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Report of Faecal Microbiology

Patient Name:	Janine WADE
Address:	46 Sunshine St
	Manly Vale NSW 2093
Date of Birth:	14/01/1982
Name of Requesting Practitioner:	Robyn COSFORD
Laboratory Number:	158756
Date of Sample Collection:	7/05/2024
Date of Sample Processing	09/05/2024
Date of Report Issued:	16/05/2024

Dear Dr Robyn COSFORD,

Thank you for referring your patient to Bioscreen.

The following is a summary of our faecal microbiota testing from your patient's sample.

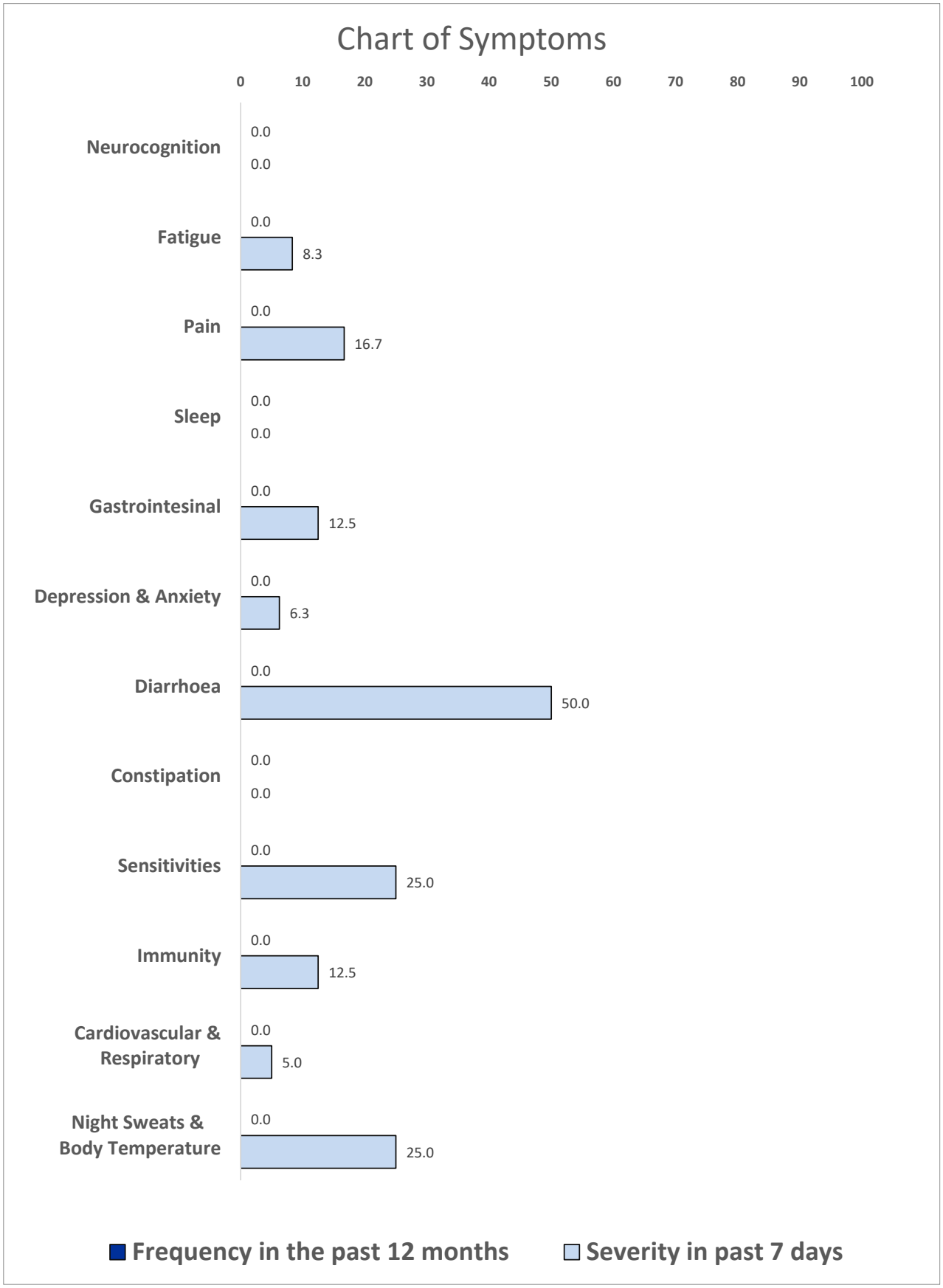
Chart of Symptoms
0
10
20
30
40
50
60
70
80
90
100
Neurocognition
0.0
0.0
Fatigue
0.0
8.3
Pain
0.0
16.7
Sleep
0.0
0.0
Gastrointesinal
0.0
12.5
Depression & Anxiety
0.0
6.3
Diarrhoea
0.0
50.0
Constipation
0.0
0.0
Sensitivities
0.0
25.0
Immunity
0.0
12.5
Cardiovascular & Respiratory
0.0
5.0
Night Sweats & Body Temperature
0.0
25.0
Frequency in the past 12 months
Severity in past 7 days

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Detailed Report, Faecal Microbiology

	Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
Bacterial Count (Total)	3.6×10^9	1.0×10^9 - 1.0×10^{12}	Within Ref Range		
Facultative Anaerobe [Aerobe] Counts	2.1×10^7	1.0×10^7 - 1.0×10^8	Within Ref Range		
Anaerobe Count	3.6×10^9	1.0×10^8 - 1.0×10^{12}	Within Ref Range		

Aerobe:Anaerobe Ratio: 5.9 (Reference Range is 0.5 - 4.0)

Facultative Anaerobe [Aerobe] Counts

	Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
Aerobe Count (total)	2.1×10^7	1.0×10^7 - 1.0×10^8	Within Ref Range		
Escherichia coli coliform (Total)	2.1×10^4	7.0×10^6 - 9.0×10^7	Low		
Escherichia coli	2.1×10^4			0.1%	70-90%
Non-E.coli coliforms	2.1×10^5	$<5.0 \times 10^5$	Within Ref Range		
Klebsiella pneumoniae	2.1×10^5			1%	<5%
Enterococcus (Total)	1.6×10^7	$<5.0 \times 10^5$	High	74%	<5%
Enterococcus faecium	1.6×10^7			74%	
Streptococcus (Total)	5.2×10^6	$<3.0 \times 10^5$	High	24.7%	<5%
Streptococcus parasanguinis	5.2×10^6			24.7%	
Staphylococcus (Total)	5.2×10^4	$<2.0 \times 10^5$	Within Ref Range	0.2%	<5%
Staphylococcus epidermidis	4.2×10^4	$<2.0 \times 10^5$		0.2%	
Staphylococcus hominis	1.0×10^4	$<2.0 \times 10^5$		< 0.01%	

	Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
Faecal Fungi (Total)	1.0×10^2	$<1.0 \times 10^4$	Within Ref Range		
Rhodotorula mucilaginosa	1.0×10^2				

Anaerobe Counts

	Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
Anaerobe Count (total)	3.6×10^{9}	1.0×10^{8} - 1.0×10^{12}	Within Ref Range		
Bacteroides and related genera (Total)	$<9.0 \times 10^{7}$	5.0×10^{8} - 9.5×10^{11}	Low	1.2%	85-95%
Bacteroides xylanisolvens	1.0×10^{7}			0.3%	
Bacteroides salyersiae	2.1×10^{7}			0.6%	
Alistipes finegoldii	1.0×10^{7}			0.3%	
Eubacterium and related genera (Total)	1.4×10^{9}	1.0×10^{8} - 1.0×10^{9}	High	37.6%	<15%
Collinsella aerofaciens	1.2×10^{9}			34.7%	
Eggerthella lenta	1.0×10^{8}			2.9%	
Lactobacillus and related genera (Total)	2.2×10^{7}	5.0×10^{5} - 1.0×10^{7}	High	0.6%	0.5-2%
Ligilactobacillus ruminis	2.1×10^{7}			0.6%	
Lactobacillus acidophilus	1.0×10^{6}			< 0.01%	
Bifidobacterium and related genera (Total)	2.2×10^{9}	5.0×10^{5} - 5.0×10^{8}	High	60.7%	5-11%
Bifidobacterium adolescentis	2.2×10^{9}			60.7%	

Examples of Scientific Notation of Powers of Ten

$10^{2} = 10 \times 10 = 100$ $10^{3} = 10 \times 10 \times 10 = 1{,}000$ $3.5 \times 10^{2} = 3.5 \times 10 \times 10 = 3500$

Summary Report, Faecal Microbiology

Total Aerobe Count: 2.1 x 10^7 cfu/g (colony forming units/g)

Total Anaerobe Count: 3.6 x 10^9 cfu/g

Aerobe: Anaerobe Ratio is: 5.9. The Reference Range is 0.5 to 4.

Comment: This ratio is above the reference range.

Aerobe:Anaerobe Ratio - High

- A high aerobe:anaerobe ratio is usually due to a low count of anaerobes or the absence some genera of anaerobes. Growth of anaerobes is promoted by a diet that includes plentiful meat and /or bone broth, fish and soybean protein.

Faecal Aerobes

Enterococcus sp.: Overgrowth
Streptococcus sp.: Overgrowth
E.Coli: Undergrowth

Comments

E. coli

- The reason for the low E.coli percentage distribution/ total count in the sample is unclear. However, recent exposure to antipyretics and/or analgesia (eg. paracetamol) may cause a marked change in the faecal ecology resulting in a significant alteration of the E.coli viable count (Bioscreen data, 2001). Recent supplementation with fructo-oligosaccharide (FOS) may also have suppressed growth of this organism.
- Undetectable levels of E.coli. Oral application of E.coli probiotics may be beneficial. Changing and normalizing the colonic aerobic microbial flora with the E. coli probiotic has shown to be safe and beneficial in patients with Ulcerative Colitis[1,2] and Crohn's Disease[3]. The probiotic, once ingested and if adhere to the mucosal wall, will colonize the colon within a few days, and will remain colonized after oral administration ceased. Oral application of the E.coli probiotic has shown to stimulate and enhance immune responses and induces nonspecific natural immunity[4,5].
- E.coli is an important intestinal micro-organism responsible for the synthesis of essential amino acids (eg. trytophan, phenylalanine, tyrosine)[6,7,8] vitamins (folic acid, vit K2)[9,10], and coenzymes (CoQ10)[11] important for cellular metabolism and reproduction. Determination into the levels of these essential amino acids in patients with persistent and chronic low levels of E.coli may be beneficial. Acute depletion of tyrosine and phenylalanine has shown to have selective effect on decision-making in depressive patients[12]. Tyrosine depletion has also shown to have recognition and working memory impairment[13].
- Consider supplementing oral sugars (eg galactose, fucose) to increase the densities of current intestinal coliforms (eg E.coli)[14,15] as opposed to adding a different strain with probiotics. Health professionals can contact Bioscreen for further information.
- Consider checking the folate, vitamin K2, CoQ10 levels and supplement if indicated.
- Consider checking the levels of the following essential amino acids: tryptophan, tyrosine, phenylalanine, and supplement if indicated.

Streptococcus/Enterococcus

- Both Enterococcus and Streptococcus spp. are Gram positive, facultative anaerobic organisms and are classified as homofermenative, producing only lactic acid from glucose catabolism and generally regarded as potent D- and L-lactic acid producers (Bioscreen data).

- Increased distribution of lactic acid bacteria (Streptococcus, Enterococcus sp.) may lower the colonic pH[16] and has been reported to :(1) modify faecal microbial metabolism particularly the Bacteroides and Bifidobacterium spp, resulting in a decreased production of volatile fatty acids[17], and (2) alter intestinal epithelial barrier function increasing passive intestinal permeability to small and large molecules. However, this consideration requires further study.
- High colonization of faecal lactic acid bacteria (Streptococcus, Enterococcus sp.) significantly and positively correlate with cognitive dysfunctions (nervousness, memory loss, forgetfulness, confusion, mind going blank)[18,19,20,21], and sleep patterns (Bioscreen data).
- Increased proportion of lactic acid may result in a change in the distribution of the anaerobic microbial flora. This change of the fecal flora may affect the production of primary bile acids and influencing the bile acid composition in both the bile and the intestine[22]. The possibility of fat malabsorption may occur. However, this consideration requires further study.
- If indicated, ampicillin/amoxycillin may assist in the suppression of the faecal Enterococcus and Streptococcus spp.. If the patient has not recently been exposed to ampicillin/amoxycillin, the organism Enterococcccus should be susceptible to the antibiotic. Bacitracin may be a suitable alternative against both organisms if patient is reported to have adverse reactions to the penicillins. Bacitracin is a non-absorbable antibiotic; however, potential nephrotoxicity and allergic reactions may occur[23].

Faecal Anaerobes

Eubacterium sp.: Overgrowth
Bifidobacterium sp.: Overgrowth
Lactobacillus sp.: Overgrowth
Bacteroides sp.: Undergrowth

Comments

Bacteroides sp.

Undergrowth of Bacteroides spp.

- Low and limited distribution of Bacteroides spp may affect the production of volatile fatty acids. Volatile fatty acids are important for the growth of colonocytes.
- Consider the supplement of menaquinones (vitamin K2), and protoporphyrin IX (hemin) to improve the growth of anaerobes. High concentration of vitamin K2 (up to 300µg/kg) is found in natural yogurt, cheese, and butter[24].
- Consider the supplement of biotin, bicarbonate, sodium and/or potassium to assist the production of volatile fatty acids by anaerobes.
- A general diet consisting of meat/ bone broth, fish protein or soybean protein may assist the growth of these organisms.
- The cellulolytic Bacteroides (B.vagatus, B.ovatus, Parabacteroides distasonis, B.fragilis, B. thetaiotamicron, B. uniformis, B. intestinalis, B.cellulosilyticus) are generally regarded as the most prevalent anaerobic micro-organisms in human intestinal microbial flora responsible for the degradation of the insoluble components of dietary fibers.
- This change of the fecal flora may affect the production of primary bile acids and influencing the bile acid composition in both the bile and the intestine[22].

Bifidobacterium/Lactobacillus sp.

- Members of the genera Lactobacillus and Bifidobacterium are Gram positive bacilli and lactic acid producing bacteria. A few members of both genera can grow in a microaerophilic environment; but most are obligate anaerobes.
- High levels of Bifidobacterium spp. in the anaerobic microbial flora. Increased level of Bifidobacterium may stimulate amine production[25]. Similarly, increased levels of this organism may also lower the colonic pH[16], modifying faecal microbial metabolism particularly the Bacteroides spp, resulting in a decreased production of volatile fatty acids[17], and altering intestinal epithelial barrier function increasing passive intestinal permeability to small and large molecules.

- High levels of Lactobacillus spp. in the anaerobic microbial flora.
  Metabolic acidosis and neurological dysfunction (depressed conscious state, confusion, aggressive behaviour, slurred speech and ataxia) have been reported in patients with increased level of lactobacilli in the anaerobic faecal flora[26].
- Cease all oral supplementation of lactic acid probiotics if indicated.

Eubacterium sp.

- Eubacterium sp is generally regarded as one of the most frequently recovered organisms in the gastrointestinal tract, second only to Bacteroides spp.
- The increased distribution of this organism in the gastrointestinal tract is unclear, however, the cell wall of the organism has shown to be proinflammatory and arthritogenic[27].

Faecal Fungi

- Faecal fungi were recovered and the % abundance was within the normal range.

If you require further assistance please contact Bioscreen and arrange a consultation.

Report authorised 20th May, 2024 by Dr Henry Butt.

Bioscreen Pty Ltd.

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