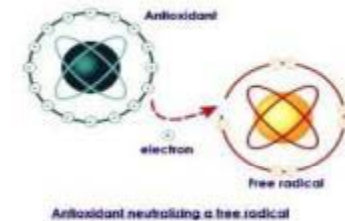
Oxidative stress causes cell aging and death

Abuse your
body and the
biochemical
stresses can
lead to big
problems.

Blackcurrant
can help.



Normal, balanced stage



Source of Reactive Oxygen Species

- Air pollution
- UV rays
- Bio products from food and metabolism of chemicals
- Cellular respiration

- Biomembrane damage
- DNA damage
- Protein damage
- Lipid peroxidation

Cancer CVD, Diabetes type I II, Neurodegenerative diseases

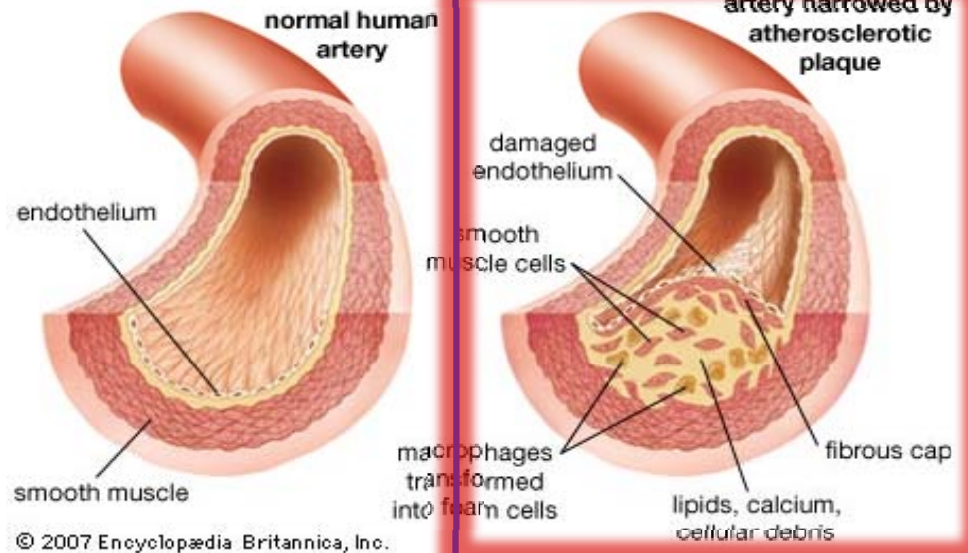
Free radicals cause cardiovascular diseases development



Oxidative stress



Atherosclerosis



Oxidative stress



Stroke, Atherosclerosis,
High Blood Pressure, Heart
attack

- Protein damage and lipid peroxidation leads to loss of the membrane integrity, cell damage and death
- Biomembrane damage leads to the cell death
- DNA damage leads to mutations

- So where are we with regard to health and blackcurrant?
- Vit C is still king and the way forward for health.
- However the “interesting stuff” is still derived from the polyphenols

Cancer

Reduced cancer levels cancer model following blackcurrant consumption

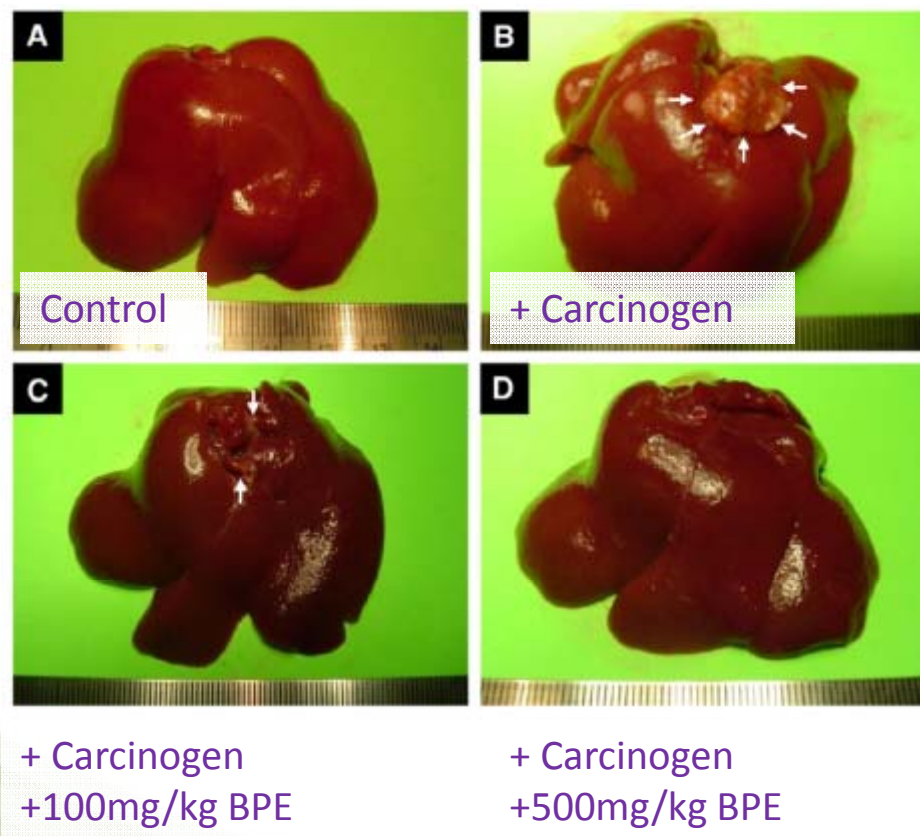


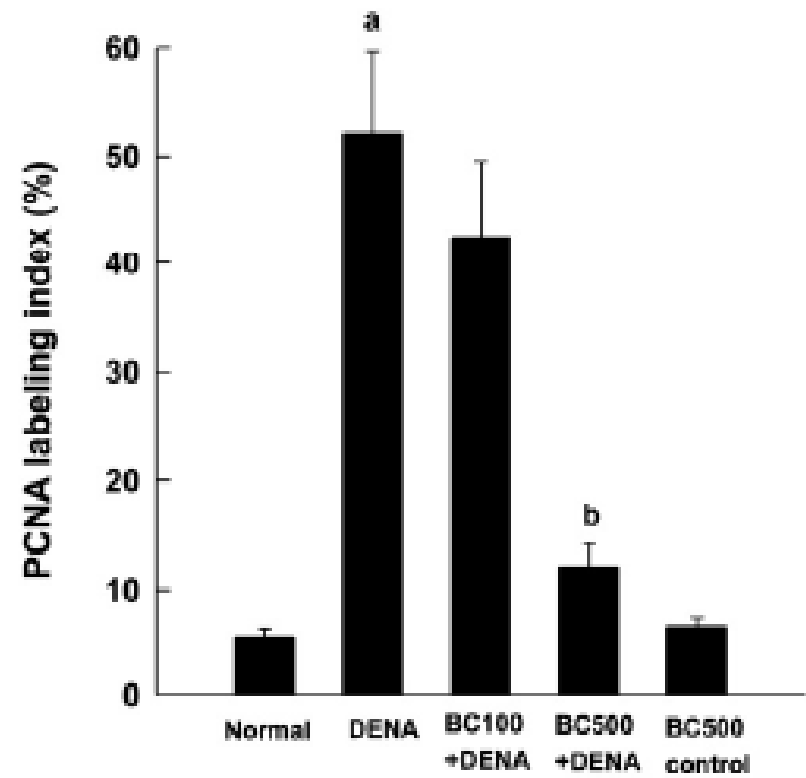
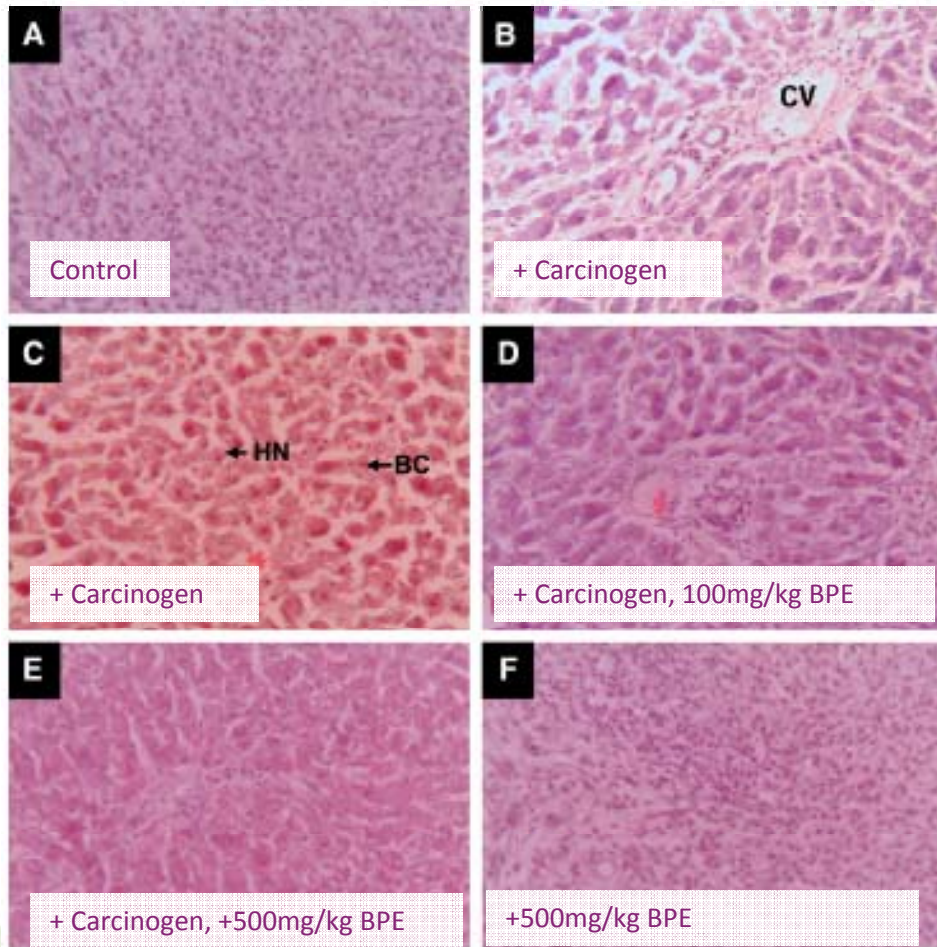
Cancer induction
& promotion



± Blackcurrant
polyphenol
extract

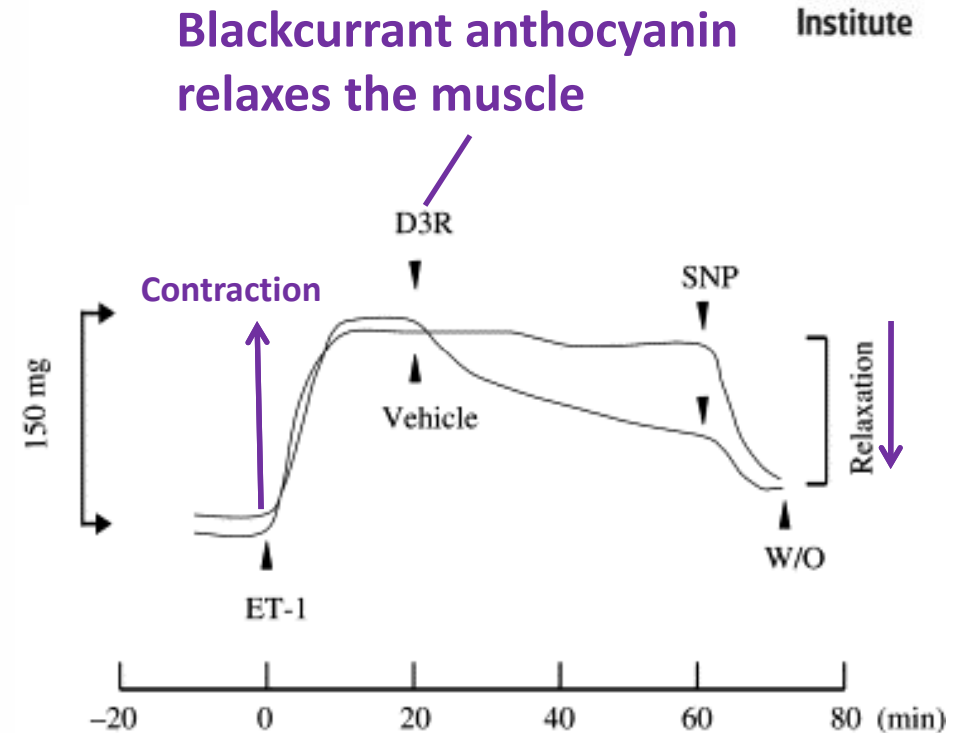
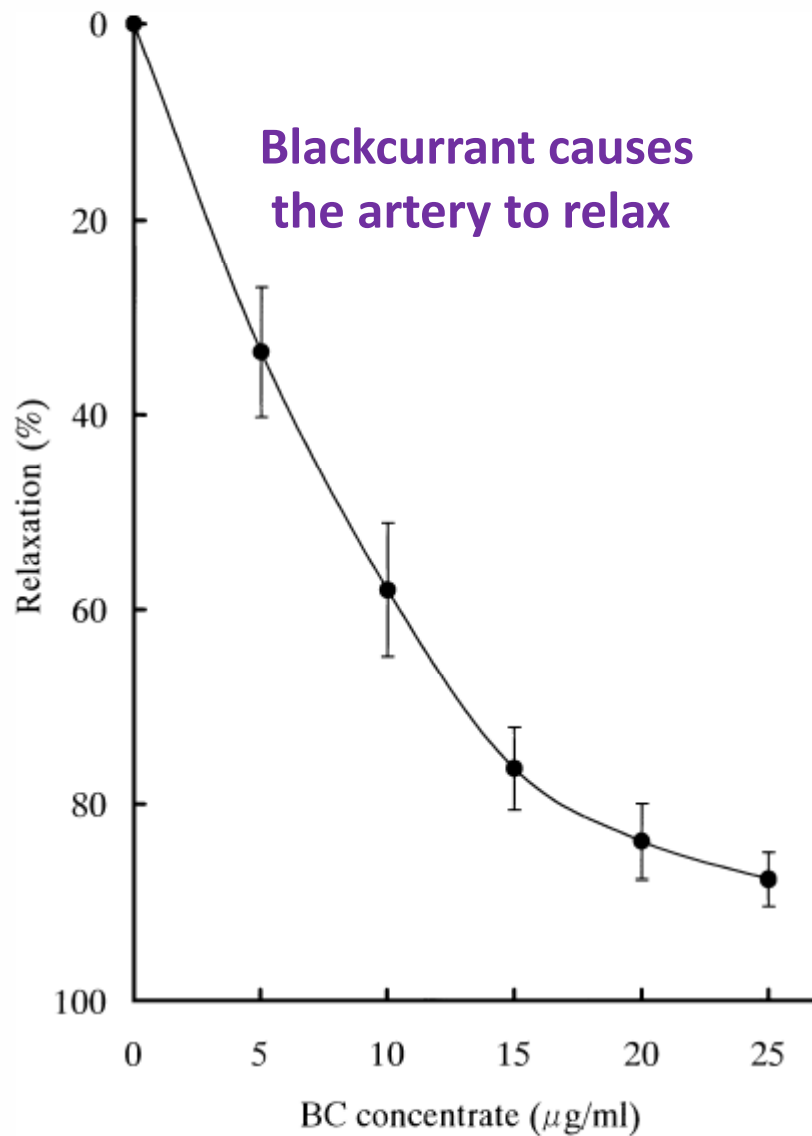
Reduction in macroscopic
hepatocyte nodule number, size
and proliferation.
BPE one had no deleterious
effects



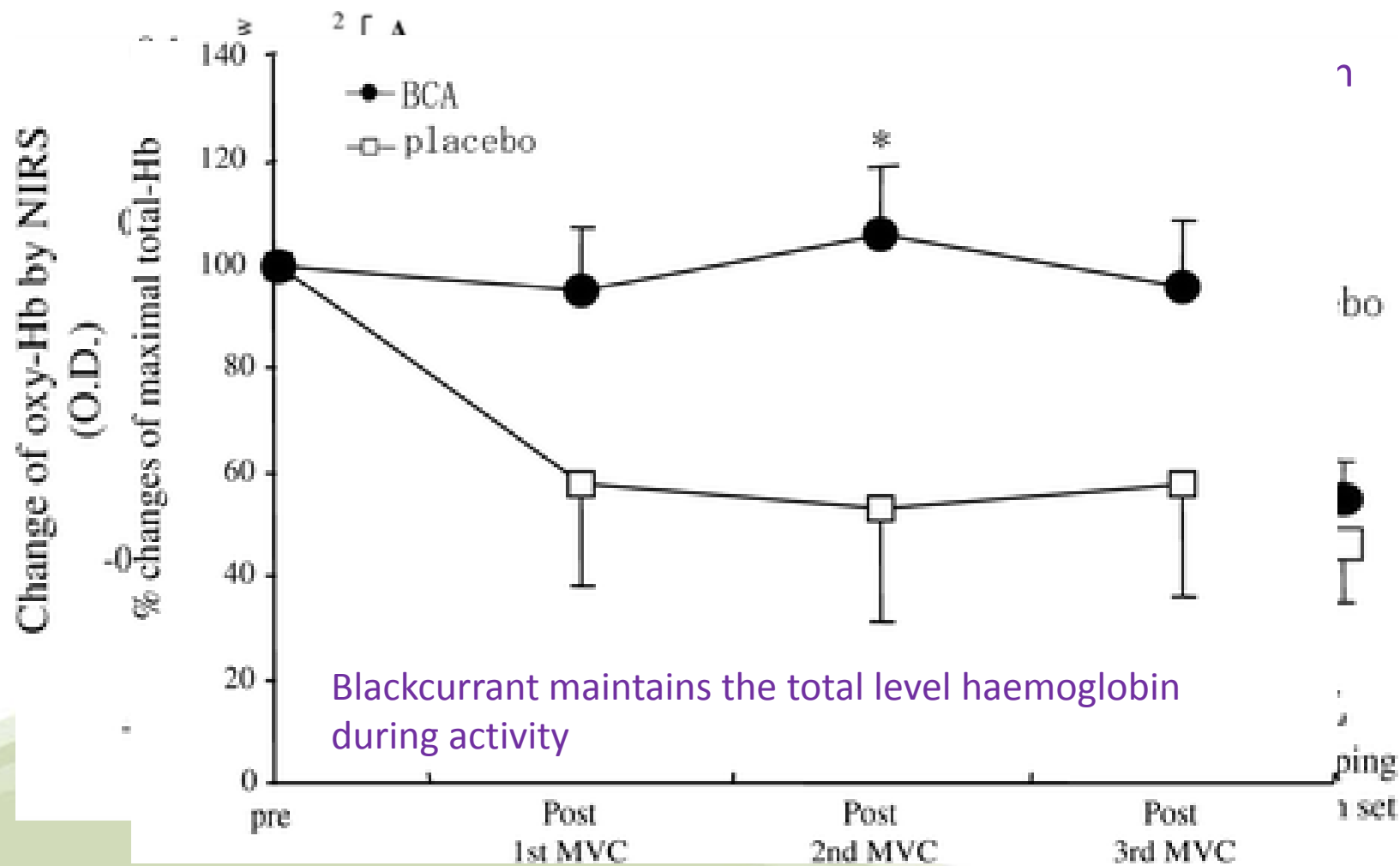


Proliferative nuclear antigen (PCNA)

Artery and muscle model systems



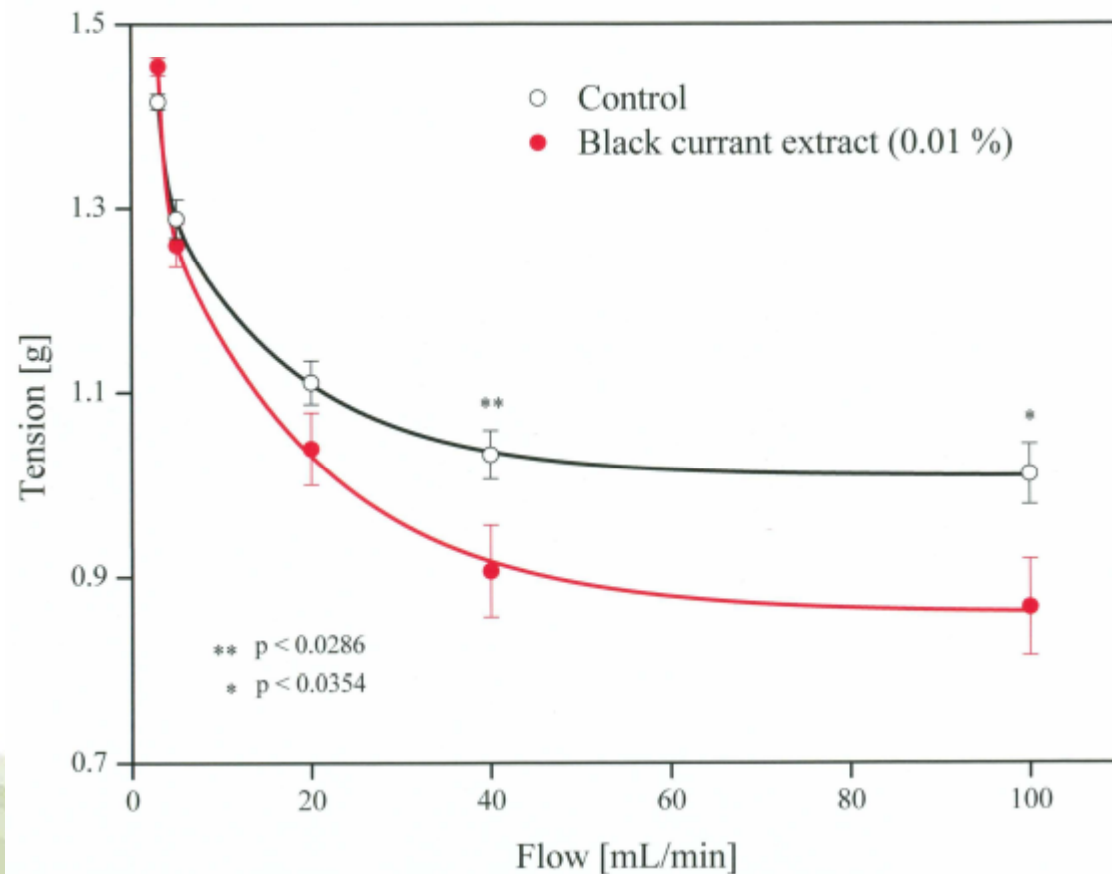
Blackcurrant intake increases blood and maintains the haemoglobin levels: a computer operator study



Blackcurrant anthocyanins cause a flow-dependent increase in blood perfusion in isolated human intracerebral arteries:

Blackcurrant increases the brain blood flow in a model system

- Flow-dependent isometric tension was measured in segments of isolated human intracerebral arteries from consciousness areas: derived from brain surgery.
- The anthocyanin driven vasodilatation may have a beneficial effect on the cognitive functions in dementia of the Alzheimer type, in the prevention of TIA and stroke
- Flow-dependent relaxation is almost identical to fluvastatin.





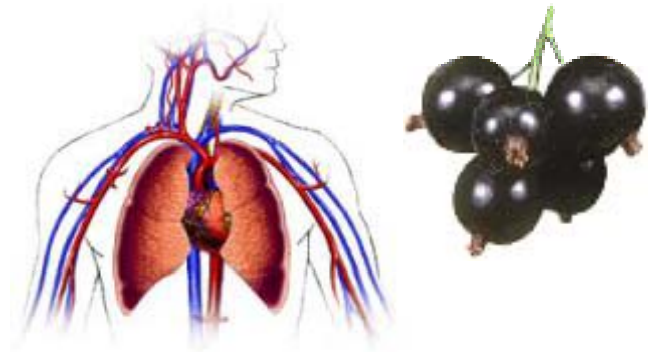
Case Study

Cardiovascular function and intake of soft fruit



Intervention trial – assess effects of six week ingestion of

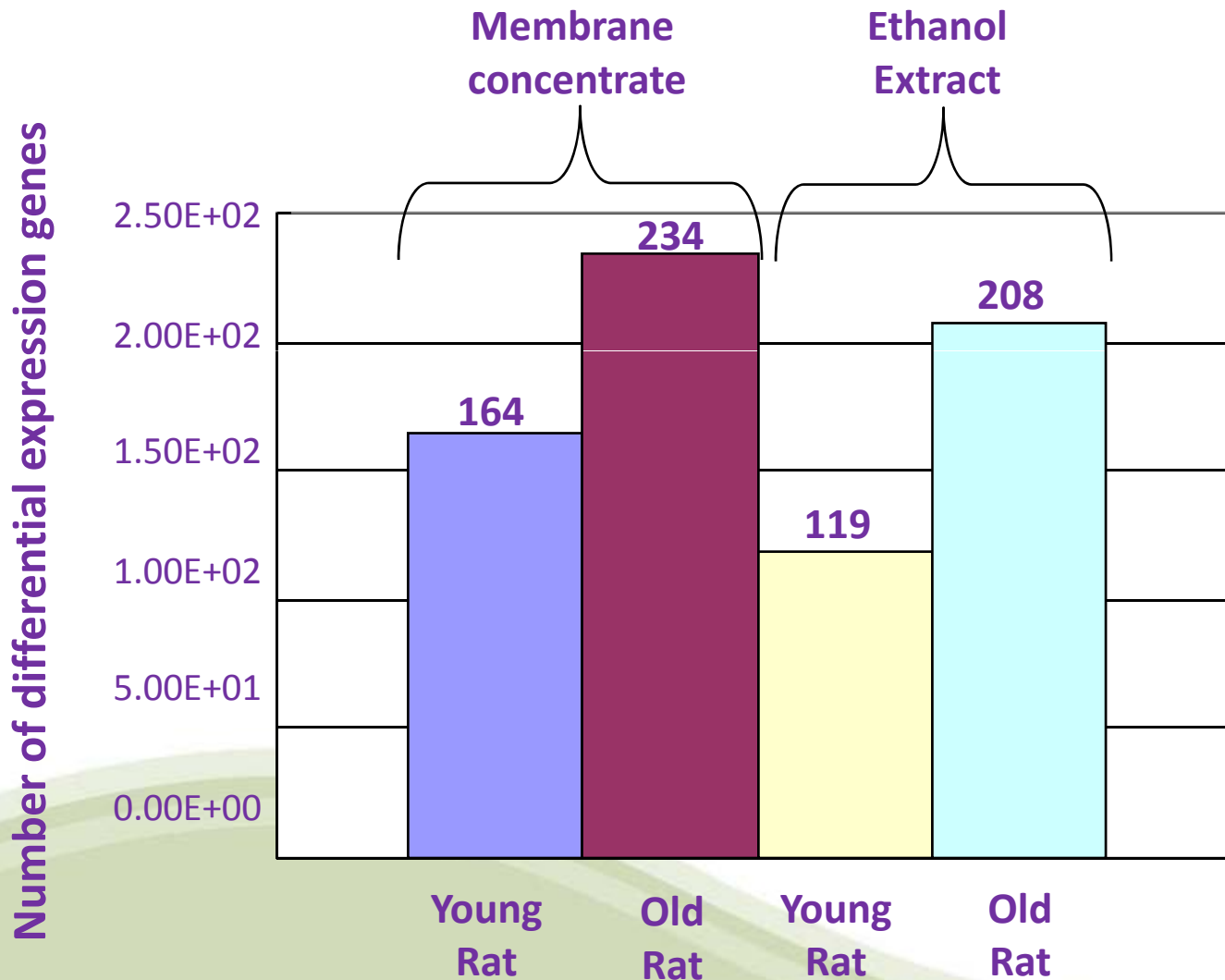
- Blackcurrant berries with low vitamin C content
- Blackcurrant berries with high vitamin C content
- Blueberries (No vitamin C)
- Coloured flavoured water (control)



Effects on cardiovascular function

- Assess Micro-circulation & macro-circulation, arterial stiffness, (SphygmoCor Pulsewave Analysis System) and carotid intima media thickness (Accuson Sequoia).
- Relate to *In vivo* markers for endothelial cell function and oxidative stress. Assess bioavailability of fruit derived antioxidants.
- Both blackcurrant groups showed reductions in isoprostanes: this means that the level of inflammation reduced following blackcurrant consumption

Number of Differential Expression Genes by Feeding Rats with Blackcurrants



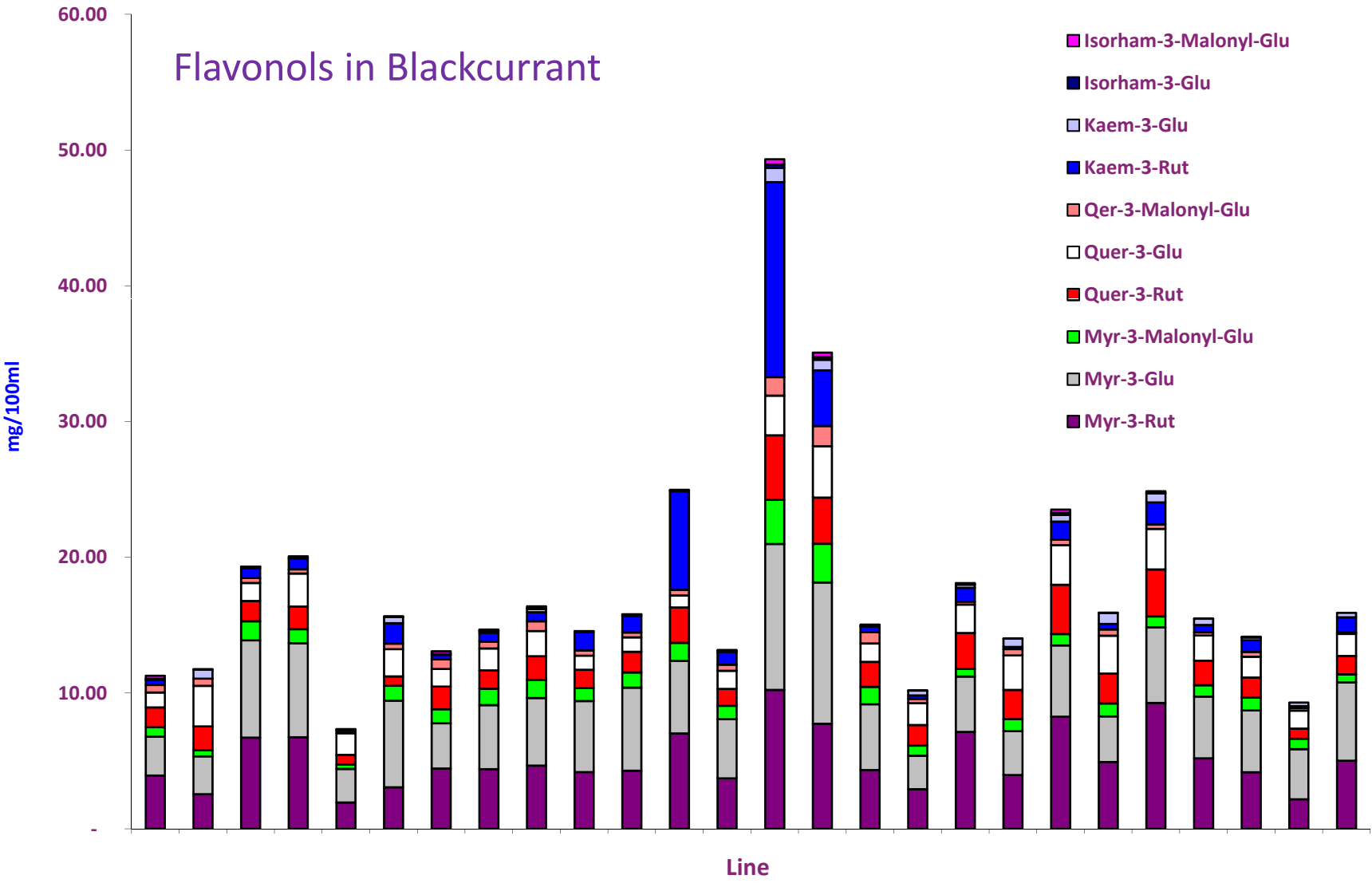
Blackcurrant benefits will depend on your age, the variety used and processing method



The diversity of health beneficial components in blackcurrant: a snapshot



Flavonols in Blackcurrant



Conclusions

- The time line for health claims looks mid – long term: antioxidant Vs pharmacological Vs signalling.
- Further health studies need to look at what the body does to the blackcurrant components. This will identify the active ingredients
- Appropriate concentrations must be used in order to fully ascertain their mode of action *in vivo*.
- We need more and better designed intervention studies.
- We can do more to improve the health benefits of blackcurrant given the variation in the wild material.

Hope or ~~Hype~~

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