NATIONAL INSTITUTE OF MEDICAL HERBALISTS

Nutri Link
Linking Science and Nutrition

Food Sensitivity Testing

Presented for the National Institute of Medical Herbalists

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Functional Lab Testing

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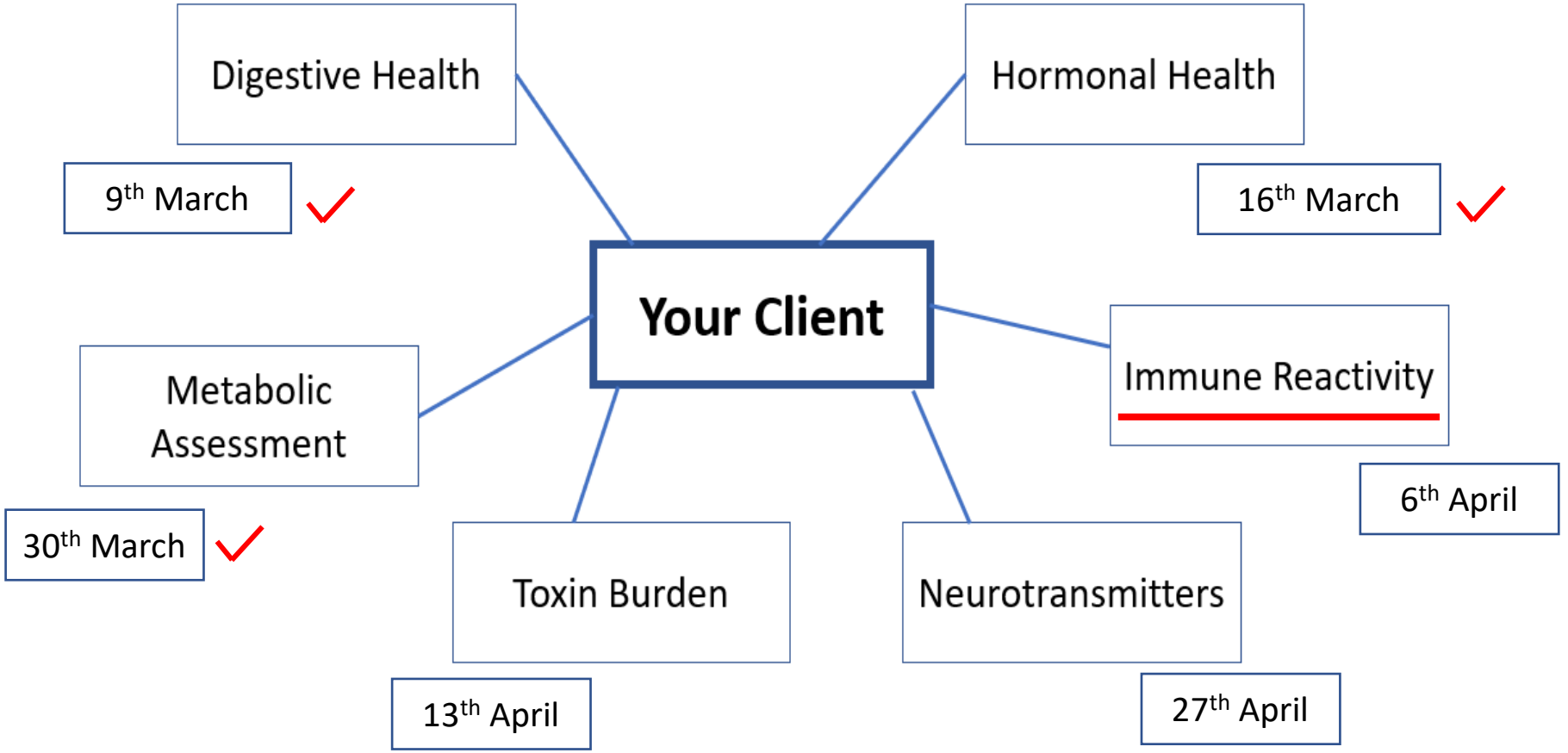

Functional Hormonal Tests – Learning Objectives

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1. Learn about the difference between food allergy, sensitivity & intolerance
2. Learn how the food sensitivity tests work, i.e. what is analysed
3. Learn about the relevance of food sensitivity testing
4. Learn about the importance of food rotation & diversity
5. Learn about how to improve mucosal immunity, i.e. SIgA
6. Increase your confidence in recommending & interpreting food sensitivity tests

Antony Haynes has been using Food Sensitivity Tests for over 25 years in clinical practice

Food Sensitivity Testing – Specimen Requirements

- Some labs require a blood draw with a test tube of blood needed, & others require much less (i.e. finger pricks of blood).
- If you have been excluding foods for more than 30 days they may not appear as positive in the test results.

Food Allergy, Sensitivity vs Food Intolerance

- The specific terms food allergy, hypersensitivity and intolerance are all commonly used interchangeably, with some evident confusion regarding the actual difference between them.
- Essentially, these terms all relate to an adverse physiological response to a particular food; however the mechanisms by which this occurs are very specific to the individual type of food sensitivity in question. These reactions can be categorised as either immunological (IgE or IgG mediated) or non-immunological in nature and can initiate an immediate (minutes to hours) or delayed (several hours to days) response to a particular food.
- Identifying the specific reactive mechanism triggered by the ingestion of this food is vital to understanding the management and implementation of appropriate dietary interventions to limit potentially unpleasant (and in some cases, life threatening) symptoms.

Food Allergy, Sensitivity vs Food Intolerance

- **Food Allergy** is an IgE mediated immune reaction to a food protein (almost always a proteinous component of food).
- **Food Sensitivity** is a non-IgE-mediated, usually IgG-mediated, delayed immune response to a food protein.
- **Food Intolerance** is the inability to properly digest a food.

Food Allergy vs Food Intolerance

Intolerances

Defects of carbohydrate splitting enzymes

(causes digestive problems)

Lactose-intolerance:	Lactase-deficiency
Fructose-intolerance:	Transport protein GLUT-5 deficiency or inactivity
Histamine-intolerance:	Deficiency of histamine removing enzyme Diaminoxidase (DAO)

Allergies

Formation of anti-bodies against protein fragments

(causes allergic symptoms)

Milk-allergy:	AB against casein
Apple-allergy:	AB against apple proteins (under the skin)
Gluten-allergy:	AB against cereal proteins

Food Sensitivity

- Food Sensitivity can be assessed and tested via IgG blood tests.
- There are some Food Sensitivity tests that assess both IgA and IgG reactivity to foods (i.e. Cyrex Labs).
- Food Sensitivity testing has been seen as controversial by some.

Food Allergy, Sensitivity vs Food Intolerance

- Many practitioners and even more patients can sometimes confuse adverse reactions to foods as food allergies, but these reactions are non-immunologic. Non-immunologic food reactions can be metabolic (lactose intolerance), pharmacologic (chemical migraine triggers such as tyramine, aspartame, monosodium glutamate, nitrates/nitrites, alcohol, coffee, and chocolate), or toxic (food poisoning) in origin.
- For example lactose intolerance can be managed with replacement of the enzyme lactase.

Food Allergy, Sensitivity vs Food Intolerance

Virtually any food can cause an allergic reaction. The most common allergens in childhood are:

- cow's milk (2.5%),
- egg (1.6%),
- peanut,
- soy,
- wheat,
- tree nuts,
- fish,
- and shellfish.

In adults, the most common allergens are:

- peanut,
- tree nuts,
- fish,
- and shellfish.

Cross Reactivity i

- Occasionally reactions with foods occur, although a person is convinced of never having eaten them. Once the diet has been checked and no ‘hidden’ sources of the food can be found one of the reason for this anomaly can be explained by the presence of what is known as a cross reaction.

- Cross reactions occur as the antibody recognises not only the antigen for which it was originally formed, but also other antigens which are very similar. This occurs because some foods and pollen, although they are not directly related to each other have identical molecules or identical parts of molecules. These regions are called epitopes and can be recognised by an antibody. This phenomenon has been observed for a long time, and common epitopes are identified more and more by means of modern molecular diagnostics.

Cross Reactivity ii

- If there is a homology of over 70% i.e. congruence between various allergens of over 70%, cross reactions can occur. A clinically relevant cross reaction is possible between 40% and 70%.
- A cross reaction therefore only occurs if a person is sensitised to a molecule which is also found in something else they are exposed to.
- As already mentioned, this could include food and pollen, but also latex and insects. Other factors which contribute to whether a cross reaction becomes clinically manifest include:

- The concentration of the allergen
- The expression of the allergen depending on status of maturity
- Temperature instability of the allergen, such as destruction through heating
- Geographic factors, biodiversity
- Cofactors such as physical exertion, taking of medication

Example Cross Reactivity - iii

- A lot of people have a type I allergy to tropomyosin, the main allergen found in the dust mite. To help them overcome their allergy many will be desensitised by allergologists and some will also manage to overcome it without medication.

- It is common to both patient groups that they form IgG antibodies - namely IgG4 - against the dust mites. This IgG4 is produced in very high concentrations and can be detected in the food sensitivity test.

- Tropomyosin however, is not only found in dust mites, but also in all invertebrates albeit in different concentrations. Commonly eaten invertebrates include mussels, oysters, scampi, squid, shrimps as well as lobsters. Therefore if someone is sensitive to dust mites they can also react to oysters. This could then be picked up in their Food Sensitivity results showing a positive reading for oyster even though they may never have eaten it.

Most Well-Known Cross Reactions - v

- **Mugwort (Artemisia Vulgaris):** Aniseed, apple, artichoke, camomile, cardamom, carrots, celeriac, cinnamon, coriander, cucumber, cumin, fennel, garlic, ginger, grape, kiwi, lychee, mango, melon, nutmeg, oregano, paprika (spice), parsley, pepper (white & black), potato, sunflower seed and tomato.
- **Birch Tree (Betula spp.):** Almond, apple, apricot, carrots, cherry, fig, hazelnut, kiwi, lychee, nectarine, pear and plum.
- **House Dust Mite/Cockroaches/Insects:** Crab, crayfish, lobster, mussels (blue), octopus, oysters, scallop, shrimp/prawn, snails, squid and cuttlefish.
- **Latex:** Avocado, banana, cassava, fig, kiwi, mango, melon, papaya, peach, potato, spinach, sweet chestnut and tomato.
- **Pollens:** Pineapple, melon, watermelon, tomato, banana, orange, pea and tree nuts.

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Exercise, Stress Response
&
Food Sensitivity

Intense Exercise and the Stress Response

- Factors that are often found to affect physical performance, including fatigue, gastrointestinal distress, food intolerance and mood disturbance are inherently linked and notably common amongst athletes, particularly at the elite level.
- The psychosocial and physical demands which go hand in hand with intense exercise are additional stressors. Anything that initiates a stress response activates the sympathetic-adrenomedullary and hypothalamus-pituitary-adrenal (HPA) axes.
- This means the release of stress and catabolic hormones, as well as inflammatory cytokines and microbial molecules, all of which can negatively influence gut health and can therefore affect performance (Clark and Mach, 2016).

Intense Exercise and Digestive Function

- Strenuous and exhaustive exercise stimulates the production of heat shock proteins that directly affect gut barrier integrity by opening up tight junctions, causing increased intestinal permeability (known as a “leaky gut”) and negatively impacting gut health (Ballantyne, 2017).
- The stress hormone cortisol has also been suggested to affect intestinal integrity, making the gut more permeable to potential toxins (Kelly et al, 2015). Stimulation of the HPA axis has been shown to reduce gut motility, with chronic stress also being associated with a decrease in mucus production in the gut and inhibition of gallbladder function (Chang et al 2014, Rodiño-Janeiro et al 2015, Earley et al 2003).
- Furthermore, adrenal steroid hormones including cortisol have been shown to impede digestion by reducing pancreatic enzyme secretion (Beaudoin et al, 1986) and research has indicated that high stress may even directly alter the gut microbiome (Knowles et al, 2008).

Intense Exercise and Digestive Function

- In order to prioritise blood flow to the heart and skeletal muscles during intense exercise, blood is diverted away from the gastrointestinal tract and other visceral organs (Brouns and Beckers, 1993).
- This lack of sufficient blood flow to the gut can further disrupt the intestinal barrier and also increases intestinal permeability (Lambert, 2008).

Intestinal permeability, IgG food intolerance and sport performance

- Intestinal barrier dysfunction increases the risk of uncontrolled immunological reactions to food-derived antigens, as well as environmental toxins and microbial antigens, by enabling these particles that would normally remain within the gut, to penetrate the intestinal lumen and interact with the mucosal-associated immune system (Rodiño-Janeiro et al, 2015).
- This stimulates the production of IgG antibodies to those specific food antigens. If food-specific antibody levels continue to rise, it may eventually result in an IgG mediated food intolerance to that particular food with subsequent symptoms experienced as a result (Cai et al, 2014)

Intestinal permeability, IgG food intolerance and sport performance

- The results of a recent longitudinal study, showed that elimination diets based on IgG mediated food intolerance, led to a significant improvement in gastrointestinal discomfort symptoms and sport performance (Kostic-Vucicevic et al, 2017).
- This is the first study of its kind to investigate the potential performance benefits to athletes, in identifying food intolerances through the measurement of food-specific IgG antibodies and then using this information to adjust their diets accordingly.
- While more studies are required, this study shows the potential benefit of using IgG food intolerance testing as an additional diagnostic tool to further enhance an individual's physical performance, which for an athlete of course, is the ultimate goal.

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Real Life Example of a CNS (Cambridge Nutritional Sciences) FoodPrint40+ Lab test (£111.60)

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Patient results p1/2

ELEVATED (≥30 U/ml)		BORDERLINE (24-29 U/ml)		NORMAL (≤23 U/ml)	
DAIRY / EGG					
105	Egg White	79	Milk (Cow)		
40	Egg Yolk	44	Milk (Goat)		
GRAINS (Gluten-Containing)*					
73	Barley	40	Gliadin*	<15	Rye
23	Durum Wheat	98	Oat	40	Wheat
GRAINS (Gluten-Free)					
53	Corn (Maize)	63	Rice		
FRUIT					
<15	Apple	<15	Grapefruit	<15	Pineapple
<15	Avocado	<15	Lemon	16	Raspberry
<15	Blackberry	19	Lime	<15	Strawberry
<15	Cherry	71	Orange		
<15	Grape (Black/Red/White)	<15	Pear		
VEGETABLES					
60	Bean (Red Kidney)	34	Cabbage (Savoy/White)	41	Potato
67	Bean (White Haricot)	<15	Carrot	68	Soya Bean
<15	Broccoli	<15	Cauliflower		
<15	Brussel Sprout	61	Pea		
FISH / SEAFOOD					
25	Cod	17	Oyster	53	Trout
<15	Crab	24	Plaice	23	Tuna
32	Haddock	22	Salmon		
<15	Lobster	<15	Shrimp/Prawn		
MEAT					
<15	Beef	<15	Lamb	<15	Turkey
<15	Chicken	<15	Pork		
HERBS / SPICES					
<15	Chilli (Red)	<15	Ginger	<15	Peppercorn (Black/White)
<15	Garlic	47	Mustard Seed		
NUTS / SEEDS					
54	Almond	62	Cashew Nut	56	Peanut
52	Brazil Nut	65	Hazelnut	72	Pistachio
MISCELLANEOUS					
<15	Mushroom	46	Yeast (Baker's)	52	Yeast (Brewer's)

* Gliadin (gluten) is tested separately to the gluten-containing grains. If your Test Report shows an elevated reaction to gliadin, it is important to eliminate consumption of foods that contain these grains, even if the grain results are not elevated. Please refer to the Patient Guidebook for further information.

Food Print 40+ (CNS)

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ELEVATED FOODS (≥30 U/ml)					
105	Egg White	62	Cashew Nut	46	Yeast (Baker's)
98	Oat	61	Pea	44	Milk (Goat)
79	Milk (Cow)	60	Bean (Red Kidney)	41	Potato
73	Barley	56	Peanut	40	Egg Yolk
72	Pistachio	54	Almond	40	Gliadin*
71	Orange	53	Corn (Maize)	40	Wheat
68	Soya Bean	53	Trout	34	Cabbage (Savoy/White)
67	Bean (White Haricot)	52	Brazil Nut	32	Haddock
65	Hazelnut	52	Yeast (Brewer's)		
63	Rice	47	Mustard Seed		

BORDERLINE FOODS (24-29 U/ml)			
25	Cod	24	Plaice

NORMAL FOODS (≤23 U/ml)					
23	Durum Wheat	<15	Pear	<15	Lobster
23	Tuna	<15	Rye	<15	Chicken
22	Salmon	<15	Shrimp/Prawn	<15	Pineapple
19	Lime	<15	Garlic	<15	Pork
17	Oyster	<15	Grape (Black/Red/White)	<15	Beef
16	Raspberry	<15	Carrot	<15	Blackberry
<15	Apple	<15	Cauliflower	<15	Chilli (Red)
<15	Broccoli	<15	Peppercorn (Black/White)	<15	Crab
<15	Ginger	<15	Strawberry	<15	Lemon
<15	Cherry	<15	Turkey	<15	Lamb
<15	Grapefruit	<15	Avocado		
<15	Mushroom	<15	Brussel Sprout		

Patient results p2/2

Real Life Example of a Cyrex Lab test
Array 10 - Food Immune Reactivity Screen
($505 = £374)

TEST	RESULT			
Array 10 - Food Immune Reactivity Screen **	**IN RANGE (Normal)**	**EQUIVOCAL***	**OUT OF RANGE**	**REFERENCE** (ELISA Index)
DAIRY and EGGS, Modified				
Egg White, cooked		1.15		0.1-1.6
Egg Yolk, cooked		1.65		0.1-1.7
Goat's Milk	1.08			0.1-1.9
Soft Cheese + Hard Cheese	0.71			0.1-1.7
Yogurt	0.99			0.1-2.0
GRAINS, Raw and Modified				
Rice, white + brown, cooked			1.96	0.1-1.3
Rice Cake		1.67		0.2-1.8
Rice Protein	1.22			0.2-1.7
Rice Endochitinase	1.20			0.2-1.7
Wild Rice, cooked	0.92			0.1-1.3
Wheat + Alpha-Gliadins	1.07			0.2-1.9
BEANS and LEGUMES, Modified				
Black Bean, cooked	1.30			0.3-2.1
Bean Agglutinins	0.98			0.3-1.9
Dark Chocolate + Cocoa			1.61	0.2-1.2
Fava Bean, cooked	1.12			0.3-1.5
Garbanzo Bean, cooked	0.79			0.2-1.8
Kidney Bean, cooked			2.34	0.3-1.5
Lentil, cooked	0.75			0.3-2.0
Lentil Lectin	0.98			0.2-1.9
Lima Bean, cooked	1.08			0.1-1.8
Pinto Bean, cooked	1.77			0.4-2.4
Soybean Agglutinin	0.77			0.1-1.7
Soybean Oleosin + Aquaporin	1.04			0.2-1.8

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Patient results p1/7

Soy Sauce, gluten-free		1.37		0.2-1.9
Tofu	0.92			0.2-1.4
NUTS and SEEDS, Raw and Modified				
Almond	0.69			0.2-1.8
Almond, roasted	0.52			0.2-2.0
Brazil Nut, raw + roasted	0.83			0.1-1.8
Cashew	0.56			0.2-1.5
Cashew, roasted	0.90			0.2-2.3
Cashew Vicilin	0.78			0.3-1.7
Chia Seed	0.97			0.2-1.7
Flax Seed	0.56			0.1-1.3
Hazelnut, raw + roasted	1.12			0.1-1.7
Macadamia Nut, raw + roasted	1.11			0.3-2.3
Mustard Seed	0.81			0.4-1.5
Pecan, raw + roasted			1.65	0.3-1.5
Peanut, roasted	0.55			0.2-1.4
Peanut Butter	0.70			0.2-1.9
Peanut Agglutinin	1.18			0.3-1.9
Peanut Oleosin		1.66		0.3-1.8
Pistachio, raw + roasted	1.44			0.4-2.0
Pumpkin Seeds, roasted	0.65			0.2-1.6
Sesame Albumin			1.33	0.2-1.3
Sesame Oleosin	1.19			0.2-1.6
Sunflower Seeds, roasted	0.62			0.2-1.5
Walnut			2.19	0.3-2.0
VEGETABLES, Raw and Modified				
Artichoke, cooked		2.28		0.1-2.7
Asparagus	0.97			0.3-2.1
Asparagus, cooked		1.67		0.1-2.2
Beet, cooked	0.89			0.1-1.5

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Patient results p2/7

Bell Pepper			1.85	0.1-1.8
Broccoli			>2.70	0.1-1.5
Broccoli, cooked	1.16			0.1-2.0
Brussels Sprouts, cooked	1.88			0.1-3.0
Cabbage, red + green		2.36		0.1-2.5
Cabbage, red + green, cooked	1.59			0.1-2.5
Canola Oleosin	0.98			0.1-1.9
Carrot	1.69			0.1-2.7
Carrot, cooked			2.25	0.1-2.2
Cauliflower, cooked		1.81		0.1-2.2
Celery			2.46	0.1-2.3
Chili Pepper	1.25			0.1-1.9
Corn + Aquaporin, cooked			2.22	0.1-1.8
Popped Corn	0.65			0.1-1.9
Corn Oleosin	0.92			0.1-1.4
Cucumber, pickled		1.98		0.1-2.6
Eggplant, cooked	1.30			0.1-2.1
Garlic		1.93		0.1-2.2
Garlic, cooked		1.37		0.1-1.9
Green Bean, cooked			1.66	0.1-1.5
Lettuce		1.31		0.1-1.5
Mushroom, raw + cooked			2.72	0.1-1.6
Okra, cooked			1.81	0.1-1.5
Olive, green + black, pickled			2.46	0.1-1.7
Onion + Scallion		1.55		0.1-1.7
Onion + Scallion, cooked			1.93	0.1-1.5
Pea, cooked	0.72			0.1-1.5
Pea Protein	0.99			0.1-2.3
Pea Lectin	1.07			0.1-1.7
Potato, white, cooked (baked)	0.79			0.1-1.8

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Patient results p3/7

Potato, white, cooked (fried)			1.93	0.1-1.6
Pumpkin + Squash, cooked			1.72	0.1-1.3
Radish		1.43		0.1-1.7
Safflower + Sunflower Oleosin		1.23		0.1-1.5
Seaweed	0.82			0.1-1.2
Spinach + Aquaporin			1.70	0.1-1.5
Tomato + Aquaporin	0.73			0.2-2.2
Tomato Paste		2.09		0.2-2.1
Yam + Sweet Potato, cooked	0.85			0.3-1.9
Zucchini, cooked	0.73			0.3-1.9
FRUIT, Raw and Modified				
Apple		1.28		0.2-1.5
Apple Cider			1.43	0.3-1.3
Apricot	2.03			0.2-2.8
Avocado	1.13			0.6-2.5
Banana	1.12			0.1-2.3
Banana, cooked	1.71			0.2-2.8
Latex Hevein	1.37			0.3-2.0
Blueberry			1.90	0.1-1.6
Cantaloupe + Honeydew Melon	0.88			0.1-1.2
Cherry	1.07			0.2-1.4
Coconut, meat + water			2.57	0.2-2.0
Cranberry	1.21			0.3-2.4
Date	0.80			0.2-1.4
Fig			2.63	0.2-2.2
Grape, red + green			1.11	0.2-1.0
Red Wine	1.45			0.1-2.3
White Wine	1.68			0.1-2.6
Grapefruit	1.38			0.2-1.9
Kiwi	1.02			0.2-1.7

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Patient results p4/7

Lemon + Lime			1.80	0.2-1.3
Mango	0.96			0.2-1.5
Orange			2.12	0.2-1.7
Orange Juice			2.50	0.2-1.8
Papaya		1.60		0.2-1.7
Peach + Nectarine	1.33			0.2-2.0
Pear	1.61			0.2-2.6
Pineapple	1.37			0.1-1.9
Pineapple Bromelain	1.88			0.2-2.6
Plum			2.35	0.3-2.2
Pomegranate			2.60	0.4-2.2
Strawberry		2.16		0.3-2.3
Watermelon			2.31	0.2-1.8
FISH and SEAFOOD, Raw and Modified				
Cod, cooked	0.99			0.2-1.8
Halibut, cooked			2.08	0.1-1.6
Mackerel, cooked	1.54			0.2-2.0
Red Snapper, cooked		1.16		0.1-1.5
Salmon	1.28			0.2-2.3
Salmon, cooked	0.89			0.2-2.4
Sardine + Anchovy, cooked	1.36			0.3-2.9
Sea Bass, cooked	1.81			0.2-2.8
Tilapia, cooked	1.08			0.1-1.8
Trout, cooked		1.96		0.1-2.4
Tuna	1.55			0.1-2.7
Tuna, cooked	0.75			0.1-1.3
Whitefish, cooked	0.95			0.1-1.4
Crab + Lobster, cooked	1.24			0.2-2.1
Imitation Crab, cooked		1.53		0.1-1.7
Clam, cooked	1.35			0.1-1.9

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Patient results p5/7

Oyster, cooked			2.22	0.1-1.6
Scallops, cooked	1.33			0.1-2.0
Squid (Calamari), cooked	0.85			0.1-2.0
Shrimp, cooked	0.98			0.1-2.1
Shrimp Tropomyosin	0.93			0.1-1.6
Parvalbumin			1.72	0.1-1.7
MEAT, Modified				
Beef, cooked medium	1.37			0.3-1.9
Chicken, cooked			1.75	0.2-1.5
Lamb, cooked			1.74	0.1-1.3
Pork, cooked	1.13			0.1-2.2
Turkey, cooked	0.63			0.1-1.3
Gelatin	0.50			0.1-1.3
Meat Glue		1.24		0.1-1.3
HERBS, Raw				
Basil	1.38			0.2-1.8
Cilantro			1.86	0.1-1.5
Cumin	1.66			0.2-2.3
Dill			2.22	0.3-1.7
Mint	1.13			0.3-2.1
Oregano		2.49		0.4-2.6
Parsley			2.07	0.1-1.3
Rosemary	0.93			0.3-2.2
Thyme	1.29			0.4-1.8
SPICES, Raw				
Cinnamon	0.35			0.3-1.7
Clove			2.49	0.4-1.8
Ginger			2.63	0.1-2.5
Nutmeg	1.36			0.2-1.9
Paprika	1.13			0.2-2.1

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Turmeric (Curcumin)	1.01			0.1-1.7
Vanilla	1.57			0.1-2.4
GUMS				
Beta-Glucan			1.47	0.1-1.3
Carrageenan	1.48			0.2-2.0
Gum Guar			2.53	0.2-2.4
Gum Tragacanth	0.53			0.1-1.4
Locust Bean Gum			1.64	0.2-1.4
Mastic Gum + Gum Arabic	0.62			0.1-1.1
Xanthan Gum			1.74	0.1-1.7
BREWED BEVERAGES and ADDITIVES				
Coffee Bean Protein, brewed	1.19			0.2-1.8
Black Tea, brewed			1.68	0.3-1.6
Green Tea, brewed			2.02	0.3-1.8
Honey, raw +processed			1.53	0.1-1.3
Food Coloring	1.01			0.2-1.8

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Organic Acid Testing

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Q & A