

BIOTRANSFORMASIE

die sleutel tot 'n gesonder lewe



GEBRUIKERSGIDS

 **BOSS**

BIOTRANSFORMASIE EN
OKSIDATIEWE STRESSTATUSPROFIEL

INHOUDSOPGAWE

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BELANGRIK:

Voltooi asseblief AL die inligting op die vorms van bl. 4 - 9 in die inligtingsboekie en handig die boekie in saam met al die uriene- en speekselmonsters op die dag waarop die bloed getrek word.



A. BIOTRANSFORMASIE EN OKSIDATIEWE STRESSTATUSPROFIEL

Agtergrondinligting

In vandag se wêreld van geprosesseerde voedsel en besoedeling, word toksiese stowwe byna oral aangetref. Dit kom voor in die voedsel wat ons eet, die water wat ons drink, en die lug wat ons inasem. Na beraming, is 60 tot 80 persent van alle kankers die direkte gevolg van hierdie omgewingstoksiene. Omgewingstoksiene kan ook 'n rol speel in die ontstaan van neurologiese afwykings soos Alzheimer en Parkinson se siekte, asook in verstandelike of gedragsafwykings soos depressie, angs, skisofrenie en aandagafleibaarheidsindroom. Omdat die senuweestelsel nou verbind is met die immuunstelsel, affekteer toksiene ook ons immuunfunksie. Dus kan ons vermoë om normaal te dink en te voel drasties geaffekteer word deur blootstelling aan toksiene.

Die lewer is 'n sleutelorgaan in die die liggaam se selfverdedigingstelsel. Binne-in lewerselle bestaan gesofistikeerde meganismes wat oor miljoene jare ontwikkel het om toksiese stowwe af te breek na vorme wat jou liggaam op 'n veilige wyse kan elimineer. Die lewer gebruik twee meganismes, naamlik Fase I en Fase II biotransformasie, wat ontwerp is om vetoplosbare toksiene na wateroplosbare stowwe om te skakel sodat jou liggaam hierdie stowwe maklik kan uit-skei as waterige vloeistowwe soos gal en uriene.

In Fase I, skakel jou liggaam se ensieme 'n toksien om in 'n stof wat verder gemetaboliseer kan word in Fase II. Dit word moontlik gemaak deur verskeie chemiese reaksies en tydens hierdie proses word vrye radikale geproduseer wat die lewerselle kan beskadig. Antioksidante (soos vitamien C en E) kan die skade verminder wat deur vrye radikale veroorsaak word, maar as antioksidante laag is en die blootstelling aan toksiene hoog, word hierdie toksiene gevaarliker en kan nie so vinnig of volledig geëlimineer word nie. Stadige biotransformasie veroorsaak dat

meer toksiese stowwe in die liggaam sirkuleer en uiteindelik kan dit vir jare in die vetweefsel gestoor word, net om weer vrygestel te word tydens oefening, periodes van stres of wanneer daar gevas word. Tydens die vrystelling van hierdie toksiene, kom simptome soos hoofpyn, swak geheue, maagpyn, naarheid, moegheid, duiseligheid en palpitasies voor.

Fase II word ook die konjugeringsweg genoem waardeur ander ensieme in lewerselle nog 'n stof byvoeg tot die metaboliëte van Fase I. Dit maak die toksien wateroplosbaar en minder skadelik sodat dit dan uitgeskei kan word uit die liggaam deur waterige vloeistowwe soos gal en uriene. Vir effektiewe Fase II biotransformasie, benodig die lewerselle swawel-bevattende aminosure soos taurien en sisteien. Die nutriënte glisien, glutamien, cholien en inositol word ook benodig vir effektiewe Fase II biotransformasie. Die hoofweë van Fase II sluit die volgende in: glutatioonkonjugering, sulfaatkonjugering, glisienkonjugering en glukuronsuurkonjugering.

'n Aantal toestande het 'n invloed op hoe goed die lewer detoksifikasie uitvoer. Herhaaldelike blootstelling aan toksiene in voedsel, water en die omgewing verhoog die biotransformasielas en indien die Fase I en II biotransformasieweë oorlaai word, sal toksiene in die liggaam ophoop.

Biotransformasie en oksidatiewe stresstatus-toets

Een metode om die detoksikasievermoë van die lewer te bepaal, is om die algehele toestand van jou gesondheid te ondersoek. Toksiese stowwe is bydraende faktore in 'n wye reeks gesondheidsprobleme. Daar is ook verskeie lewertoetse (soos die analise van lewersiensime) wat kliniese bewyse van bestaande lewerskade ondersoek. Ongelukkig is lewerskade reeds teenwoordig teen die tyd wat hierdie toetse abnormaal registreer.

'n Toets om die lewer se biotransformasiefunksie te bepaal kan gedoen word. Tydens hierdie toets word die lewer blootgestel aan algemene stowwe soos kaffeien, aspirien en parasetamol in veilige dosisse en monsters van bloed, uriene en speeksel word dan versamel en getoets. Hierdie toets is uniek omdat Fase I en II biotransformasieweë, sowel as die oksidatiewe stresstatus en antioksidantkapasiteit bepaal word. Fase I aktiwiteit word getoets deur middel van

die kaffeïenuitskeidingstoets en in Fase II word die produksie van vier konjugate bepaal. Die verhouding tussen die aktiwiteite van die twee fases word ook bereken om wanbalanse te bepaal. Bloedmonsters word gebruik om die oksidatiewe stresstatus en antioksidantkapasiteit te bepaal. Hierdie data kan dan gekorreleer word met die resultate van die biotransformasiekapasiteitstoets.



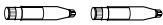






B. TOETSPROSEDURE

Dit is baie belangrik dat die toetsprosedure streng gevolg word. Die dokumentasie en alle monsters (bloed, speeksel en uriene) moet saam met mekaar gestuur word, alvorens die laboratorium die monsters kan analiseer.

Omtrent die toetsstel en prosedure

Drie verbindings, kaffeïen, parasetamol en aspirien, word oraal geneem om die lewer se Fase I en Fase II biotransformasiekapasiteit te toets. Speeksel en uriene word geanaliseer om te bepaal hoe goed die lewer toksiene kan omskakel en uitskei uit die liggaam.

Die stel wat voorsien word, bestaan uit die volgende:

	Voorbeeld	Aantal	Beskrywing
A		1	Een 1 L urienhouer
B		1	Een klein urienhouer
C + D		2	Twee salivette om speeksel te versamel
E		1	Een 150 mg kaffeientablet
F		2	Twee 300 mg aspirientablette
		2	Twee 500 mg parasetamoltablette
G		1	Etiket vir alle houers word voorsien en moet ingevul word met die versamelyd, naam en datum en op die korrekte houers geplak word.
H		1	'n Gebruikersgids met belangrike vorms wat ingevul en teruggestuur moet word
I		1	Ekstra plastieksak met dokumentsak aan die buitekant aangebring






Instruksies voordat daar met die toets begin word

Tydens die toets kan 'n normale dieet gevolg word, behalwe vir die volgende beperkings.

MOET NIE die volgende inneem tydens die toets nie:

- Alkohol, koffie, tee, kakao, sjokolade, kola-drinkies, rooibostee, gesondheidstee;
- Medikasie wat kaffeïen, salisilate (aspirien) of parasetamol bevat;
- Steenvrugte (bv. sultanas, korente, rosyne ens.);
- Neute en sade, pepperment of "liquorice", (bv. lekkers, suiglekkers, kougom, tee);
- Speserye (bv. kerrie, dille, oreganum, paprika ens.);
- Brassica groente, soos broccoli, blomkool, kool, brusselse spruite en tamatie.

INSTRUKSIES

	Tyd	Gebruik	Stappe wat gevolg moet word
1	Vroegoggend		Versamel 'n vroeë-oggend basislyn urienmonster in die klein urienhouer. Alle urienmonsters moet so gou moontlik gevries word.
2	08:00		Neem die kaffeïentablet voor ontbyt.
3	10:00		Versamel die 1ste speekselmonster. [Lees asseblief die gedetailleerde instruksies op die volgende bladsy].
SIEN AANWYSINGS OP VOLGENDE BLADSY			
4	16:00		Versamel die 2de speekselmonster (sien hier bo).
5	21:00		Hou op eet en drink (behalwe water). Maak die blaas leeg. Neem twee aspirien- en twee parasetamoltablette.
6	Oornag 21:00 - 07:00		Versamel alle oornag uriene tot 07:00 die volgende oggend in die 1 L houer. Alle urienmonsters moet so gou moontlik gevries word. Let wel: bottel het 'n prop en 'n seël.
7		Moet deur patoloë gedoen word	Versamel bloedmonster in drie buise: twee wat EDTA bevat (pers prop) en een stollingsbuis (geel prop). Dit sal gedoen word by die patologiestak wanneer die bevrore speeksel- en urienmonsters teruggebring word. Nie nodig om te vas.
8	Stuur al die monsters terug in die ekstra plastieksak. Sit die blou boekie in die dokumentsak wat op die buitekant van plastieksak geplak is. Skeur die wit strip af en seël die dokumentsak		

Voor speekselversameling, maak seker van die volgende:

1. Versamel speeksel op die presiese tyd(e) aangedui deur jou geneesheer.
2. Moet niks eet of drink vir ten minste 30 min voordat jy die speeksel versamel nie.
3. Vermyn aktiwiteite wat kan veroorsaak dat jou tandvleis bloei – moenie jou tande borsel of flos voor versameling van die speekselmonster nie.
4. Verwyder lipstiffie of lipsalf voor versameling.

Hoe om speeksel te versamel m.b.v. die salivette

Speeksel moet versamel word op die presiese tyd(e) gespesifiseer deur jou geneesheer. Die salivette wat voorsien word, is spesifiek ontwerp vir die doel om speeksel te versamel. Lees asseblief die volgende aanwysings noukeurig.

LET ASB. OP – SALIVETTE IS NIE BEDOEL VIR GEBRUIK DEUR KINDERS ONDER DIE OUDERDOM VAN DRIE JAAR NIE. KINDERS ONDER DIE OUDERDOM VAN TIEN JAAR MOET VOLWASSE TOESIG HÊ.

INSTRUKSIES - Volg hierdie stappe om speeksel te versamel:

	STAP 1: Verwyder slegs die boonste dop van die buis om die ronde watteprop bloot te stel. Moet nie die kleiner binneste buis waarin die watteprop is, verwyder nie.
	STAP 2: Hou die buis voor jou mond en keer dit om sodat die watteprop in jou mond ingly. Moet nie met jou vingers aan die watteprop raak nie.
	STAP 3: Rol die watteprop liggies in jou mond rond vir 5 minute of totdat jy nie langer kan voorkom om oortollige speeksel in te sluk nie (die watteprop behoort versadig te wees).
	STAP 4: Plaas die buis voor jou mond en laat dit teruggly in die kleiner binneste buis en maak dig toe met die dop. <i>Moet nie met jou vingers aan die watteprop raak nie. Die salivette behoort nou te lyk presies soos voor jy begin het, met die dop, binneste buis, watteprop en sentrifugebuis.</i>
	STAP 5: Skryf jou volle naam, geboortedatum, datum van versameling en tyd van versameling op die etikette wat voorsien is en plak dit op die regte houters.
	STAP 6: Vries die salivettebuis en neem dit na die geneesheer of laboratorium binne 3 dae.

C. BELANGRIKE PAPIERWERK OM TE VOLTOOI

PASIËNTINLIGTING

Alle inligting van bl.4 - 9 moet voltooi word, insluitend gewig, lengte en verwysende dokter.

Toetse aangevra:	Detoksifikasieprofiel		
Monster inligting:	Bloed	Speeksel	Uriene
Naam:			
Van:			
Geboortedatum:			
ID:			Geslag:
Sel:			Gewig:
Tel:			Lengte:
Posadres:			
Het enige familielid al die toets gedoen? Indien wel verskaf asb. naam, van en familieverband:			
Verwysende geneesheer:			
Mediesefonds Inligting	Naam van mediesefonds:		
	Rekeningpligtige I.D. nr.		
	Mediesefondsnummer:		
	Naam van hooflid:		

NAVRAE

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LEEFSTYLVRAE						
1	Gebruik jy tabakprodukte?			Nee	Ja	
2	Woon of werk jy saam met iemand wat in jou teenwoordigheid rook?			Nee	Ja	
3	Hoe dikwels eet jy kitskos			Nie gereeld	Weekliks	Daaglik
4	Hoeveel alkoholiese drankies drink jy per week			< 1	1 – 5	> 5
5	Werk jy gereeld met toksiese chemikalieë soos insektisiede of onkruidodders?			Nee	Ja	
6	Het jy in die afgelope jaar twee of meer kere voorgeskrewe medikasie gebruik?			Nee	Ja	
7	Gebruik jy enige chroniese medikasie? Indien ja, spesifiseer asb.			Nee	Ja	
	<i>Spesifiseer asb.:</i>					
8	Gebruik jy medikasie vir voorbehoeding / hormoonvervangingsterapie?			Nee	Ja	
	<i>Spesifiseer asb.:</i>					
9	Lei jy aan gastrointestinale probleme?			Nee	Ja	
10	Is jy dikwels onverklaarbaar moeg? Indien ja, vul asb. die Piper Moegheidskaal vorm bl.7 in.			Nee	Ja	
11	Gediagnoseer met mediese toestand? Indien ja, spesifiseer asb.			Nee	Ja	
	<i>Spesifiseer asb.:</i>					

MEDIESE SIMPTOME VRAELYS													
		NB!!: PUNTESKAAL: HOE GE-REELD EN ERNSTIG ERVAAR JY DIE VOLGENDE SIMPTOME - IN DIE LAASTE 30 DAE:					NB!!: PUNTESKAAL: HOE GE-REELD EN ERNSTIG ERVAAR JY DIE VOLGENDE SIMPTOME - IN DIE LAASTE 30 DAE:						
		Nooit / Amper nooit	Ongereeld, effek is nie ernstig	Ongereeld, effek is ernstig	Gereeld, effek is nie ernstig	Gereeld, effek is ernstig	Nooit / Amper nooit	Ongereeld, effek is nie ernstig	Ongereeld, effek is ernstig	Gereeld, effek is nie ernstig	Gereeld, effek is ernstig		
		0	1	2	3	4			0	1	2	3	4
KOP	Hoofpyn	0	1	2	3	4	OË	Waterige of jeukerige oë	0	1	2	3	4
	Flouheid	0	1	2	3	4		Geswelde, rooi of plakkerige ooglede	0	1	2	3	4
	Duiseligheid	0	1	2	3	4		Sakke of donker kringe onder oë	0	1	2	3	4
	Slaaploosheid	0	1	2	3	4		Dowwe of tunnelvisie (sluit nie by- of versindheid in nie)	0	1	2	3	4
ORE	Jeukerige ore	0	1	2	3	4	VEL	Aknee	0	1	2	3	4
	Oorpyn, oorinfeksies	0	1	2	3	4		Uitslag, droë vel	0	1	2	3	4
	Dreinerig uit oor	0	1	2	3	4		Haarverlies	0	1	2	3	4
	Gesuis in ore, gehoerverlies	0	1	2	3	4		Blosing of gloede	0	1	2	3	4
								Oormatige sweet	0	1	2	3	4

		0	1	2	3	4			0	1	2	3	4
NEUS	Toe neus	0	1	2	3	4	MOND/ KEEL	Chroniese hoës	0	1	2	3	4
	Sinusprobleme	0	1	2	3	4		Verstikking, gereelde behoefte om keel skoon te maak	0	1	2	3	4
	Hooikoors	0	1	2	3	4		Seer keel, hees, verlies van stem	0	1	2	3	4
	Niesbuie	0	1	2	3	4		Swelling of verandering in kleur van tong, tandvleis, lippe	0	1	2	3	4
	Oormatige mukus-vorming	0	1	2	3	4		Sere in die mond of keel	0	1	2	3	4
HART	Onreëlmatige hartklop	0	1	2	3	4	LONGE	Borskongestie	0	1	2	3	4
	Vinnige of harde hartklop	0	1	2	3	4		Asma, brongitis	0	1	2	3	4
	Borspyn	0	1	2	3	4		Kortasem	0	1	2	3	4
	Sweet oormatig	0	1	2	3	4		Moelik om asem te haal	0	1	2	3	4
EMOSIES	Buierigheid	0	1	2	3	4	ENERGIE/ AKTI- WITEIT	Moegheid, traagheid	0	1	2	3	4
	Depressie	0	1	2	3	4		Apatie, letargie	0	1	2	3	4
	Woede, geïrriteerd	0	1	2	3	4		Hiperaktiwiteit	0	1	2	3	4
								Rusteloosheid	0	1	2	3	4
	Angstigheid, vrees, sensuueagtigheid	0	1	2	3	4		Moegheid/tamheid vererger met strawwe oefening/inspanning en voel sleg daarna	0	1	2	3	4
GE- DAGTES	Moelik om besluite te neem	0	1	2	3	4	GEWIG	Eet of drink oormatig	0	1	2	3	4
	Stotter of stamel	0	1	2	3	4		Lus vir sekere kosse	0	1	2	3	4
	Praat onduidelik	0	1	2	3	4		Oorgewig	0	1	2	3	4
	Leerprobleme	0	1	2	3	4		Eet kompulsief	0	1	2	3	4
	Swak geheue	0	1	2	3	4		Waterretensie	0	1	2	3	4
	Deurmekaar, swak begrip	0	1	2	3	4		Ondergewig	0	1	2	3	4
	Swak konsentrasie	0	1	2	3	4							
	Swak fisiese koördinasie	0	1	2	3	4							
SPYSVER- TERINGS- KANAAL	Naarheid, braking	0	1	2	3	4	GE- WRIGTE/ SPIERE	Pyn in gewrigte	0	1	2	3	4
	Diarree	0	1	2	3	4		Artritis	0	1	2	3	4
	Hardlywigheid	0	1	2	3	4		Styfheid of beperkte beweging	0	1	2	3	4
								Spierspyn	0	1	2	3	4
	Opgeblase gevoel	0	1	2	3	4		Gevoel van swakheid of moegheid	0	1	2	3	4
								Pyn in verskillende gewrigte met verskillende interalle/tye asof pyn beweeg	0	1	2	3	4
ANDER	Opbreek van winde, oormatige gas	0	1	2	3	4							
	Sooibrand	0	1	2	3	4							
	Intestinale / maagpyn	0	1	2	3	4							
	Gereeld siek	0	1	2	3	4							
	Moet dikwels of dringend urineer	0	1	2	3	4							
	Genitale gejeuk of afskeidings	0	1	2	3	4							
	Gevoelige limfkliere	0	1	2	3	4							

PIPER MOEGHEIDSKAAL												
Antwoord asb. die vrae hieronder deur die skaal in die volgende kolom te gebruik		Skaal	Merk asb. die regte skaal									
			1	2	3	4	5	6	7	8	9	10
1	Hoe lank ervaar jy moegheid? (Kies slegs een respons): 1 - voel nie moeg nie, 2 - minute, 3 - ure, 4- dae, 5 - weke, 6 maande, 7 - ander (beskryf asb.)		1	2	3	4	5	6	7	8	9	10
2	Tot watter mate veroorsaak die moegheid wat jy nou ervaar 'n gevoel van ontsteltenis by jou?	1 Geen 10 'n Groot mate	1	2	3	4	5	6	7	8	9	10
3	Tot watter mate meng die moegheid wat jy nou ervaar in met jou vermoë om jou werk of skoolaktiwiteite te voltooi?	1 Geen 10 'n Groot mate	1	2	3	4	5	6	7	8	9	10
4	Tot watter mate meng die moegheid wat jy nou ervaar in met jou vermoë om sosiaal te verkeer met jou vriende?	1 Geen 10 'n Groot mate	1	2	3	4	5	6	7	8	9	10
5	Tot watter mate meng die moegheid wat jy nou ervaar in met jou vermoë om seksueel aktief te wees?	1 Geen 10 'n Groot mate	1	2	3	4	5	6	7	8	9	10
6	Oor die algemeen, tot watter mate veroorsaak die moegheid wat jy nou ervaar dat jy nie kan deelneem aan die tipe aktiwiteite wat jy geniet nie?	1 Geen 10 'n Groot mate	1	2	3	4	5	6	7	8	9	10
7	Hoe sal jy die graad van intensiteit of ernstigheid van die moegheid beskryf wat jy nou ervaar?	1 Matig 10 Ernstig	1	2	3	4	5	6	7	8	9	10
8	Tot watter mate sal jy die moegheid wat jy nou ervaar beskryf as	1 Aangenaam 10 Onaangenaam	1	2	3	4	5	6	7	8	9	10
9	Tot watter mate sal jy die moegheid wat jy nou ervaar beskryf as	1 Aanvaarbaar 10 Onaanvaarbaar	1	2	3	4	5	6	7	8	9	10
10	Tot watter mate sal jy die moegheid wat jy nou ervaar beskryf as	1 Beskermend 10 Destruktief	1	2	3	4	5	6	7	8	9	10
11	Tot watter mate sal jy die moegheid wat jy nou ervaar beskryf as	1 Positief 10 Negatief	1	2	3	4	5	6	7	8	9	10
12	Tot watter mate sal jy die moegheid wat jy nou ervaar beskryf as	1 Normaal 10 Abnormaal	1	2	3	4	5	6	7	8	9	10
13	Tot watter mate voel jy nou	1 Sterk 10 Swak	1	2	3	4	5	6	7	8	9	10
14	Tot watter mate voel jy nou	1 Wakker 10 Slaperig	1	2	3	4	5	6	7	8	9	10
15	Tot watter mate voel jy nou	1 Lewendig 10 Lusteloos	1	2	3	4	5	6	7	8	9	10
16	Tot watter mate voel jy nou	1 Verfris 10 Moeg	1	2	3	4	5	6	7	8	9	10
17	Tot watter mate voel jy nou	1 Energiek 10 Tam	1	2	3	4	5	6	7	8	9	10

PIPER MOEGHEIDSKAAL												
Antwoord asb. die vrae hieronder deur die skaal in die volgende kolom te gebruik		Skaal	Merk asb. die regte skaal									
			1	2	3	4	5	6	7	8	9	10
18	Tot watter mate voel jy nou	1 Geduldig 10 Ongeduldig	1	2	3	4	5	6	7	8	9	10
19	Tot watter mate voel jy nou	1 Ontspanne 10 Gespanne	1	2	3	4	5	6	7	8	9	10
20	Tot watter mate voel jy nou	1 Opgewek 10 Depressief	1	2	3	4	5	6	7	8	9	10
21	Tot watter mate voel jy nou	1 In staat om te konsentreer 10 Nie in staat om te konsentreer nie	1	2	3	4	5	6	7	8	9	10
22	Tot watter mate voel jy nou	1 In staat om te onthou 10 Nie in staat om te onthou nie	1	2	3	4	5	6	7	8	9	10
23	Tot watter mate voel jy nou jy kan	1 Helder dink 10 Nie helder dink nie	1	2	3	4	5	6	7	8	9	10
24	Oor die algemeen, wat glo jy is die mees direkte oorsaak van jou moegheid of wat dit vererger?											
25	Oor die algemeen, die beste ding wat jy gevind het wat jou moegheid verlig, is:											
26	Is daar enigiets anders wat jy wil byvoeg om jou moegheid beter aan ons te beskryf?											
27	Ondervind jy nou enige ander simptome?											

TOESTEMMINGSVERKLARING	
Biotransformasie en oksidatiewe stresstatusvaluasie	
1	Agtergrond en doel van die detoksifikasie en oksidatiewe stresvaluasie
<p>Detoksifikasie van eksogene en endogene toksiene is 'n natuurlike en kritiese biologiese proses wat uit verskeie biochemiese weë bestaan. Die effektiwiteit van hierdie weë varieer tussen individue en kan die gesondheid van 'n individu tot 'n groot mate beïnvloed. Op soortgelyke wyse verskil die balans tussen die vorming van vrye radikale en die antioksidantverdedigingsstelsel van die menslike liggaam om hierdie vrye radikale te kan hanteer. Vrye radikale kan onder sekere toestande verhoog – meestal as gevolg van endogene faktore – en die liggaam se vermoë om dit te hanteer aftekeer gesondheid en veroudering. Wanneer die antioksidantverdediging nie die vrye radikale in balans kan hou nie, verhoog oksidatiewe stres en word skade aan die liggaam veroorsaak. Hierdie twee prosesse, detoksifikasie en oksidatiewe stres, kan gemeet word in biologiese materiaal deur gebruik te maak van verskeie toetse en dit is nuttig om die effektiwiteit van hierdie gesondheidsverwante prosesse te bepaal. Dit kan ook help om te besluit of leefstylgewoontes soos voeding van 'n individu aangepas moet word om hierdie prosesse te ondersteun. Die kombinasie van toetse wat gedoen word op die voorsiene materiaal, stel dit ten doel om hierdie twee prosesse te evalueer.</p>	
2	Prosedures
2.1 Evaluering van detoksifikasie	
2.1.1	Twee speekselmonsters sal geneem word onderskeidelik twee en agt ure na kaffeïenbelading. Hierdie monsters sal gebruik word om Fase I van die detoksifikasieprofiel te ondersoek.
2.1.2	Een 10 uur urienmonster sal geneem word na die aspirien- en parasetamolbelading. Die urienmonster sal gebruik word om Fase II van die detoksifikasieprofiel te ondersoek.

2.2 Oksidatiewe stresevaluasie

- 2.2.1 Twee bloedmonsters sal gesamentlik geneem word tot 'n totaal van 15 ml bloed.
- 2.2.2 Die bloedmonsters sal verwerk word vir 'n reeks toetse wat merkers van vry-radikaal skade en antioksidantstatus bepaal.

2.3 Molekulêre genetiese toetsing

- 2.3.1 DNS kan moontlik uit bloedmonsters geïsoleer word vir navorsingsdoeleindes alleenlik. Dit sal behulpsaam wees in die identifikasie van genetiese en epigenetiese variasies wat 'n rol speel in biotransformasie, oksidatiewe stress en gebrekkige energiemetabolisme.

3 Risikos en moontlike ongemak vir die pasiënt / individu

Die normale risiko en moontlike ongemak wat ervaar word wanneer 'n bloedmonster geneem word.

4 Verklaring van konfidensialiteit

Inligting wat voorsien word sal as hoogs vertroulik hanteer word. Slegs individue van die navorsingsgroep en die verwysende geneesheer sal toegang hê tot die inligting. Data wat in wetenskaplike joernale gepubliseer word, sal geen inligting insluit wat 'n pasiënt of sy/haar familie kan identifiseer nie.

5 Onttrekkingsklousule

Ek verstaan dat ek ter enige tyd onttrekking aan die evaluasie kan versoek. My deelname of die van my kind is daarom vrywillig totdat ek andersins versoek.

6 Die bogenoemde projek is deeglik verduidelik en die volgende bykomende inligting is aan my uitgewys

- 6.1 Dat die bloed, speeksel en urienmonsters gebruik mag word vir alle toetse relevant tot die evaluering van detoksifikasiefunksie en oksidatiewe stresstatus en dat geen vergoeding vir hierdie materiaal voorsien sal word nie.
- 6.2 Dat die biologiese materiaal wat voorsien is, slegs gehou sal word by die Sentrum vir Menslike Metabonika, Noordwes-Universiteit, Potchefstroom, totdat ek ter enige tyd (skriftelik) versoek dat die materiaal vernietig word.
- 6.3 Dat die onttrekkingsklousule aan my verduidelik is en dat ek die implikasies daarvan verstaan.
- 6.4 Indien u enige verdere navrae het sien asb. kontakbesonderhede op p.4.

7 Verklaring van toestemming

Ek, _____
(volle name en van in drukskrif) gee hiermee toestemming tot:

- 7.1 deelname aan die bogenoemde evaluasie van detoksifikasie en oksidatiewe stres. Ek gee ook toestemming dat die volgende monsters gebruik kan word vir hierdie doeleindes en dat dit gestoor kan word so lank nodig mag wees vir verdere relevante toetse: (a) 15 ml veneuse bloedmonster wat by my geneem is soos gespesifiseer, (b) die urienmonster wat geneem is soos gespesifiseer en (c) die speekselmonsters wat geneem is soos gespesifiseer OF
- 7.2 deelname van my kind, _____
(volle name en van in drukskrif) aan die bogenoemde evaluasie van detoksifikasie en oksidatiewe stres. Ek gee ook toestemming dat die volgende monsters gebruik kan word vir hierdie doeleindes en dat dit gestoor kan word so lank nodig mag wees vir verdere relevante toetse:
- (a) 15 ml veneuse bloedmonster wat by die kind geneem hier bo geneem is soos gespesifiseer,
(b) die urienmonster wat geneem is soos gespesifiseer en
(c) die speekselmonsters wat geneem is soos gespesifiseer.

Ek verstaan dat ek / my kind deelneem aan die evaluasie. Ek bevestig dat ek ten volle kennis dra van die inhoud van hierdie vorm en dat ek die nodige toestemming gee deur die ondertekening daarvan.

Geteken te _____ (plek) op _____ (datum).

Handtekening _____ (Handtekening van ouer / voog – in die geval van minderjariges, moet 'n ouer / voog toestemming gee.)

Handtekening van verantwoordelike individu _____
(Individu wat die projek en toestemmingsverklaringvorm aan die deelnemer verduidelik het.)

Getuie 1: _____ Getuie 2: _____

<p>2.2 Oxidative stress evaluation</p> <p>2.2.1 Two blood samples will be taken simultaneously to a total of 15 ml blood.</p> <p>2.2.2 The blood samples will be processed for an array of tests that measures markers of free radical damage and antioxidant status.</p> <p>2.3 Molecular genetic testing</p> <p>2.3.1 DNA may be isolated from blood samples for research purposes only. This will help identify genetic and epigenetic variations that play a role in biotransformation, oxidative stress and energy metabolism deficiencies.</p>	<p>3 Risks and possible discomfort for the patient / individual</p> <p>The usual risk and possible discomfort experienced when a blood sample is obtained.</p>	<p>4 Declaration of confidentiality</p> <p>Information provided will be treated as highly confidential. Only individuals of the research group and the referring practitioner will have access to information. Data published in a scientific journal will include no information that could identify a patient or his/her family.</p>	<p>5 Withdrawal clause</p> <p>I understand that I may request withdrawal of the evaluation at any time. My participation or that of my child is therefore on a voluntary basis until I request otherwise.</p>	<p>6 The above-mentioned project was thoroughly explained and the following additional information pointed out to me</p> <p>6.1 That the blood, saliva and urine samples may be used for all relevant tests to evaluate detoxification function and oxidative stress status and that no compensation for this material will be provided.</p> <p>6.2 That the biological material provided will reside only at the Centre for Human Metabonomics, North-West University, Potchefstroom, until I request (in writing) the destruction of this material at any time.</p> <p>6.3 That the withdrawal clause was explained to me and that I understand its implications.</p> <p>6.4 If you have any further enquiries please refer to p.4 for our contact details.</p>	<p>7 Declaration of consent</p> <p>7.1 participation in the above-mentioned evaluation of detoxification and oxidative stress. I also consent that the following samples may be used for further relevant tests: (a) 15 ml venous blood sample which was taken from me as specified, (b) the urine sample which was taken as specified, and (c) the saliva samples which were taken as specified OR</p> <p>7.2 participation of my child, (print full name and surname) in the above-mentioned evaluation of detoxification and oxidative stress. I also consent that the following samples may be used for these purposes and to storage thereof until such time as it is needed for further relevant tests: (a) 15 ml venous blood sample which was taken from the child named above as specified, (b) the urine sample which was taken as specified, and (c) the saliva samples which were taken as specified</p> <p>I understand that I or my child are participating in the evaluation. I hereby acknowledge that I understand and are fully aware of the content of the forms and by signing this form I give the necessary permission.</p> <p>Signed at _____ (place) on _____ (date).</p> <p>Signature _____ (A parent/guardian must give consent in the case of minors.)</p> <p>Signature of responsible individual: _____ Individual who explained the project and informed consent form to the participant</p> <p>Witness 1: _____ Witness 2: _____</p>
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INFORMED CONSENT	
Biotransformation and oxidative stress status evaluation	
1	Background and aim of the detoxification and oxidative stress evaluation
<p>Detoxification of exogenous and endogenous toxins is a natural and critical biological process consisting of several biochemical pathways. The effectiveness of these pathways varies between individuals and can significantly affect the health of an individual. Similarly, the steady state between the formation of free radicals and the antioxidant defence system of the human body to cope with these free radicals, which may elevate under certain conditions mostly as a result of endogenous factors, also varies between individuals and affects health and ageing. When the antioxidant defence cannot keep the free radicals at a steady state, oxidative stress increases and incurs damage to the body. These two processes, detoxification and oxidative stress, can be measured in biological material using several tests and are useful to estimate the effectiveness of these health-related processes. It may also help decide if lifestyle habits, such as nutrition, of an individual should be adapted to support these processes. The combination of tests that is done on the material provided aims to evaluate these two processes.</p>	
2	Procedures
<p>2.1 Evaluation of detoxification</p> <p>2.1.1 Two saliva samples will be taken two and eight hours after caffeine loading respectively. These samples will be used to assess Phase I of the detoxification profile.</p> <p>2.1.2 One 10 hour urine sample will be taken after the aspirin and paracetamol loading. The urine sample will be used to assess Phase II of the detoxification profile.</p>	

PIPER FATIGUE SCALE											
Please answer the questions below using the scale measurement in the next column											
Scale measurement											
Please mark appropriate scale											
19	To what degree are you now feeling	1 Stressed	2	3	4	5	6	7	8	9	10
20	To what degree are you now feeling	1 Exhausted	2 Depressed	3	4	5	6	7	8	9	10
21	To what degree are you now feeling	1 Able to concentrate	2 Unable to concentrate	3	4	5	6	7	8	9	10
22	To what degree are you now feeling	1 Able to remember	2 Unable to remember	3	4	5	6	7	8	9	10
23	To what degree are you now feeling	1 Able to think clearly	2 Unable to think clearly	3	4	5	6	7	8	9	10
24	Overall, what do you believe is most directly contributing to or causing your fatigue?										
25	Overall, the best thing you have found to relieve your fatigue is:										
26	Is there anything else you would like to add that would describe your fatigue better to us?										
27	Are you experiencing any other symptoms right now?										







PIPER FATIGUE SCALE															
Please answer the questions below using the scale measurement in the next column						Scale measurement									
Please mark appropriate scale						1	2	3	4	5	6	7	8	9	10
1	How long have you been feeling fatigue? (Check one response only): 1 - not feeling fatigue, 2 - minutes, 3 - hours, 4 - days, 5 - weeks, 6 months, 7 - other (please describe.....)					1	2	3	4	5	6	7	8	9	10
2	To what degree is the fatigue you are feeling now causing you distress?					1	2	3	4	5	6	7	8	9	10
3	To what degree is the fatigue you are feeling now interfering with your ability to complete your work or school activities?					1	2	3	4	5	6	7	8	9	10
4	To what degree is the fatigue you are feeling now interfering with your ability to socialise with your friends?					1	2	3	4	5	6	7	8	9	10
5	To what degree is the fatigue you are feeling now interfering with your ability to engage in sexual activity?					1	2	3	4	5	6	7	8	9	10
6	Overall, how much is the fatigue which you are now experiencing interfering with your ability to engage in the kind of activities you enjoy doing?					1	2	3	4	5	6	7	8	9	10
7	How would you describe the degree of intensity or severity of the fatigue which you are experiencing now?					1	2	3	4	5	6	7	8	9	10
8	To what degree would you describe the fatigue you are experiencing now as being pleasant					1	2	3	4	5	6	7	8	9	10
9	To what degree would you describe the fatigue you are experiencing now as being agreeable					1	2	3	4	5	6	7	8	9	10
10	To what degree would you describe the fatigue you are experiencing now as being destructive					1	2	3	4	5	6	7	8	9	10
11	To what degree would you describe the fatigue you are experiencing now as being positive					1	2	3	4	5	6	7	8	9	10
12	To what degree would you describe the fatigue you are experiencing now as being abnormal					1	2	3	4	5	6	7	8	9	10
13	To what degree are you now feeling					1	2	3	4	5	6	7	8	9	10
14	To what degree are you now feeling					1	2	3	4	5	6	7	8	9	10
15	To what degree are you now feeling					1	2	3	4	5	6	7	8	9	10
16	To what degree are you now feeling					1	2	3	4	5	6	7	8	9	10
17	To what degree are you now feeling					1	2	3	4	5	6	7	8	9	10
18	To what degree are you now feeling					1	2	3	4	5	6	7	8	9	10

0	1	2	3	4									
0	1	2	3	4	Chronic coughing	MOUTH/ THROAT	Stuffy nose	0	1	2	3	4	
0	1	2	3	4			Sinus problems	0	1	2	3	4	
0	1	2	3	4			Hay fever	0	1	2	3	4	
0	1	2	3	4			Sneezing attacks	0	1	2	3	4	
0	1	2	3	4			Excessive mucus formation	0	1	2	3	4	
0	1	2	3	4			HEART	Irregular or skipped heartbeat	0	1	2	3	4
0	1	2	3	4				Rapid or pounding heartbeat	0	1	2	3	4
0	1	2	3	4				Chest pain	0	1	2	3	4
0	1	2	3	4				Excessive sweating	0	1	2	3	4
0	1	2	3	4			HEART	Mood swings	0	1	2	3	4
0	1	2	3	4				Depression	0	1	2	3	4
0	1	2	3	4				Anger, irritability, aggressiveness	0	1	2	3	4
0	1	2	3	4				Anxiety, fear, nervousness	0	1	2	3	4
0	1	2	3	4				Difficulty in making decisions	0	1	2	3	4
0	1	2	3	4	MIND	Stuttering or stammering	0	1	2	3	4		
0	1	2	3	4		Slurred speech	0	1	2	3	4		
0	1	2	3	4		Learning disabilities	0	1	2	3	4		
0	1	2	3	4		Poor memory	0	1	2	3	4		
0	1	2	3	4	MIND	Confusion, poor comprehension	0	1	2	3	4		
0	1	2	3	4		Poor concentration	0	1	2	3	4		
0	1	2	3	4		Poor physical coordination	0	1	2	3	4		
0	1	2	3	4		WEIGHT	Underweight	0	1	2	3	4	
0	1	2	3	4			Water retention	0	1	2	3	4	
0	1	2	3	4			Compulsive eating	0	1	2	3	4	
0	1	2	3	4		WEIGHT	Excessive weight	0	1	2	3	4	
0	1	2	3	4			Crawling certain foods	0	1	2	3	4	
0	1	2	3	4	Binge eating / drinking		0	1	2	3	4		
0	1	2	3	4	Arthritis		0	1	2	3	4		
0	1	2	3	4	MUSCLE/ JOINT		Pain or aches in joints	0	1	2	3	4	
0	1	2	3	4		Stiffness or limitation of movement	0	1	2	3	4		
0	1	2	3	4		Pain or aches in muscles	0	1	2	3	4		
0	1	2	3	4		Feeling of weakness or tiredness	0	1	2	3	4		
0	1	2	3	4		Migratory arthralgia - pain in different joints at different times as if pain is travelling	0	1	2	3	4		
0	1	2	3	4		DIGESTIVE TRACT	Constipation	0	1	2	3	4	
0	1	2	3	4			Diarrhea	0	1	2	3	4	
0	1	2	3	4			Bloated feeling	0	1	2	3	4	
0	1	2	3	4			Belching, passing excessive gas	0	1	2	3	4	
0	1	2	3	4			Heartburn	0	1	2	3	4	
0	1	2	3	4	Intestinal / stomach pain		0	1	2	3	4		
0	1	2	3	4	OTHER		Frequent illness	0	1	2	3	4	
0	1	2	3	4			Frequent or urgent urination	0	1	2	3	4	
0	1	2	3	4			Genital itch or discharge	0	1	2	3	4	
0	1	2	3	4			Painful lymph nodes (cervical, axillary, inguinal, or supraclavicular)	0	1	2	3	4	

MEDICAL SYMPTOMS QUESTIONNAIRE																																																							
HEAD	Fairness	0	1	2	3	4	Waterly or itchy eyes	0	1	2	3	4																																											
													Headaches	0	1	2	3	4																																					
Dizziness	0	1	2	3	4	Bags or dark circles under eyes	0	1	2	3	4																																												
												Insomnia	0	1	2	3	4	Blurred or tunnel vision (not including near- or far-sightedness)	0	1	2	3	4																																
EARS	Tchy ears	0	1	2	3	4	Acne	0	1	2	3													4																															
												Ear aches, ear infections	0	1	2	3	4	Hives, rashes, dry skin	0	1	2	3	4																																
																									Drainage from ear	0	1	2	3	4	Hair loss	0	1	2	3	4																			
																																					Ringing in ears, hearing loss	0	1	2	3	4	Flushing, hot flashes	0	1	2	3	4							
																																																	SKIN	Excessive sweating	0	1	2	3	4
NBI: POINT SCALE: HOW OFTEN THE FOLLOWING SYMPTOMS - IN THE LAST 30 DAYS: Occasionally, effect is not severe Occasionally, effect is severe Frequently, effect is severe																																																							
NBI: POINT SCALE: HOW OFTEN THE FOLLOWING SYMPTOMS - IN THE LAST 30 DAYS: Never / Almost never Occasionally, effect is not severe Occasionally, effect is severe Frequently, effect is severe																																																							
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LIFESTYLE QUESTIONNAIRE											
1	Do you use tobacco products?	No	Yes								
2	Do you live or work with someone who smokes in your presence?	No	Yes								
3	How often do you eat fast foods	Not often	Weekly	Daily							
4	How many alcoholic drinks do you have per week	< 1	1 - 5	> 5							
5	Do you ever use toxic chemicals such as insect sprays or herbicides?	No	Yes								
6	Have you taken any prescription medication two or more times in the past year?	No	Yes								
7	Do you take any chronic medication? Please specify if yes.	No	Yes								
8	Do you take birth-control or hormone replacement medication? Please specify if yes.	No	Yes								
9	Do you suffer from gastrointestinal problems?	No	Yes								
10	Are you often tired for no reason? If yes, please complete Piper Fatigue form p. 7.	No	Yes								
11	Diagnosed with medical condition? Please specify if yes.	No	Yes								
Please specify:											

INSTRUCTIONS - Follow these steps to collect your saliva:

	<p>STEP 1: Remove only the top cap of the tube to expose the cotton swab. Do not remove the insert (smaller internal container) housing the cotton swab.</p>
	<p>STEP 2: Hold the tube to your lips, and tip the tube so that the swab slides into your mouth. Do not touch the cotton swab with your fingers.</p>
	<p>STEP 3: Gently roll the swab around in your mouth for 5 minutes or until you can no longer prevent swallowing excess saliva (the cotton swab should be saturated).</p>
	<p>STEP 4: Place the tube to your lips and allow the swab to slide back into the insert (small internal vessel) and firmly close with the top cap/stopper. Do not touch the swab with your fingers. The salivette should now look exactly as it did when you started, with the cap, insert, cotton swab and centrifuge tube.</p>
	<p>STEP 5: On the supplied labels, write your full name, date of birth, date of collection and collection time and attach it to the correct containers.</p>
	<p>STEP 6: Freeze the salivette tubes and take it to the practitioner or laboratory within 3 days.</p>

C. IMPORTANT PAPERWORK TO BE COMPLETED

PATIENT INFORMATION			
All information from p.4 - 9 must be completed including weight, height and referring doctor.			
Tests requested		Detoxification profile:	
Monster info		Blood:	Saliva:
		Urine:	
Name:			
Surname:			
Date of birth:			
ID:	Sex:		
Cell:	Weight:		
Tel:	Height:		
Postal address:			
Has anyone in the family been tested? If so, provide us with full names and family connection:			
Referring doctor:			
Medical aid information		Name of medical aid:	
		Guarantor I.D. no:	
		Medical aid number:	
		Name of main member:	
ENQUIRIES			
Human Metabolomics, North-West University, Potchefstroom Campus. Enquiries: Cecile Cooke , tel 018 299 2042, fax: 087 231 5527, email: cecile.cooke@nwu.ac.za Postal address: Biochemistry, Private bag X6001, Potchefstroom, 2520			







Pre-test instructions

During this test a normal diet can be assumed except for the following dietary restrictions.

DO NOT consume the following during the test:

- Alcohol, coffee, tea, cocoa, chocolate, cola soft drinks, rootbros tea, health tea;
- Medication containing caffeine, salicylates (aspirin) or paracetamol;
- Stone fruits (eg. sultanas, currants, raisins etc);
- Nuts and seeds, peppermint or liquorice (eg. sweets, lollies, gums, plants/tea);
- Spices (eg. curry, dill, oregano, paprika etc);
- Brassica vegetables like broccoli, cabbage, brussels sprouts, cauliflower and tomato.

INSTRUCTIONS

Time	Use	Steps to be taken
1		Collect an early morning baseline urine sample in the small urine sample container. All urine samples must be frozen as soon as possible.
2		Take the caffeine tablet before breakfast.
3		Collect the 1st saliva sample. [Please read detailed instructions on next page]
PLEASE SEE DIRECTIONS ON NEXT PAGE		
4		Collect the 2nd saliva sample (see above).
5		Cease eating and drinking (except water). Empty bladder. Take the two aspirin and two paracetamol tablets.
6	 21:00 - 07:00	Collect all overnight urine until 07:00 the next morning in the 1 L container. All urine samples must be frozen as soon as possible. Please note: bottle has a cap and a seal.
7	Must be done by Pathologists	Collect blood sample in three tubes: two containing EDTA (purple top) and one clotted tube (yellow top). This will be done at the pathology branch when the frozen saliva and urine samples are brought back. Not necessary to fast.
8		Return all samples in the extra plastic bag. Place the blue booklet in the document pouch attached to the plastic bag. Remove strip to seal the document pouch.

Before saliva collection make sure of the following directions:

1. Collect saliva at the specific time(s) listed by your physician.
2. Do not eat or drink anything for at least 30 minutes before collecting saliva.
3. Avoid activities that may cause your gums to bleed – do not brush or floss.
4. Remove lipstick and lip balm before collection.

How to collect saliva using the salivettes

Saliva should be collected at the precise time(s) specified by your practitioner. The provided Salivette, is a device made specifically for the purpose of collecting saliva. Please read the following directions carefully before starting your collection.

PLEASE NOTE – SALIVETTES ARE NOT INTENDED FOR USE WITH CHILDREN UNDER THE AGE OF THREE.



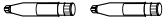






CHILDREN UNDER THE AGE OF TEN SHOULD HAVE ADULT SUPERVISION.

aspirin and paracetamol in safe doses and samples of blood, urine and saliva are collected. This test is unique because Phase I and II biotransformation pathways as well as the oxidative stress status and antioxidant capacity are assessed. Phase I activity is tested by means of the caffeine clearance test, and in Phase II the production of four conjugates are

determined. The ratio between the activities of the two phases is also calculated to detect imbalances. Blood samples are used to determine the oxidative stress status and antioxidant capacity. This data can then be correlated with the results of the biotrans-

formation capacity test. Aspirin and paracetamol are taken orally to challenge the liver's Phase I and Phase II biotransformation capacity. Saliva and urine are analysed to determine how well the liver can convert and clear toxins from the body.

The provided kit consists of the following:

Description	Amount	Sample
One 1 L urine container	1	
One small urine container	1	
Two saliva collection tubes (salivettes)	2	
One 150 mg caffeine tablet	1	
Two 300 mg aspirin tablets	2	
Two 500 mg paracetamol tablets	2	
Labels for all containers are supplied and should be completed with the collection time, name and date and applied to the correct containers.	1	
User manual containing important forms that must be completed and send back.	1	
Extra plastic bag with document pouch attached to the outside	1	

A. BIOTRANSFORMATION AND OXIDATIVE STRESS STATUS PROFILE

Background information

In today's world of processed food and pollution, toxic substances exist almost everywhere. They are in the food we eat, the water we drink, and the air we breathe. It is estimated that 60 to 80 percent of all cancers are a direct result of these environmental toxins. Environmental toxins may also play a role in the development of neurological disorders such as Alzheimer's and Parkinson's disease, and in mental or behavioural disorders such as depression, anxiety, schizophrenia and attention deficit disorder. Since the nervous system is intricately connected to the immune system, toxins also affect our immune function. Thus, our very ability to think and feel normal can be drastically affected by exposure to toxins.

The liver is a key organ in your body's self-defence system. Inside the liver cells there are sophisticated mechanisms that have evolved over millions of years to break down toxic substances into forms which your body can safely eliminate. The liver uses two mechanisms called Phase I and Phase II biotransformation, designed to convert fat soluble toxins into water soluble substances so that your body can easily excrete these substances via watery fluids such as bile and urine.

In Phase I, your body's enzymes convert a toxin into a substance which can be further metabolised in Phase II. This is achieved by various chemical reactions and during this process, free radicals are produced which can damage the liver cells. Antioxidants (such as vitamin C and E) can reduce the damage caused by free radicals, but if antioxidants are low and toxin exposure high, these toxins become more dangerous and cannot be eliminated as rapidly or as completely. Slower biotransformation results in more toxic substances circulating in the body which are eventually stored for years in fatty tissue, being released during times of exercise, stress or fasting. During the release of these toxins, symptoms such as headaches, poor memory, stomach pain, nausea, fatigue, dizziness and palpitations may occur.

Phase II is also called the conjugation pathway whereby other enzymes in liver cells add another substance to metabolites from Phase I. This makes the toxin water soluble and less harmful, so it can then be excreted from the body via watery fluids such as bile or urine. For efficient Phase II biotransformation, the liver cells require sulphur-containing amino acids such as taurine and cysteine. The nutrients glycine, glutamine, and choline and inositol are also required for efficient Phase II biotransformation. Major Phase II pathways include glutathione conjugation, sulphate conjugation, glycine conjugation and glucuronide conjugation.

A number of conditions affect how well the liver performs its detoxifying duties. Repeated exposure to toxins in food, water and the environment increases the biotransformation burden and if the Phase I and II biotransformation pathways become overloaded, there will be a build-up of toxins in the body.

Biotransformation and oxidative stress

status test

One method to assess the liver's detoxifying ability is to examine the overall state of your health. Toxic substances are contributing factors in a wide range of health problems. There are also several different liver tests (such as liver enzyme analysis) which look for clinical evidence of existing liver damage. Unfortunately, by the time these tests register abnormal, liver damage is already present.

A test to assess the liver's biotransformation function can be done. During this test the liver is challenged by common substances such as caffeine,

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IMPORTANT:

Please complete ALL the information fields on the questionnaires from p. 4 – 9 in the information booklet and submit together with all the samples taken (saliva and urine) on the day of collecting your blood sample.



BIOTRANSFORMATION AND
OXIDATIVE STRESS STATUS PROFILE

BOSS

USER MANUAL



the key to a healthier life

BIOTRANSFORMATION

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