

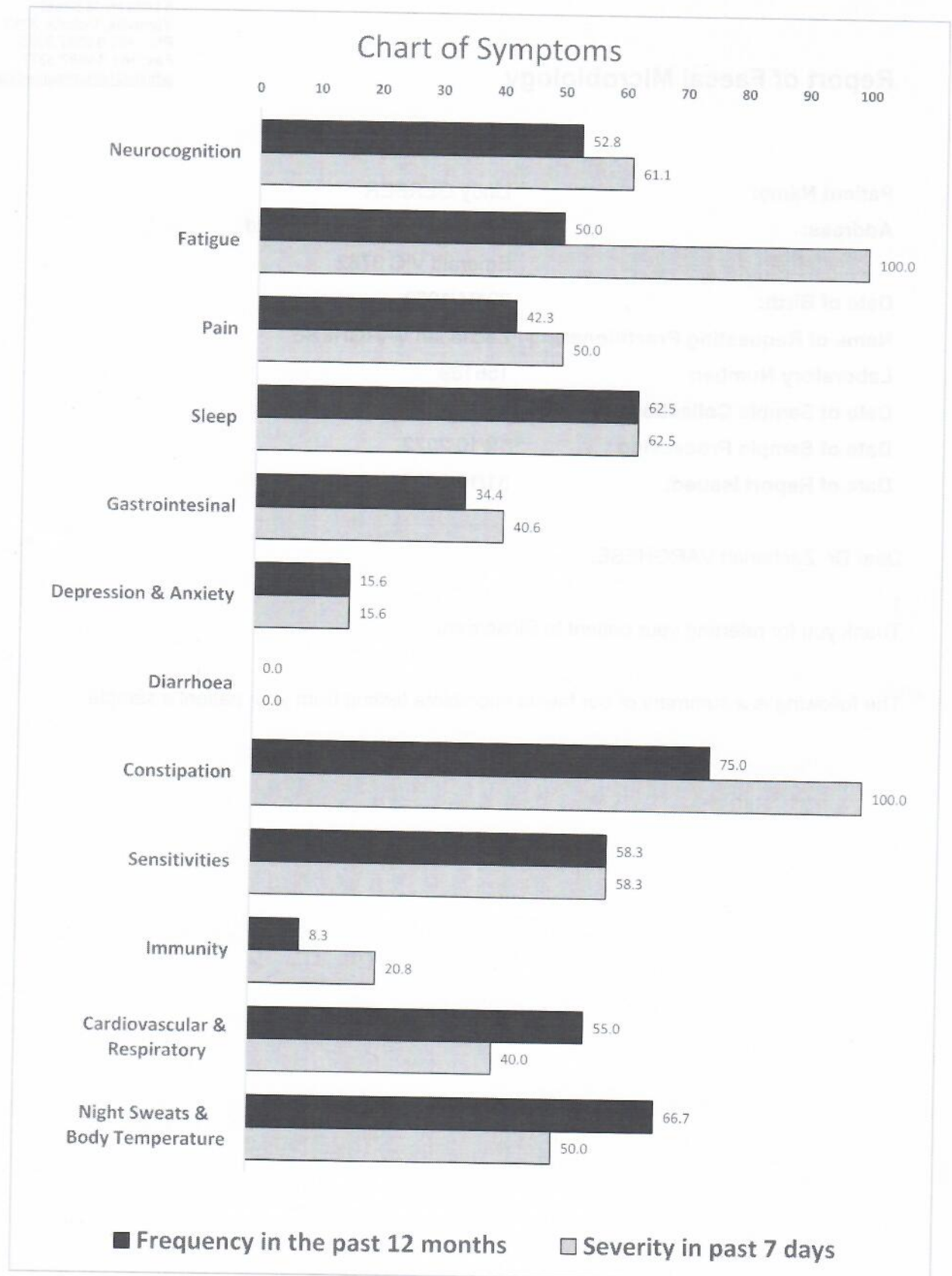
Report of Faecal Microbiology

Patient Name: Lindy GERBER
Address: 401 Belgrave-Gembrook Rd
Emerald VIC 3782
Date of Birth: 22/04/1953
Name of Requesting Practitioner: Zachariah VARGHESE
Laboratory Number: 156189
Date of Sample Collection: 16/10/2022
Date of Sample Processing: 19/10/2022
Date of Report Issued: 31/10/2022

Dear Dr Zachariah VARGHESE,

Thank you for referring your patient to Bioscreen.

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



Detailed Report, Faecal Microbiology

Bacterial Count (Total)**Facultative Anaerobe
[Aerobe] Counts****Anaerobe Count****Aerobe:Anaerobe Ratio:**

Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
1.3×10^{10}	$1.0 \times 10^9 - 1.0 \times 10^{12}$	Within Ref Range		
3.4×10^4	$1.0 \times 10^7 - 1.0 \times 10^8$	Low		
1.3×10^{10}	$1.0 \times 10^8 - 1.0 \times 10^{12}$	Within Ref Range		

0.0 (Reference Range is 0.5 - 4.0)

**Facultative Anaerobe
[Aerobe] Counts****Aerobe Count (total)****Escherichia coli coliform
(Total)***Escherichia coli***Streptococcus (Total)***Streptococcus anginosus**Streptococcus mitis*

Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
3.4×10^4	$1.0 \times 10^7 - 1.0 \times 10^8$	Low		
$<1.0 \times 10^4$	$7.0 \times 10^6 - 9.0 \times 10^7$	Low		
$<1.0 \times 10^4$			< 0.01%	70-90%
3.4×10^4	$<3.0 \times 10^5$	Within Ref Range	100%	<5%
2.2×10^4			66.7%	
1.1×10^4			33.3%	

Faecal Fungi (Total)

Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
$<1.0 \times 10^1$	$<1.0 \times 10^4$	Within Ref Range		

Anaerobe Counts**Anaerobe Count (total)****Bacteroides and related genera (Total)***Bacteroides uniformis**Bacteroides thetaiotaomicron**Bacteroides nordii***Eubacterium and related genera (Total)****Lactobacillus and related genera (Total)****Bifidobacterium and related genera (Total)****Clostridium and related genera (Total)***Clostridium innocuum**Blautia coccoides*

Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
1.3×10^{10}	$1.0 \times 10^8 - 1.0 \times 10^{12}$	Within Ref Range		
1.2×10^{10}	$5.0 \times 10^8 - 9.5 \times 10^{11}$	Within Ref Range	91.3%	85-95%
1.1×10^{10}		Limited Species Detected	86.8%	
5.6×10^8			4.3%	
3.4×10^7			0.3%	
$<9.0 \times 10^7$	$1.0 \times 10^8 - 1.0 \times 10^9$	Low	$< 0.01\%$	$<15\%$
$<5.0 \times 10^5$	$5.0 \times 10^5 - 1.0 \times 10^7$	Low	$< 0.01\%$	0.5-2%
$<5.0 \times 10^5$	$5.0 \times 10^5 - 5.0 \times 10^8$	Low	$< 0.01\%$	5-11%
1.1×10^9	$<5.0 \times 10^8$	High	8.7%	1-10%
1.1×10^9			8.5%	
2.2×10^7			0.2%	

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: 3.4×10^4 cfu/g (colony forming units/g)

Total Anaerobe Count: 1.3×10^{10} cfu/g

Aerobe: Anaerobe Ratio is: 0. The Reference Range is 0.5 to 4.

Comment: This ratio is below the reference range.

Aerobe:Anaerobe Ratio - Low

- A low aerobe:anaerobe ratio is usually due to a low count of *E. coli*. Growth of aerobes is promoted by a diet that is high in fructooligosaccharides. Galactose may be given as a prebiotic. Oral *E. coli* probiotics may also be given to increase the count of *E. coli* in the gut.

Faecal Aerobes

Streptococcus sp.: Overgrowth (% Distribution)

E.Coli: Undetected

Total Aerobic Flora: 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 Disease³. 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 immunity⁴.
- E. coli* is an important intestinal micro-organism responsible for the synthesis of essential amino acids (eg. tryptophan, phenylalanine, tyrosine)^{5,6,7} vitamins (folic acid, vit K2)^{8,9}, and coenzymes (CoQ10)¹⁰ 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 patients¹¹. Tyrosine depletion has also shown to have recognition and working memory impairment¹².
- Consider supplementing oral sugars (eg galactose, fucose) to increase the densities of current intestinal coliforms (eg *E. coli*)^{13,14} 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

- Streptococcus* spp. are Gram positive, facultative anaerobic organisms and are classified as homofermentative, 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 pH¹⁵ and has been reported to : (1) modify faecal microbial metabolism particularly the *Bacteroides* and *Bifidobacterium* spp, resulting in a decreased production of volatile fatty acids¹⁶, 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)^{17,18,19,20}, 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 intestine²¹. The possibility of fat malabsorption may occur. However, this consideration requires further study.
- If indicated, erythromycin may assist in the suppression of the faecal *Streptococcus* spp. Ampicillin/amoxycillin may be a suitable alternative if patient is reported to have adverse reactions to the macrolids.

Faecal Anaerobes

***Clostridium* sp.: Overgrowth**

***Bacteroides* sp.: Limited *Bacteroides* spp. detected**

***Bifidobacterium* sp.: Undergrowth**

***Lactobacillus* sp.: Undergrowth**

***Eubacterium* sp.: Undergrowth**

Comments

Bacteroides sp.

- Limited and low distribution of *Bacteroides* spp may affect the availability of volatile fatty acids for cellular metabolism.
- 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 butter²².
- 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
- 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 intestine²¹.

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.
- Low levels of *Lactobacillus* and *Bifidobacterium* spp. detected. Oral Supplementation of the two probiotics may be beneficial.

Eubacterium sp.

- *Eubacterium* sp is member of the intestinal microbial flora of human, and is regarded as one of the most frequently recovered organisms in the gastrointestinal tract, second only to the *Bacteroides* spp.
- The organism is responsible for the deconjugation of bile acids and the production of butyric acids.
- The organism requires the amino acids arginine and citrulline for growth.

Clostridium sp.

- High levels of *Clostridium* spp. in the anaerobic microbial flora. Increased level of *Clostridium* spp may stimulate amine production. Levels of *Clostridium* spp. is positively correlated with the incidence of constipation (Bioscreen data).
- Oral supplementation of an antimicrobial agent (eg. phenoxymethyl penicillin) in a slow release capsule may assist in the suppression of the organism.

Faecal Fungi

- Undetectable levels of faecal fungi in the sample.

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

Report authorised 4th November, 2022 by Dr Henry Butt.

Bioscreen Pty Ltd.

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