Healthscope FUNCTIONAL PATHOLOGY
formerly ARL Functional Pathology

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LAB No:

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Patient :
D.O.B. :
Request Date :
Date Received :
Requested by :
Referring Practice :
Provider No. :
REFERRING PRACTICE REFERENCE:

FUNCTIONAL LIVER DETOXIFICATION PROFILE (FLDP)

	Within Ref. Range	Outside Ref. Range	Reference Range
Phase I			
Caffeine Clearance		1.9	0.5 - 1.6 ml/min/Kg
Phase II		**% Recovery**	
Glutathionation		5.2	5.6 - 11.4 %
Sulphation	26		16 - 36 %
Glucuronidation		26	27 - 56 %
Glycination	31		30 - 53 %
Ratios			
Sulphate:Creatinine	N/A		
Sulphate:Glucuronide		1.0	0.3 - 0.7
Phase I:Sulphation	7.1		3.5 - 13.0
Phase I:Glycination		6.1	1.3 - 3.5
Phase I:Glucuronide		7.1	1.9 - 4.2

RESULTS LEGEND

NAA = Not Able to Assay N/A = Not Applicable NG = Not Given
ND = Not Detected (L) = Low Result (H) = High

COMMENT

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Tests ordered: FLDP,PP
FINAL REPORT on 11 Jul 2011 13:18

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FUNCTIONAL LIVER DETOXIFICATION PROFILE (FLDP)
INTERPRETIVE GUIDE

Phase 1 Interpretation (Caffeine Clearance)

The Cytochrome P450 enzymes are the predominant enzyme system involved in Phase I liver detoxification. Their role is to convert toxic substances into more water soluble molecules, so they can be further metabolised in Phase II.

Result	Possible Cause	Treatment Considerations
High Phase 1	Excessive cytochrome P450 induction from exposure to: ● Alcohol, nicotine, caffeine, stress ● Drugs - steroids, sulphonamides, barbiturates, HRT ● Toxins - exhaust fumes, paint fumes, dioxin and organo-phosphorous pesticides ● High protein diets	● Naringenin (found in grapefruit juice) ● St Mary's thistle ● Antioxidants (A, C, E, Zn, Se)
Low Phase 1	Reduced activity of cytochrome P450 from exposure to: ● Drugs - benzodiazepines, antihistamines, ketoconazole, fluconazole, erythromycin, SSRIs, H2 blockers	● Green tea (catechins) ● Turmeric ● Vitamin B complex ● Bioflavonoids ● Glutathione & its precursors (glycine, glutamine, cysteine)

Intermediate Phase Interpretation

When Phase I activity is high, there is increased metabolic activity at the intermediate phase (before the molecules are presented to Phase II for conjugation). This results in an increased production of free radicals and the potential for secondary tissue damage. It is therefore essential that adequate antioxidants are available to counteract this high free radical activity.

Treatment Considerations for the Intermediate Phase

Vitamins A, C and E, Co-Enzyme Q10, Zinc and Selenium

Phase II Interpretation

Phase II reactions involve the addition of a small polar molecule to the substance, a conjugation step that may or may not be preceded by Phase I. Several types of conjugation reactions occur in the body, including glutathionation, sulphation, glucuronidation and glycination conjugation. These reactions require nutrient cofactors, which are essential for proper detoxification.

Prolonged stress on a particular Phase II pathway will cause an increase in free radical damage which, in turn, will reduce liver function in the long term.

Low Phase II - indicates down regulation of one or more conjugation pathways resulting in inadequate Phase II conjugation reactions.

High Phase II - indicates excessive conjugation of individual or all biochemical pathways, resulting in an increased concentration of metabolic products.

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FUNCTIONAL LIVER DETOXIFICATION PROFILE (FLDP)

Pathway	Responsible for Conjugation of	Treatment Considerations
Glutathionation • A significantly used pathway which is dependant on the tripeptide glutathione (glycine, glutamine, cysteine) • Individuals with diagnoses of arthritis, diabetes or heart disease may have lower glutathione levels than those who are disease free	• Pesticides • Paracetamol • Toxic Metals, e.g. Hg, Cd, Pb • Penicillin • Tetracycline • Petroleum distillates • Alcohol	• Glycine, glutamine & cysteine • Methionine • DIM/Cruciferous vegetable • Vitamins B2, B6, C • Selenium • St Mary's thistle • Glutathione
Sulphation • It is dependant on a depletable supply of inorganic sulphate • Sulphation is 'rate limited' by the amount of sulphate available to the liver • See Sulphate:Creatinine ratio Compensatory mechanism for other Phase II pathways	• N-acetylcysteine (progesterone, DHEA and melatonin) • Phenols (aromatic hydroxyl groups including histamine, dopamine, gallic acid and coumarin) • Catecholamines (adrenalin, noradrenalin)	• Sulphur-containing amino acids (methionine, cysteine, taurine) • Sulphur-rich foods (garlic, onions, cabbage) • Molybdenum (cofactor for sulphite oxidase) • Support other pathways as needed
Glucuronidation • Estimated to account for 33% of all drugs metabolised by Phase II detoxification	• Sex hormones, especially oestrogens • Paracetamol • NSAIDs • Benzodiazepines	• Calcium d-glucurate* • Magnesium • Zinc • Vitamin B complex • Essential Fatty Acids
Glycination • Predominantly involved in salicylate conjugation	• Salicylic acids (e.g. aspirin) • Benzoic acids (some ointments & food preservatives) • Phenylacetic acids (found in nuts & cigarettes)	• Glycine • Vitamin B6 • Magnesium • Reduce salicylates

*Calcium d-glucurate is metabolised to d-glucaro-1, 4-lactone (glucaro lactone GL). GL is a direct inhibitor of beta-glucuronidase, an enzyme found in the gut that cleaves bound oestrogens and carcinogens from their Phase II conjugates and permits reabsorption through the entero-hepatic circulation. By inhibiting beta-glucuronidase activity, GL increases the net elimination of carcinogens, toxins and steroid hormones via glucuronidation.

Ratios

Sulphate:Creatinine
This reflects the level of sulphur available from dietary sources and should be considered in conjunction with the Phase II sulphation result.

Phase I:Glycination and Phase I:Glucuronide
These two ratios reflect the relationship between Phase I and these conjugation pathways and will demonstrate whether the biochemical load from Phase I is high or low.

Sulphate:Glucuronide
This ratio reflects the relationship between sulphate and glucuronide. Sulphate is often up regulated to compensate for low glucuronide.

Phase I:Sulphation
This reflects the relationship between Phase I and the sulphation pathway and demonstrates whether the biochemical load from Phase I is too high.

Note: When all the ratios are high in an FLDP report, this commonly reflects a patient who is highly sensitive and may have multiple food and chemical sensitivities.

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