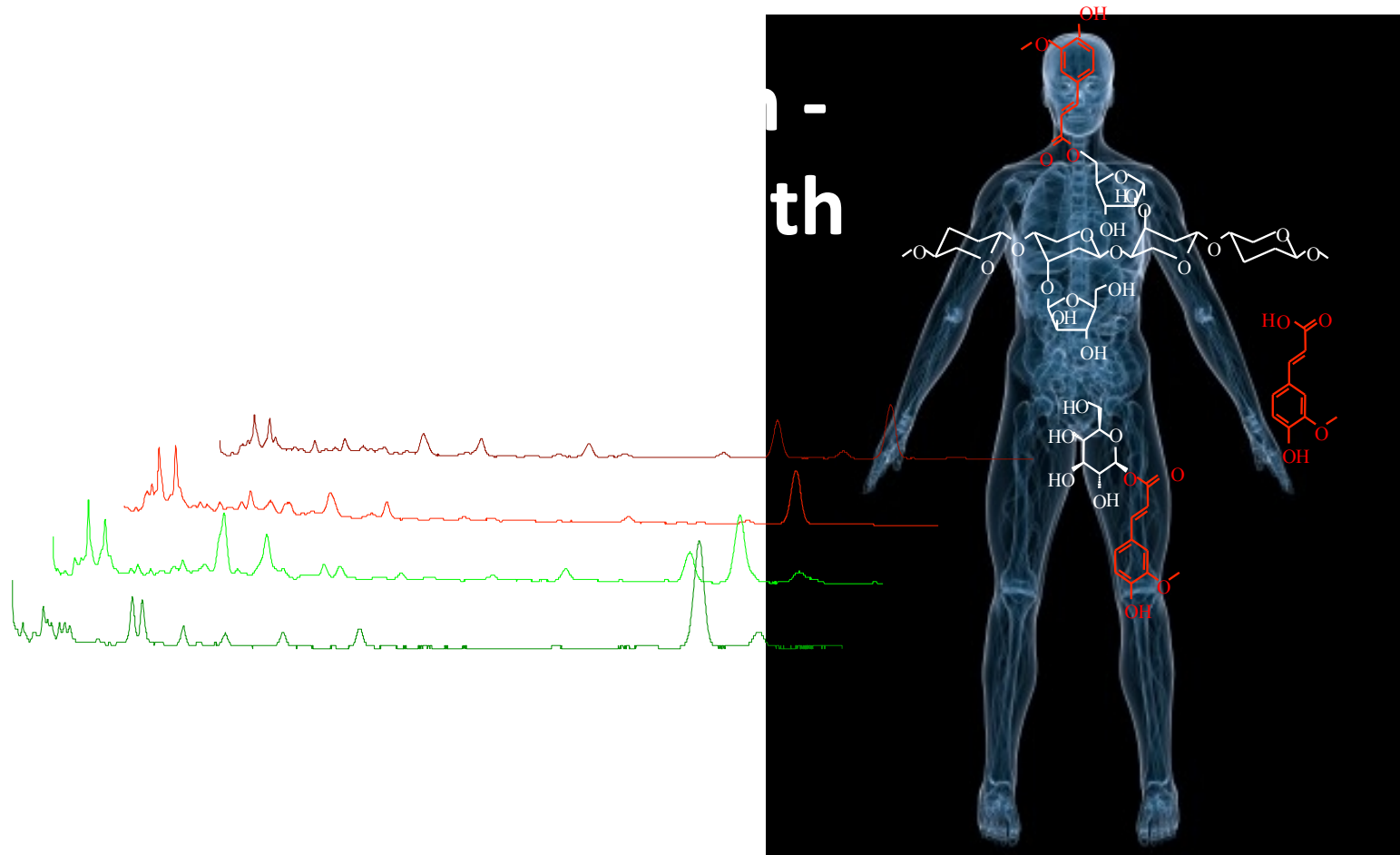




1 4 9 5  
UNIVERSITY  
OF ABERDEEN



Rowett Institute  
of Nutrition and Health



**Farmer to Pharma: Commercialisation of Natural Products**  
**Natural Compounds Special Interest Group; Cardiff 27 April 2016**

1 4 9 5



UNIVERSITY  
OF ABERDEEN



Rowett Institute  
of Nutrition and Health

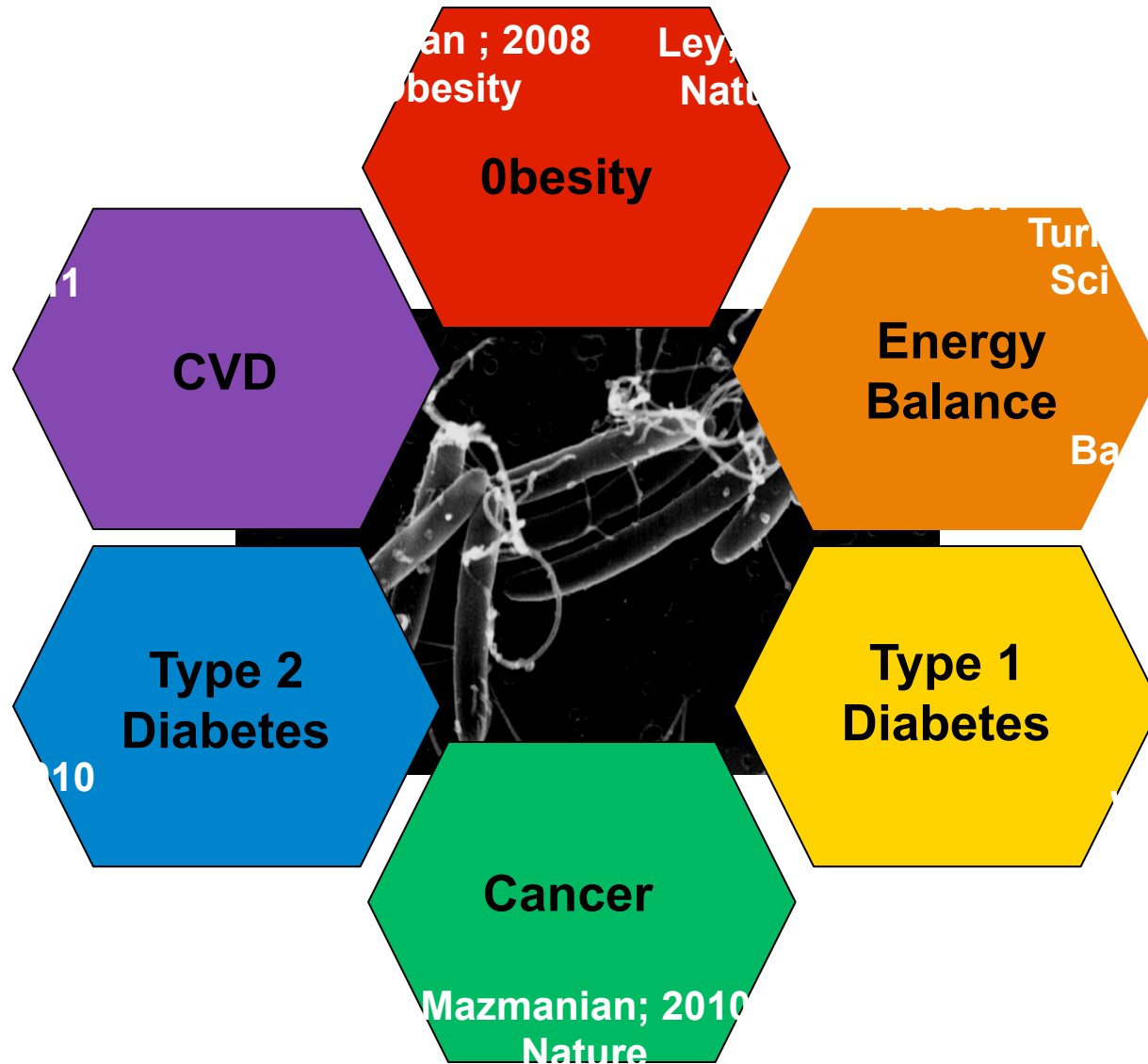




# Diet and Health



# Spectrum of Disorders





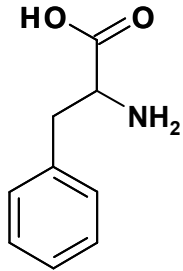
Human Colonic  
Bacteria

Derived  
Compounds

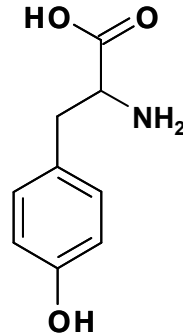


The image shows two ball-and-stick molecular models. The left model is a branched hydrocarbon with 10 carbon atoms (C<sub>10</sub>H<sub>22</sub>), specifically 2,2,4-trimethylheptane. The right model is a branched hydrocarbon with 11 carbon atoms (C<sub>11</sub>H<sub>24</sub>), specifically 2,2,4-trimethyloctane. Both models use grey spheres for carbon, white for hydrogen, and red for oxygen.

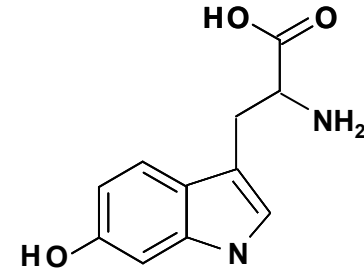
# Aromatic Amino Acids



phenylalanine

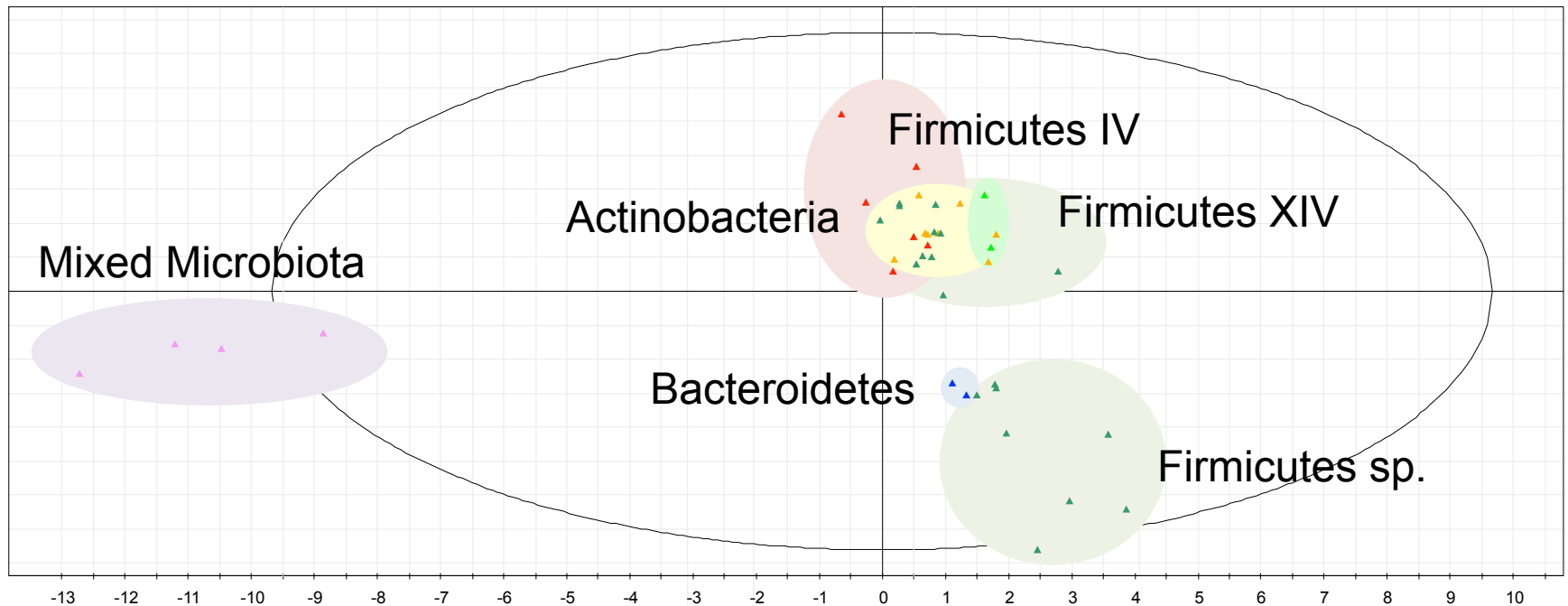
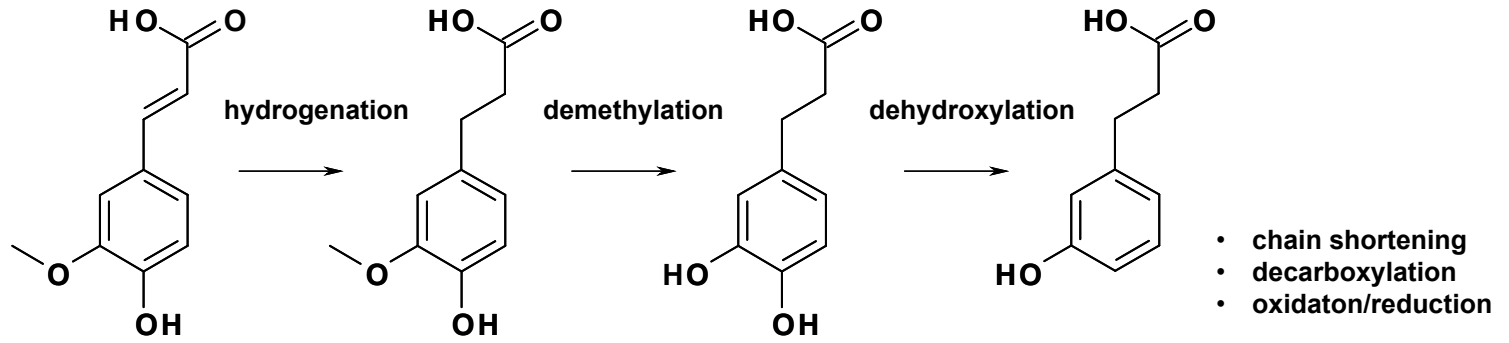


tyrosine

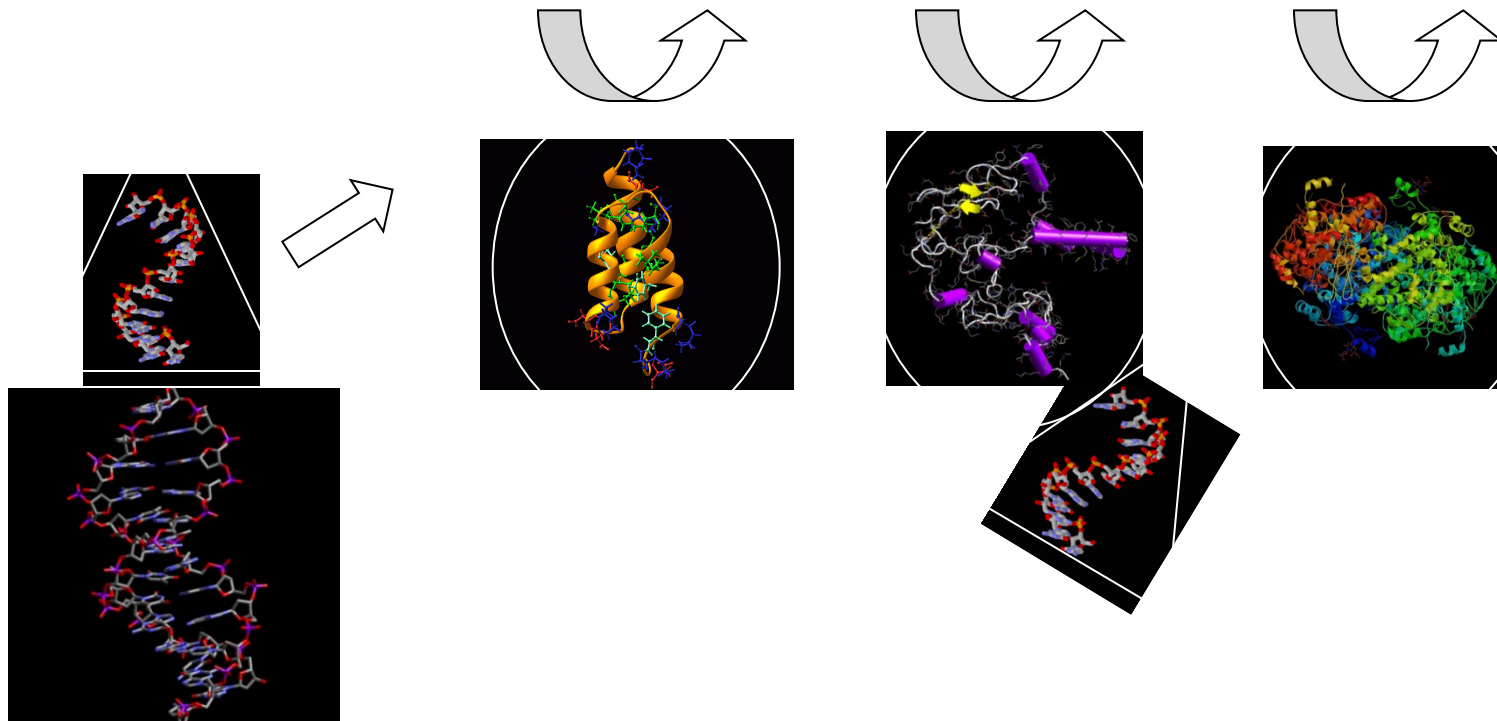


tryptophan

# Natural Product Metabolism

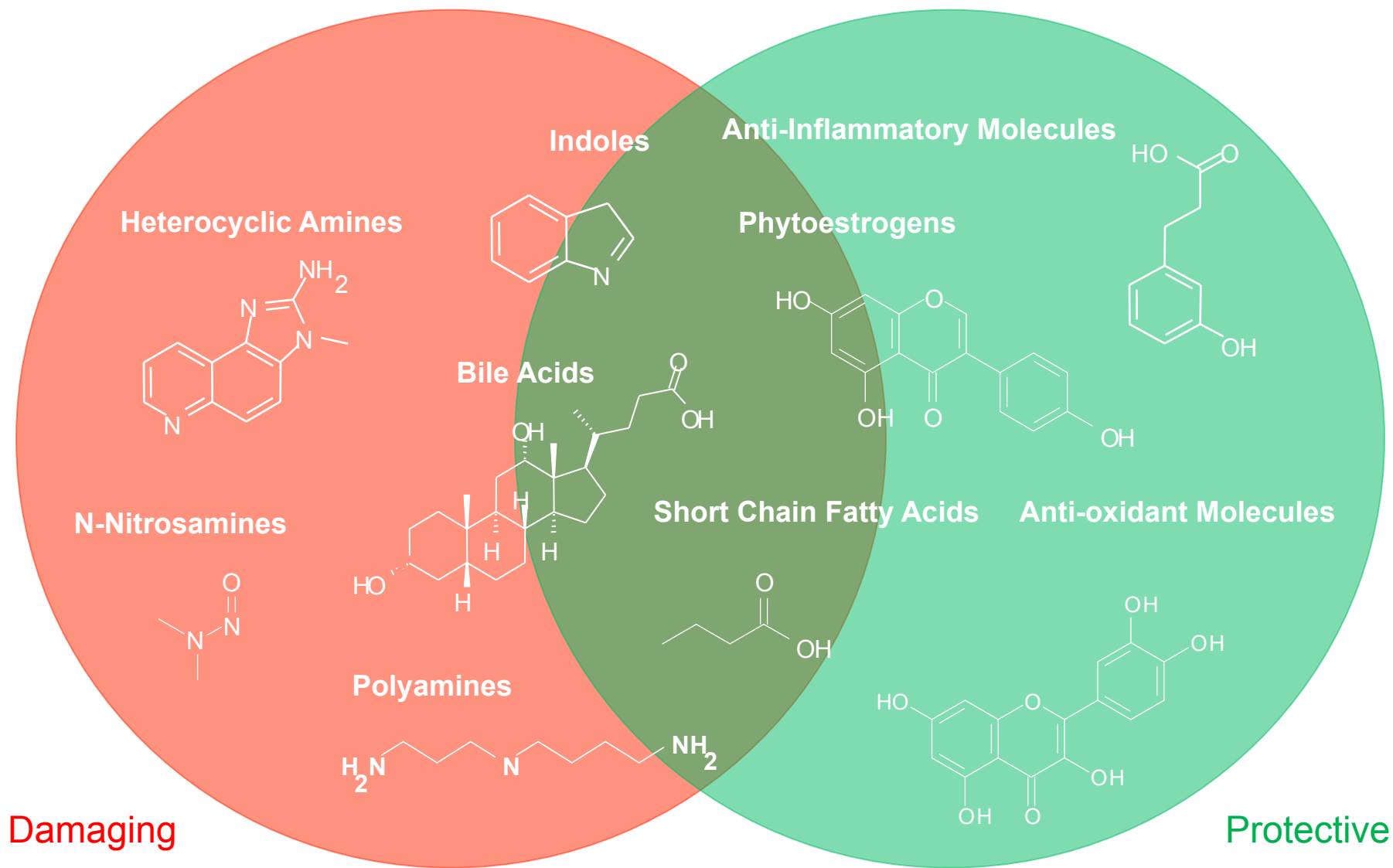


# Metabolomic Approach in Human Studies





# Dietary-Derived Metabolites



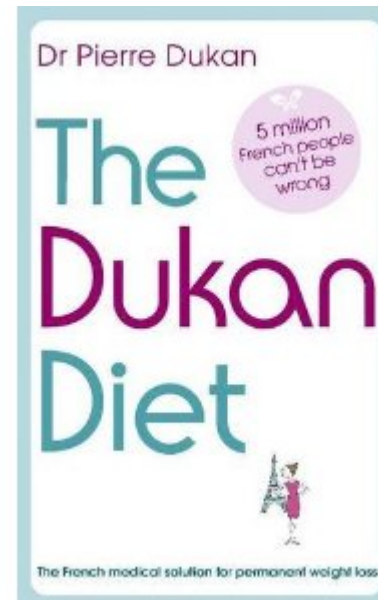
Damaging

Protective

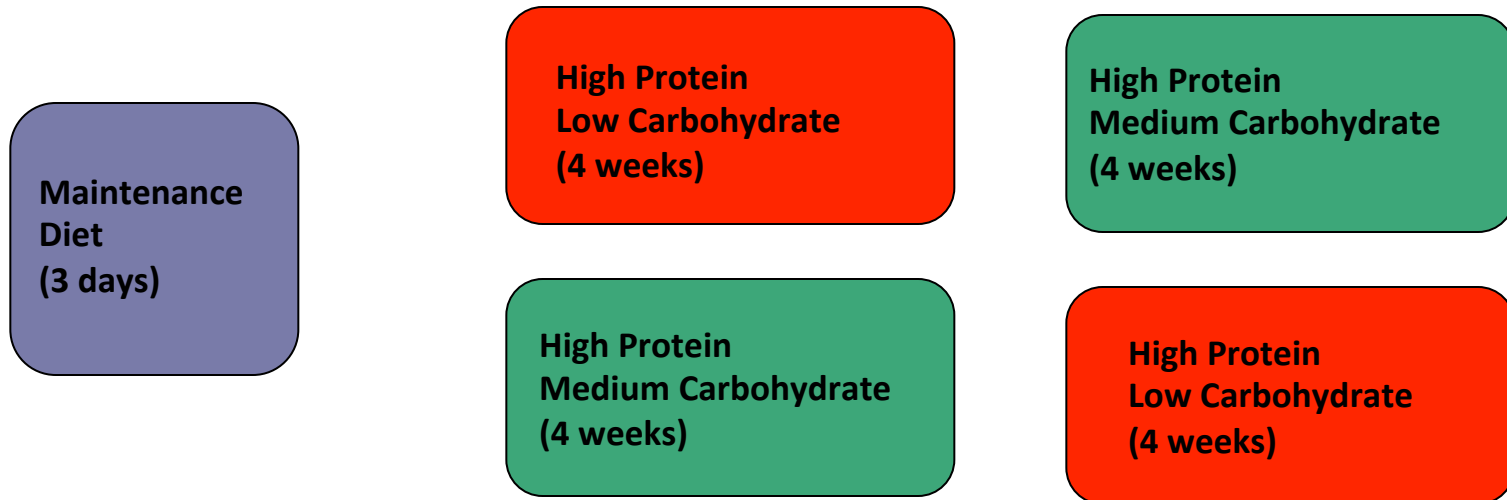
# Human Studies



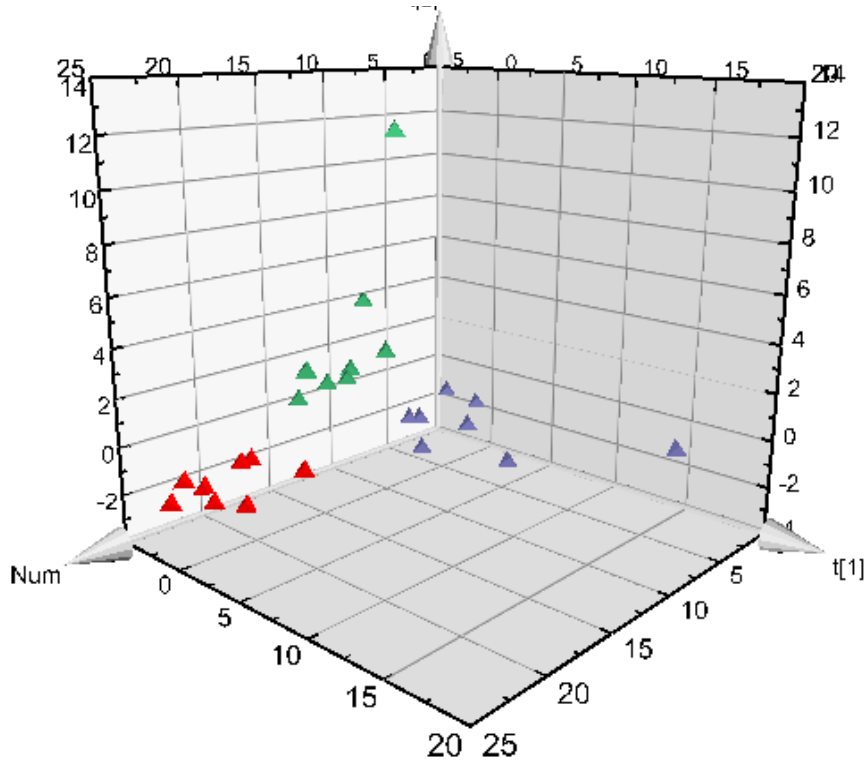
# Macronutrient Balance



# Macronutrient Balance



## Natural Product Metabolite Profile



Total Protein Metabolites ↑

Mutagenic Nitrosamines ↑

Cancer Preventative Molecules ↓

Anti-inflammatory Molecules ↓

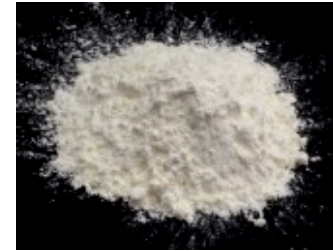
■ Maintenance

■ High Protein; Low Carbohydrate

■ High Protein; Medium Carbohydrate



# Fibre Modulation



**Maintenance  
Diet  
(3 days)**

**Resistant Starch  
(3 weeks)**

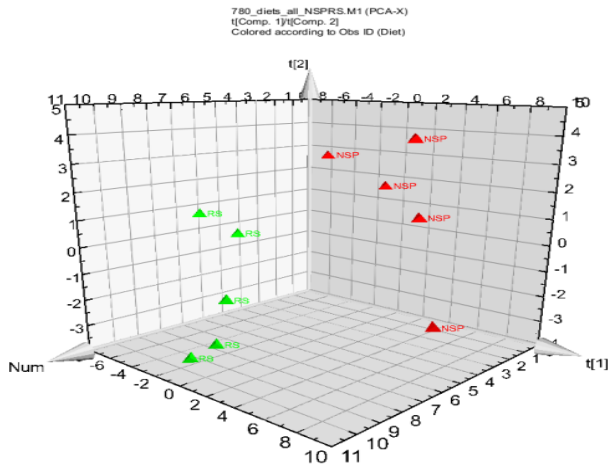
**Bran  
(3 weeks)**

**Bran  
(3 weeks)**

**Resistant Starch  
(3 weeks)**

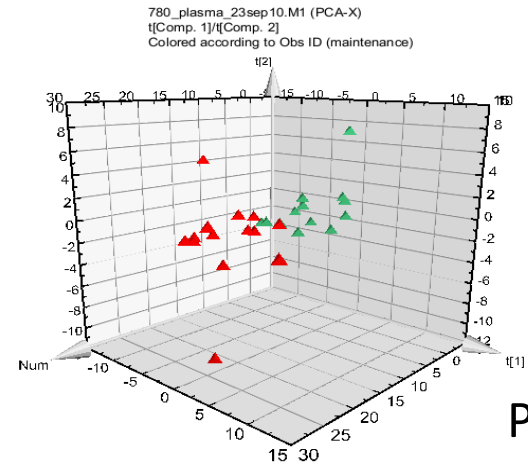


# Fibre Modulation



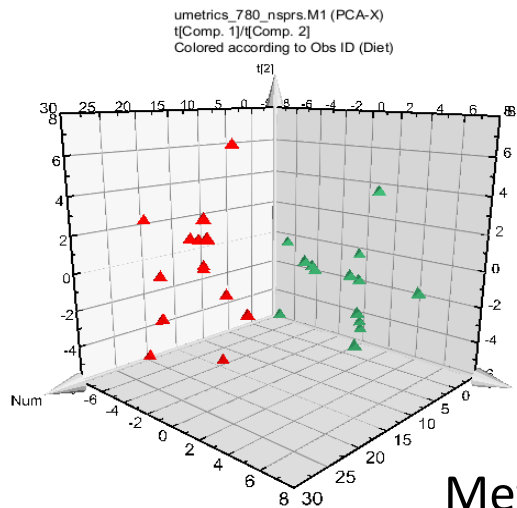
Diet

R2X[1] = 0.493651 R2X[2] = 0.15441



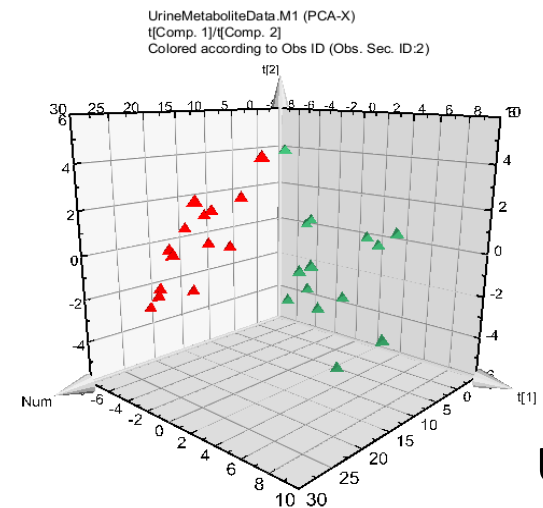
Plasma

R2X[1] = 0.266058 R2X[2] = 0.131551



Gut  
Metabolites

R2X[1] = 0.168469 R2X[2] = 0.104572



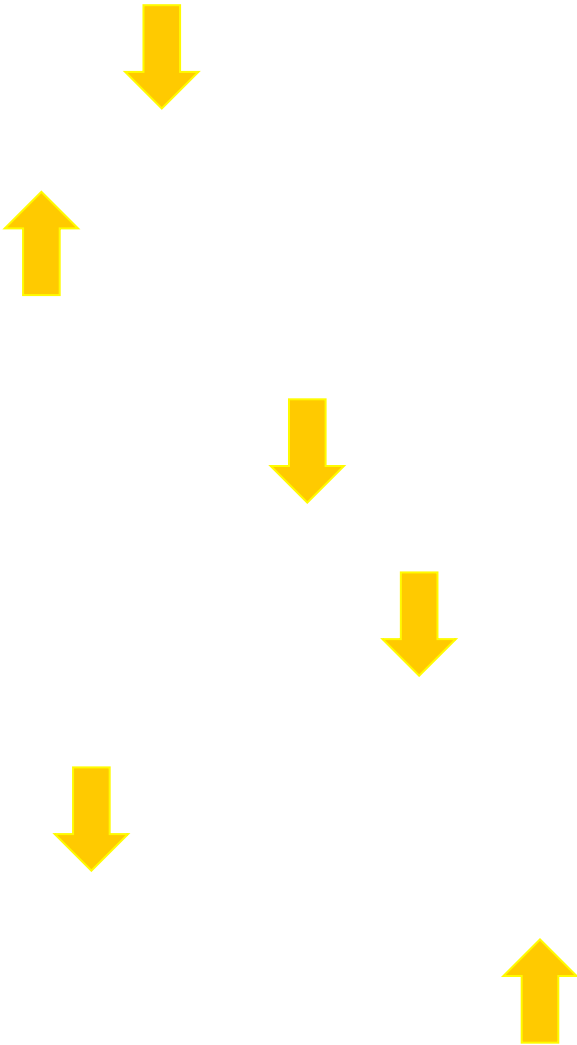
Urine

R2X[1] = 0.412313 R2X[2] = 0.147767

 Bran

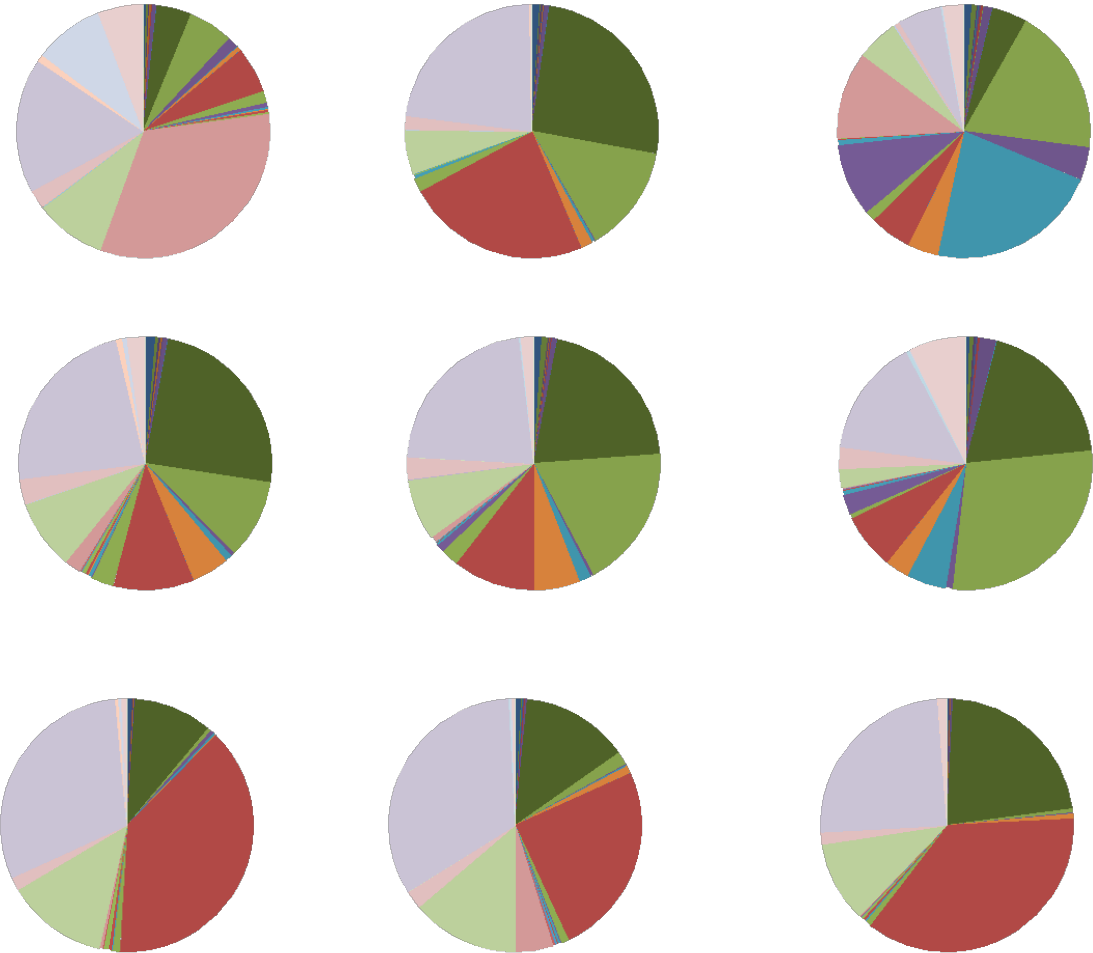
 Resistant Starch

# Fibre Modulation



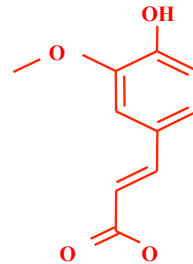
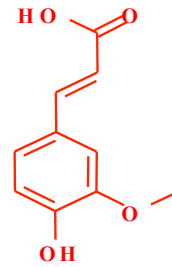
/\

# Fibre Modulation



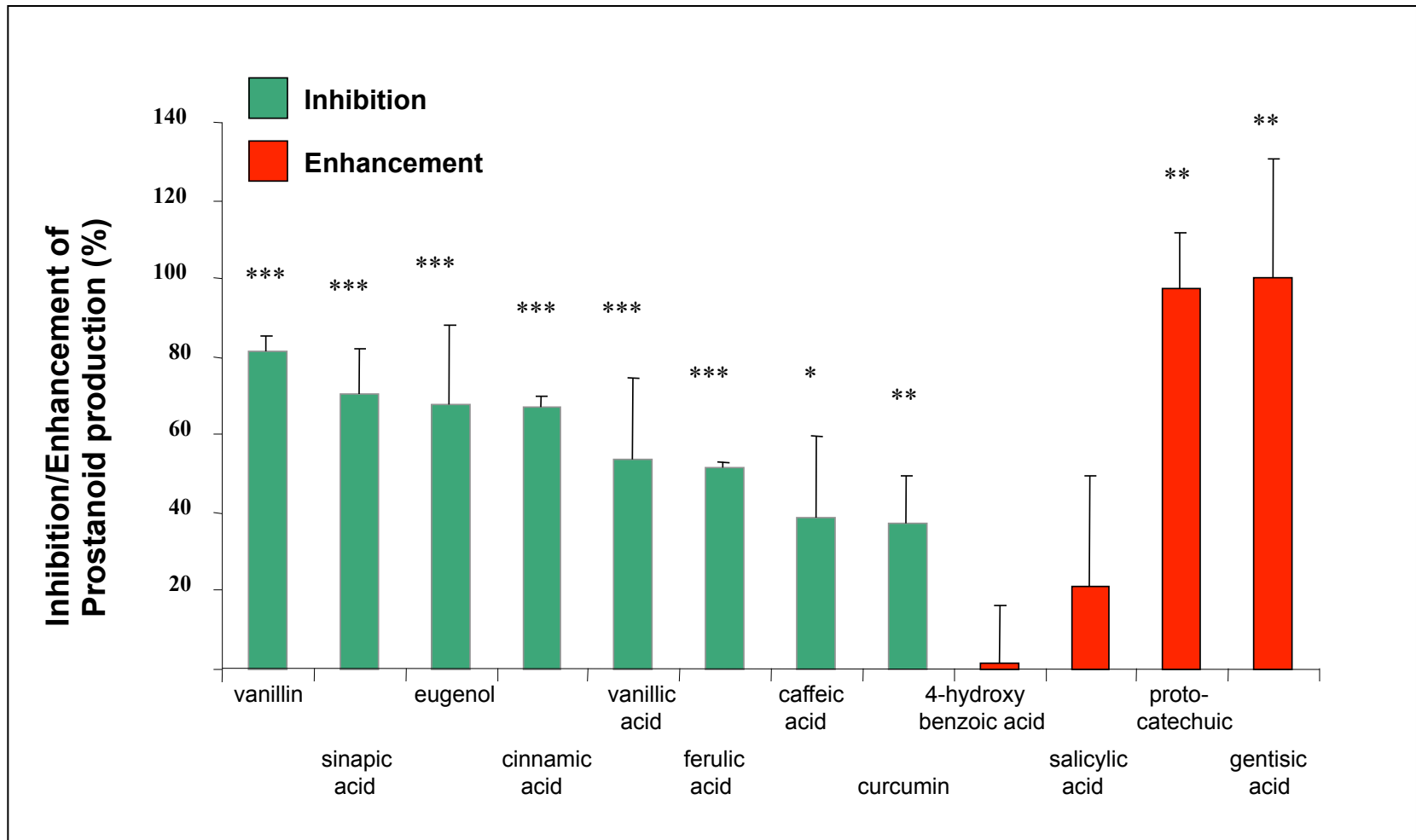
# Fibre Modulation

## ... effect on the systemic circulation

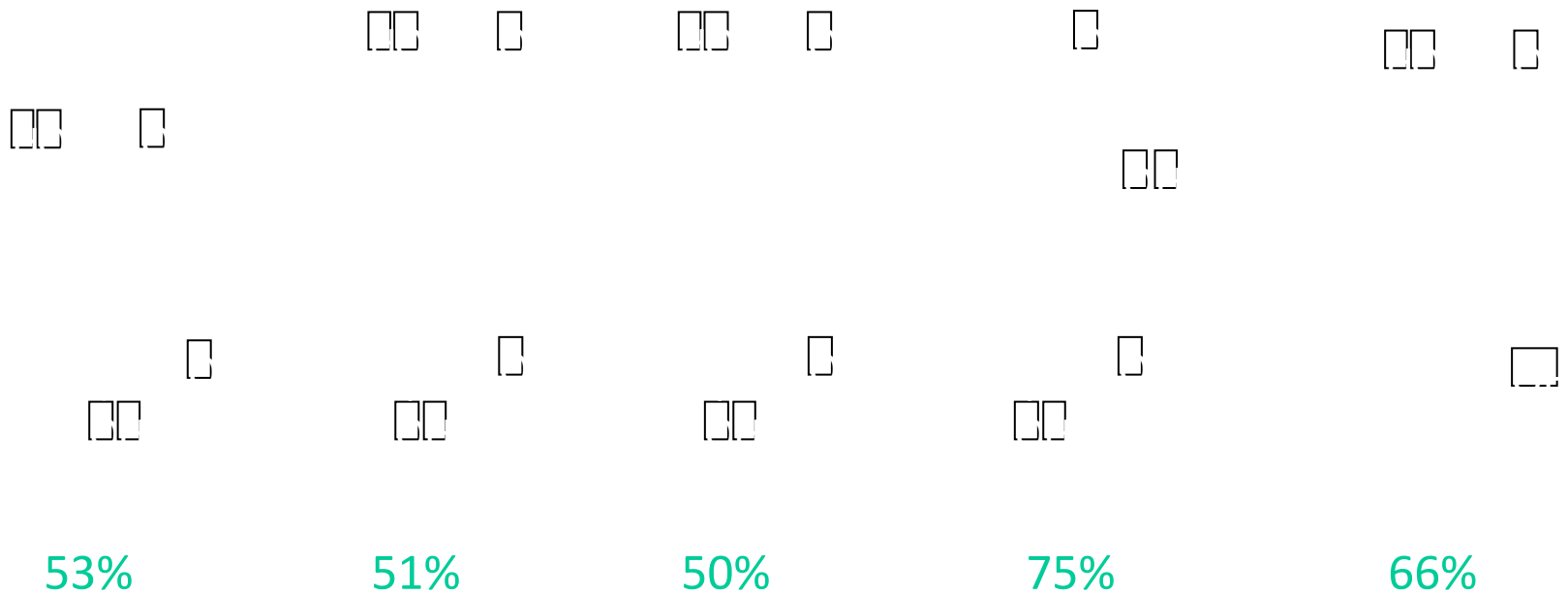




# Bioactivity: Inflammation

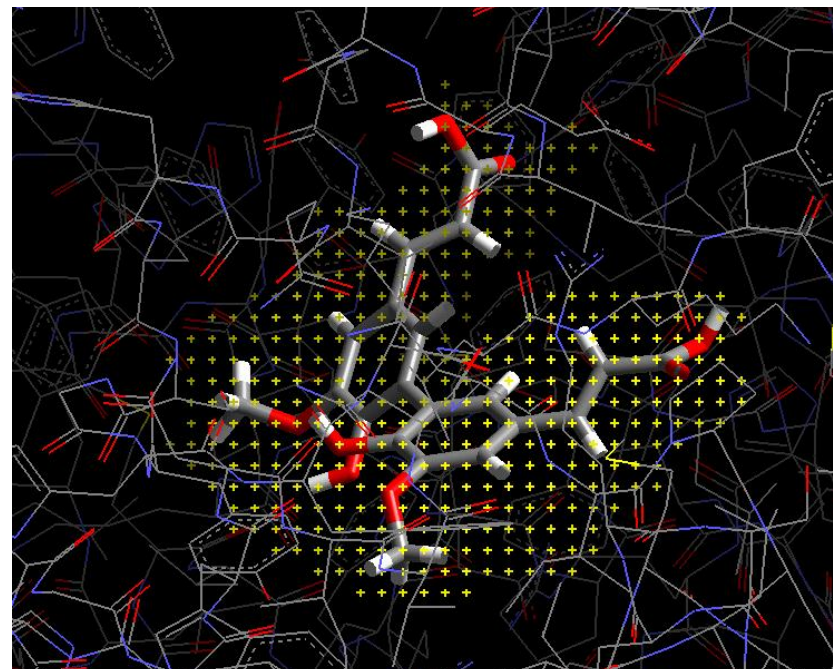
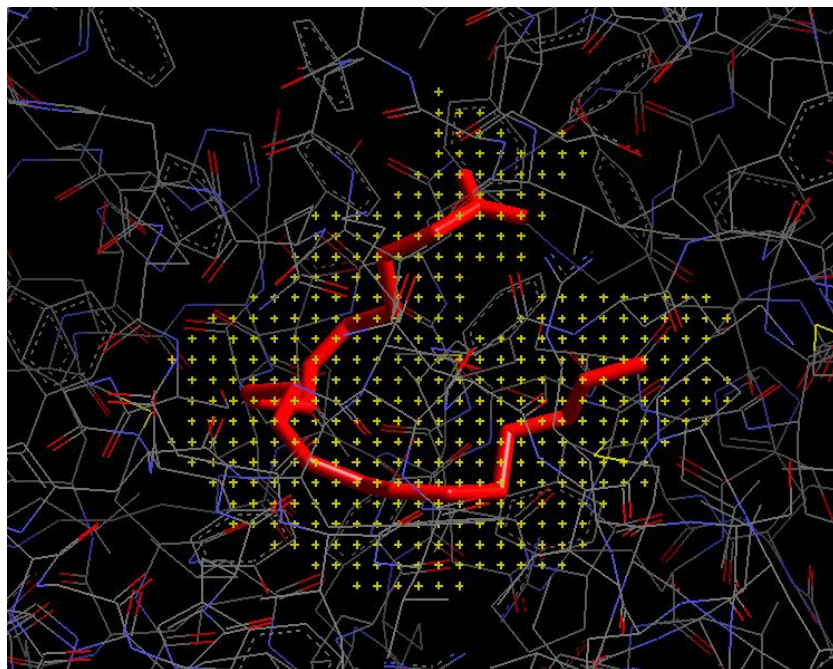


# Impact of Metabolism



## Inhibition of Neoplastic Prostanoids

# Bioactivity: Receptor Binding



A 3D molecular model of a protein structure, rendered in white and red, is shown within a grid of yellow plus signs. The background consists of a complex network of grey and blue wireframe structures, representing a molecular docking or simulation environment.

# Research Summary

# Commercialisation Examples



Tomato extract reduced aberrant blood clotting



Commensal bacterium blocks inflammatory and pathological effects of pathogen



# Acknowledgements

## **Scottish Government:**

'Food, Land and People' Strategic Programme

## **World Cancer Research Fund**

## **Alpro Foundation**

## **National Institutes of Health (US)**

## **Microbiology**

Dr Sylvia Duncan

Prof Harry Flint

## **Analytical Team**

Gary Duncan

Louise Cantlay

Susan Andersen

## **The Lab.**

Dr Madalina Neacsu

Dr Kristina Harrison

Dr Dinesh Thepa

Dr Deepak Kasote

Lorraine Scobbie

Nick Vaughan

Lesley Milne

Nick Hayward

Gema Nadal Catala

Salvatori Multari

Michael Graham

Natasha Falconer

Francesca Pohl

Sisir Kumar Barik

