

# Urine analysis in relation to diet and ASC

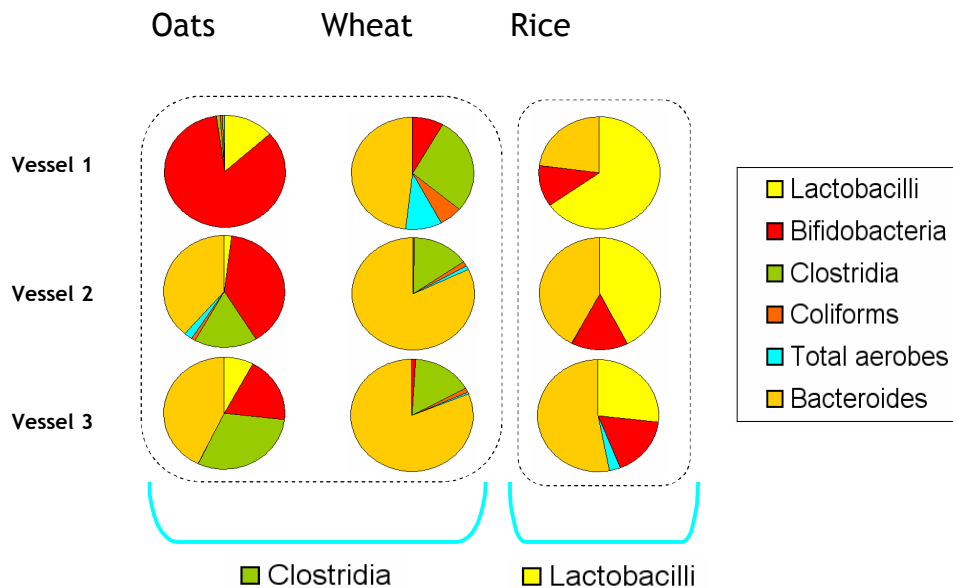
**Kevin Carr  
Director  
ESPA Research**

*Where research leads we will follow*

## How does urine analysis help with diet

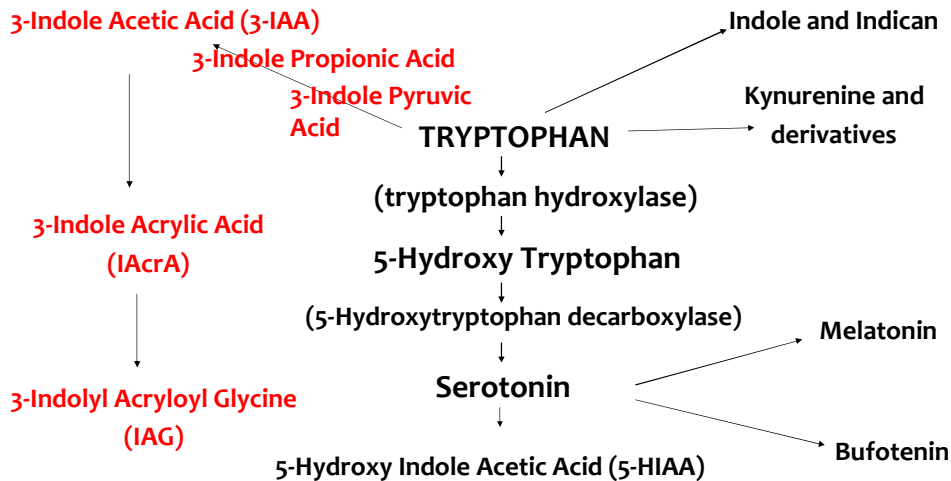
- The compounds in urine all come from the things we eat
- Some directly
  - Amino acids, peptides etc
- Some indirectly
  - Compounds produced by gut bacteria

## Different gut bacteria and different diets



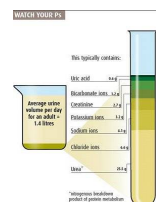
## IAG Story

- HPLC showed a peak which was higher in some ASC samples, compared with controls
- Peak identified as indolylacryloylglycine (IAG)
- IAG known to be connected with PKU and Hartnup Disease
- IAG known to be a metabolite of tryptophan
- Where IAG is produced is not known



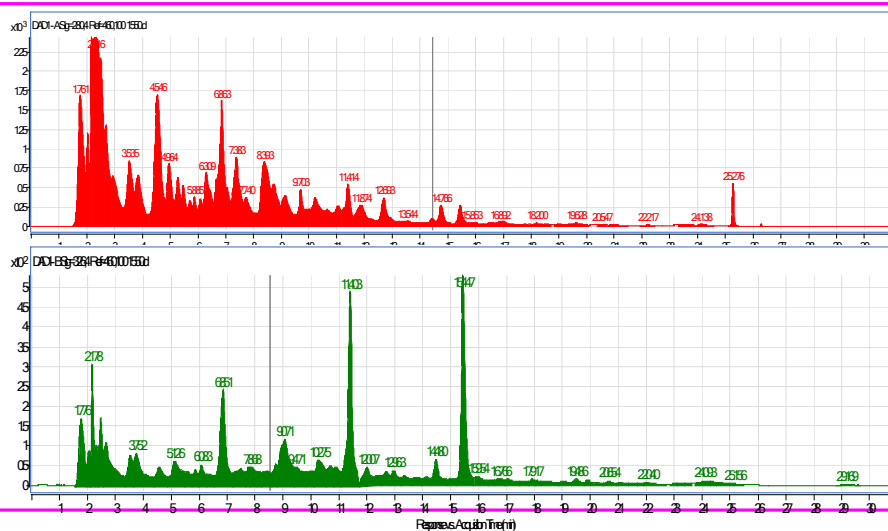
## Why analyse urine

- Blood and plasma too invasive a technique
- Urine contains the majority of metabolites excreted from the body and is collected non invasively



## Problems with the analysis of urine

- Very complex mixture of compounds
- Metabolites of interest present in very small quantities
- Metabolites can change due to the presence of other chemicals



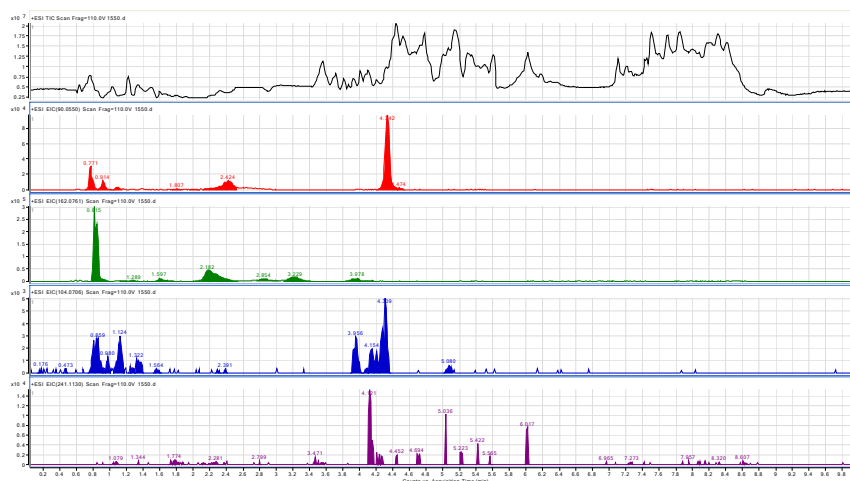
## How does ESPA Research solve these problems

- Development of new separation methods
- State-of-the-art analysing equipment and software
- Analysts who think in strange ways



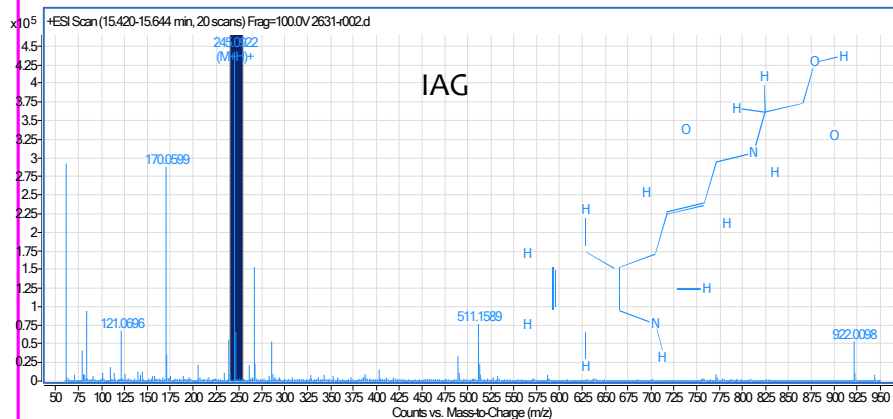
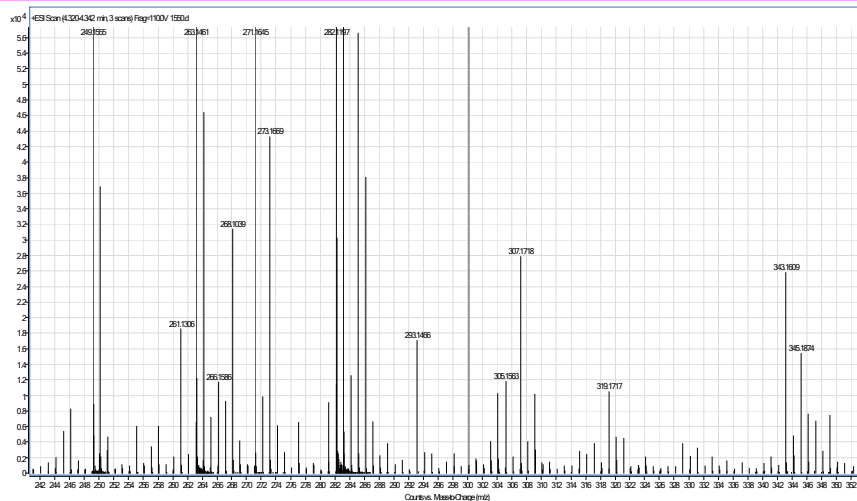
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## Present Research

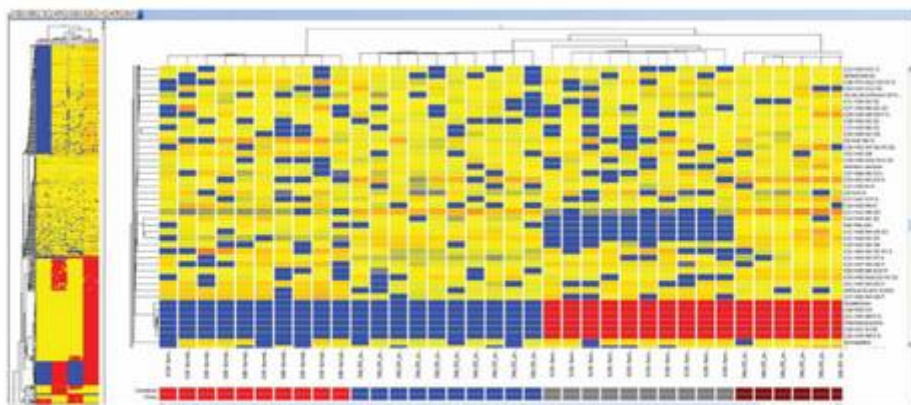
- Identify compounds which may be of relevance
- Determine ratios between urine compounds
  - Some known some unknown
  - Compare ratios of ASC subjects and controls.

Phenylpyruvate	Tetrahydrobiopterin	Valine
Homocysteine	3-(3-hydroxyphenyl)-3-hydroxypropionic acid	Leucine
2-methylbutyryl glycine	Citramalic acid	Isoleucine
Creatine	Tartaric acid (3-OH-malic)	Ornithine
Guanidinoacetate	3-oxoglutaric acid	Taurine
Bufotenine	Phenylcarboxylic acid (benzoic acid)	Methionine
5-hydroxyindoleacetic acid	Arabinose	Glycine-Serine-Glutamic acid-Asparagine
Serotonin	Hippuric acid	Salsolinol
5-hydroxyindole-3-acetic acid	4-hydroxyhippuric acid	N-methyl-Salsolinol
6-sulphatoxymelatonin	N1-methyl-2-pyridone-5-carboxamide	Norsalsolinol
Insulin-like growth factor-1	N-methyl nicotinic acid (trigonelline)	N-methyl-Norsalsolinol
Epidermal growth factor	N-methyl nicotinamide	Mono-2-ethylhexyl phthalate (MEHP)
Insulin-like growth factor binding protein-3	Dimethylamine	Mono-2-ethyl-5-oxohexylphthalate (MEOP)
Isoprostane F(2alpha)-VI	Phenylacetylglutamine	Di-2-ethylhexylphthalate (DEHP)
2,3-dinor-thromboxane B(2)	Dopamine	mono-n-butyl phthalate (MNBP)
6-keto-prostaglandin F(1alpha)	3-4 dihydroxyphenylacetic acid (DOPAC)	dibutyl phthalate (DBP)
8-hydroxy-2-deoxyguanosine (8-OHG)	3-methoxytyramine (3MT)	MEOHP
8-isoprostane-F2alpha (8-iso-PGF2alpha)	Tyrosine	MEHHP
Xanthine	Tryptophan	
Methylxanthine	Glutamine	
beta-Phenylethylamine	Glutamate	
3-methoxy-4-hydroxyphenyl glycol	Glycine	
homovanillic acid	Phenylalanine	
Glyceric acid	Asparagine	
Uric acid	Histidine	
Neopterin	Alanine	
Biopterin	Lysine	
	Cysteine	

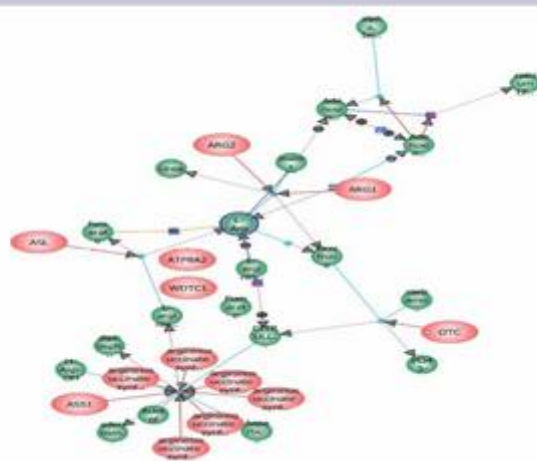
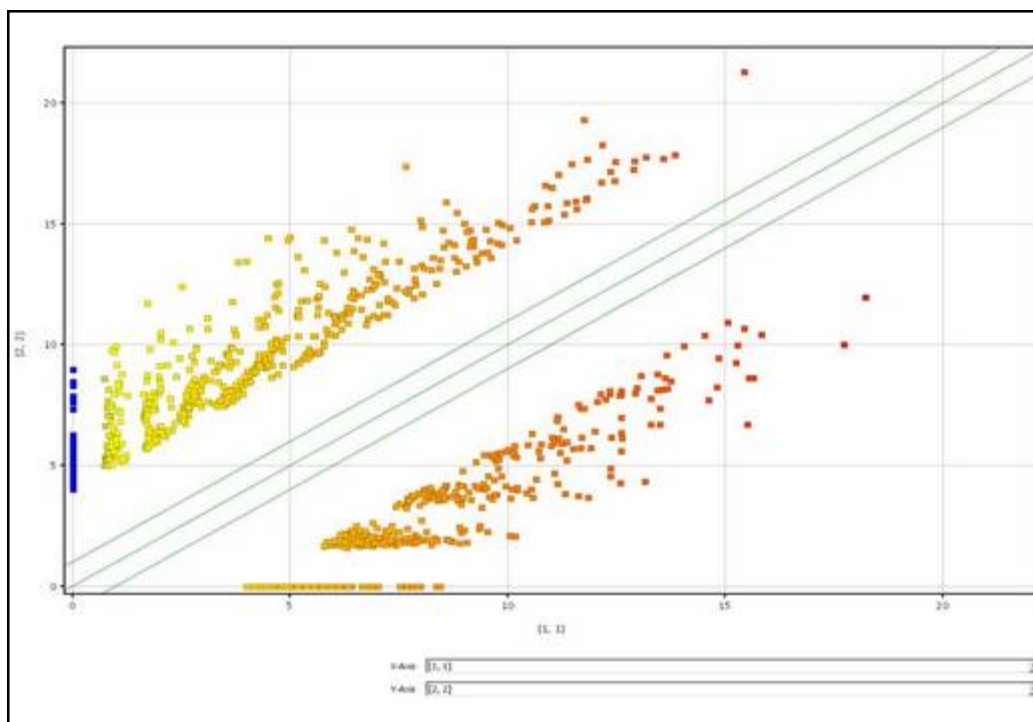
## ScanBrit urine samples

- Over 350 samples
- Statistical analysis between responders and non responders
- Identification of most relevant compounds

## What does the software do

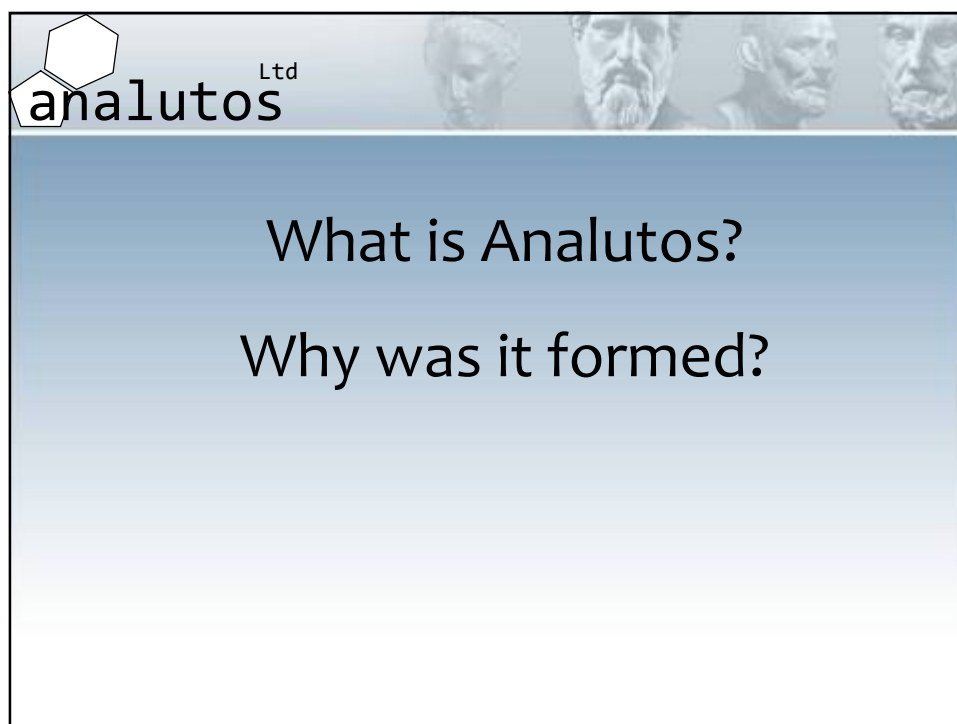
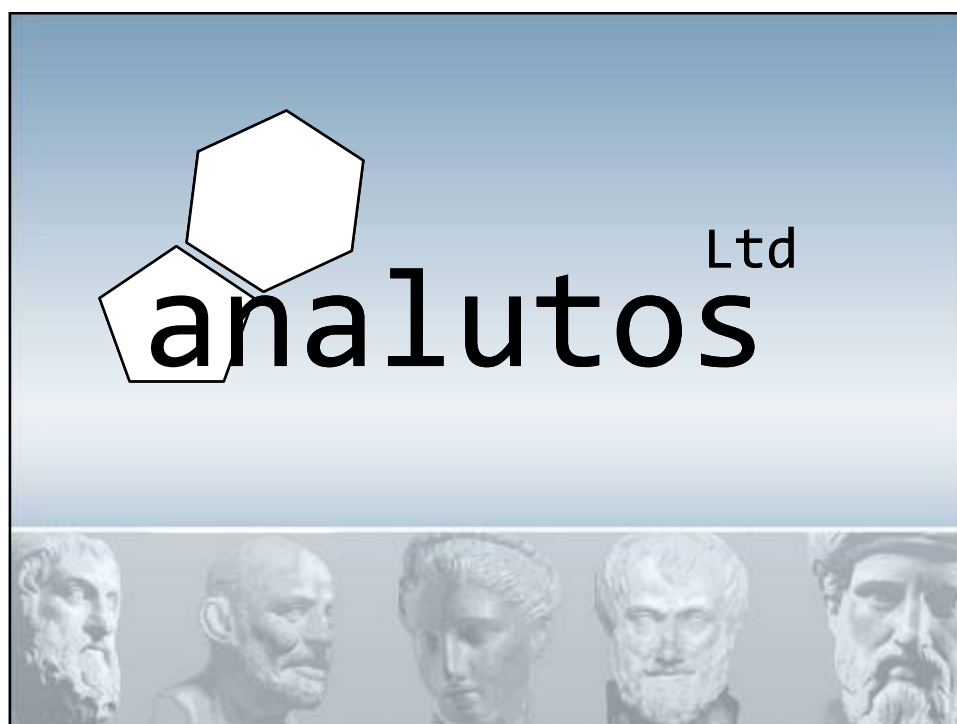







## How does urine analysis help with diet

- Discover compounds which have altered levels in ASC (and other conditions)
- Determine the biological systems which produce these compounds
- Establish problems in these biological systems which would alter the levels of the compounds
- Investigate where diet/supplements may help alleviate these problems






## What will it do?


Provide analytical services for

- Practitioners
- Parents
- Other research groups
- Industry



## How will it work?


- All samples for testing will come through Analutos
- Analutos will provide information on the test and the results but will not give advice based on those results
- Advice on implementation of diet will still be available from ESPA Research but parents will always be advised to see a professional practitioner.



**Analutos – ESPA Research Link**



Research findings by ESPA Research developed by Analutos into valid tests.

Profits from Analutos donated to ESPA Research to fund further research.



**Tests available from Analutos**

- Existing IAG analysis transferred from ESPA Research
- Urine test for the quantification of all Amino Acids
- Urine test for levels of compounds known to be of relevance in ASC (scientific literature)
- Whatever anyone wants!



## Analutos aims and objectives

- Develop tests which are relevant
- Work with practitioners and parents to develop tests they require
- Produce results in a way that practitioners and parents want



## Working together to find solutions

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