

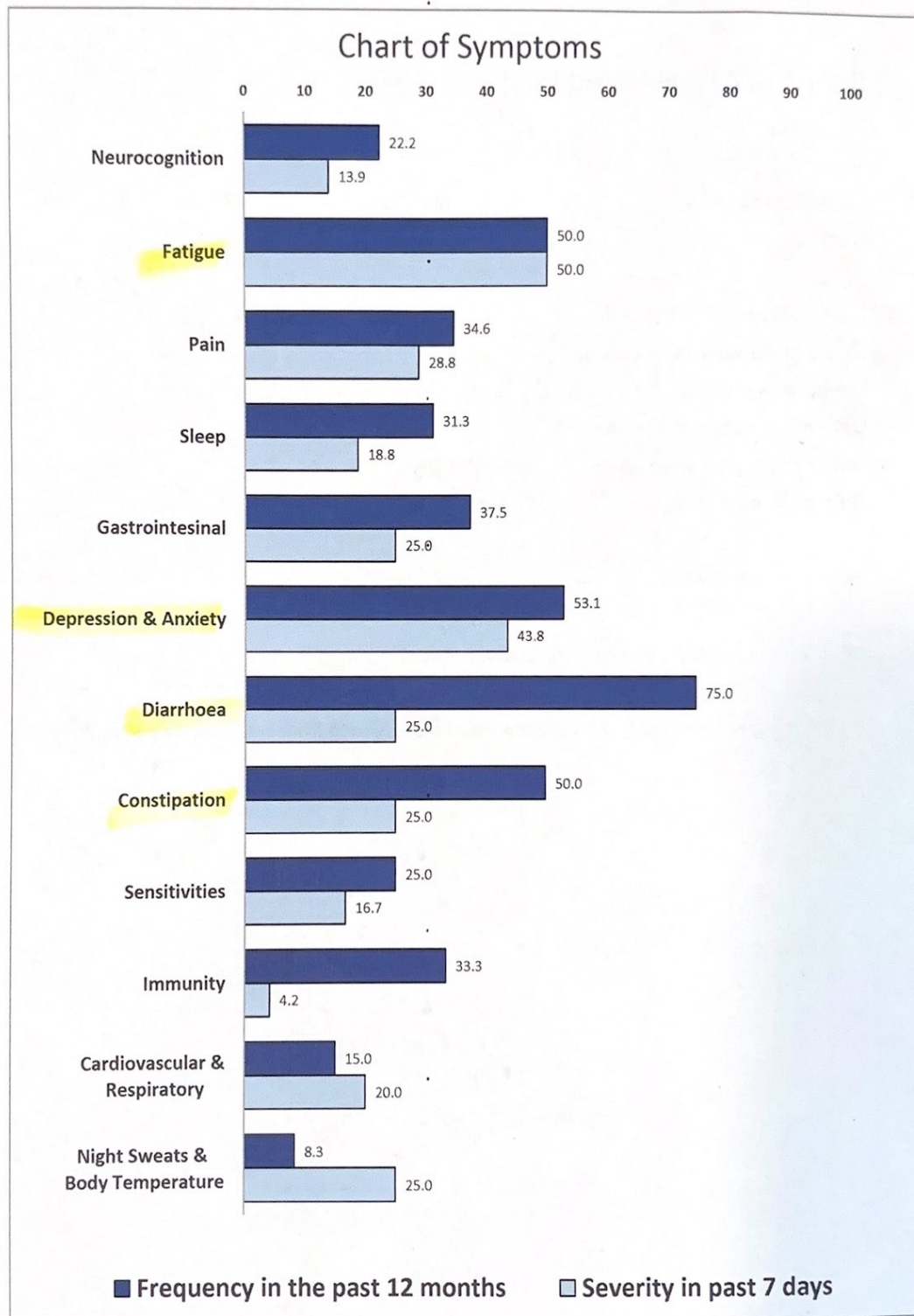
## Report of Faecal Microbiology

**Patient Name:** Sandra CAREY  
**Address:** 8 Bogan St  
Summer Hill NSW 2130  
**Date of Birth:** 02/08/1962  
**Name of Requesting Practitioner:** Isobel MARR  
**Laboratory Number:** 156305  
**Date of Sample Collection:** 7/11/2022  
**Date of Sample Processing:** 09/11/2022  
**Date of Report Issued:** 18/11/2022

Dear Dr Isobel MARR,

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

Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
$1.9 \times 10^{10}$	$1.0 \times 10^9 - 1.0 \times 10^{12}$	Within Ref Range		
$2.2 \times 10^7$	$1.0 \times 10^7 - 1.0 \times 10^8$	Within Ref Range		
$1.9 \times 10^{10}$	$1.0 \times 10^8 - 1.0 \times 10^{12}$	Within Ref Range		

Aerobe:Anaerobe Ratio: 1.2 ( Reference Range is 0.5 - 4.0)

### Facultative Anaerobe [Aerobe] Counts

#### Aerobe Count (total) Escherichia coli coliform (Total)

*Escherichia coli*

#### Enterococcus (Total)

*Enterococcus durans*

*Enterococcus faecium*

#### Streptococcus (Total)

*Streptococcus salivarius*

*Streptococcus parasanguinis*

*Streptococcus gordonii*

Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
$2.2 \times 10^7$	$1.0 \times 10^7 - 1.0 \times 10^8$	Within Ref Range		
$9.3 \times 10^4$	$7.0 \times 10^6 - 9.0 \times 10^7$	Low		
$9.3 \times 10^4$			0.4%	70-90%
$5.6 \times 10^4$	$<5.0 \times 10^5$	Within Ref Range	0.2%	<5%
$1.9 \times 10^4$			0.1%	
$3.7 \times 10^4$			0.2%	
$2.2 \times 10^7$	$<3.0 \times 10^5$	High	99.3%	<5%
$1.9 \times 10^7$			86.6%	
$1.9 \times 10^6$			8.6%	
$9.3 \times 10^5$			4.1%	

### 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)

*Phocaeicola vulgatus*

*Alistipes putredinis*

*Bacteroides clarus*

*Bacteroides ovatus*

### Eubacterium and related genera (Total)

*Collinsella aerofaciens*

### Lactobacillus and related genera (Total)

### Bifidobacterium and related genera (Total)

*Bifidobacterium longum*

### Other anaerobes

*Faecalicoccus pleomorphus*

*Peptoniphilus sp[2]*

Count cfu/g	Counts Reference Range cfu/g	Comment	Distribution % Total Count	Distribution Reference Range
$1.9 \times 10^{10}$	$1.0 \times 10^8 - 1.0 \times 10^{12}$	Within Ref Range		
$5.7 \times 10^9$	$5.0 \times 10^8 - 9.5 \times 10^{11}$	Within Ref Range Limited Species Detected	30.7%	85-95%
$3.3 \times 10^9$			17.8%	
$1.9 \times 10^9$			9.9%	
$3.7 \times 10^8$			2%	
$1.9 \times 10^8$			1%	
$1.9 \times 10^9$	$1.0 \times 10^8 - 1.0 \times 10^9$	High	9.9%	<15%
$1.9 \times 10^9$			9.9%	
$<5.0 \times 10^5$	$5.0 \times 10^5 - 1.0 \times 10^7$	Low	< 0.01%	0.5-2%
$9.3 \times 10^8$	$5.0 \times 10^5 - 5.0 \times 10^8$	High	5%	5-11%
$9.3 \times 10^8$			5%	
	$<5.0 \times 10^8$			1-10%
$9.3 \times 10^9$	$<5.0 \times 10^8$	High	49.5%	
$9.3 \times 10^8$	$<5.0 \times 10^8$	High	5%	

#### Examples of Scientific Notation of Powers of Ten

$$10^2 = 10 \times 10 = 100$$

$$10^3 = 10 \times 10 \times 10 = 1,000$$

$$3.5 \times 10^3 = 3.5 \times 10 \times 10 = 3500$$

## Summary Report, Faecal Microbiology

Total Aerobe Count:  $2.3 \times 10^7$  cfu/g (colony forming units/g)

Total Anaerobe Count:  $1.9 \times 10^{10}$  cfu/g

Aerobe: Anaerobe Ratio is: 1.2. The Reference Range is 0.5 to 4.

Comment: This ratio is within the reference range.

### Faecal Aerobes

**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<sup>1,2</sup> and Crohn's Disease<sup>3</sup>. 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<sup>4,5</sup>.
- E.coli is an important intestinal micro-organism responsible for the synthesis of essential amino acids (eg. tryptophan, phenylalanine, tyrosine)<sup>6,7,8</sup> vitamins (folic acid, vit K2)<sup>9,10</sup>, and coenzymes (CoQ10)<sup>11</sup> 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<sup>12</sup>. Tyrosine depletion has also shown to have recognition and working memory impairment<sup>13</sup>.
- Consider supplementing oral sugars (eg galactose, fucose) to increase the densities of current intestinal coliforms (eg E.coli)<sup>14,15</sup> 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 - Lactic Acid Bacteria => ↓ gdon pH*

- 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 pH<sup>16</sup> 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<sup>17</sup>, 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)<sup>18,19,20,21</sup>, 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<sup>22</sup>. 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

**Eubacterium sp.: Overgrowth**  
**Bifidobacterium sp.: Overgrowth**  
**Faecalicoccus sp.: Overgrowth**  
**Peptoniphilus sp.: Overgrowth**  
**Bacteroides sp.: Limited Bacteroides spp. detected**  
**Lactobacillus 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 butter<sup>23</sup>.
- 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 intestine<sup>22</sup>.

### *Bifidobacterium/Lactobacillus sp.*

- Members of the genus Bifidobacterium are Gram positive branching bacilli and lactic acid producing bacteria. A few members 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<sup>24</sup>. Similarly, increased levels of this organism may also lower the colonic pH<sup>16</sup>, modifying faecal microbial metabolism particularly the Bacteroides spp, resulting in a decreased production of volatile fatty acids<sup>17</sup>, and altering intestinal epithelial barrier function increasing passive intestinal permeability to small and large molecules.
- Cease all oral supplementation of lactic acid probiotics if indicated. If required, consider an antimicrobial agent (eg. ampicillin) to assist in the suppression of the organisms Bifidobacterium spp.
- Members of the genus Lactobacillus are Gram positive bacilli and lactic acid producing bacteria. A few members can grow in a microaerophilic environment; but most are obligate anaerobes.
- Low levels of Lactobacillus spp. detected. Oral Supplementation of Lactobacillus probiotics may be beneficial. Consider the intake of vitamin B6 and biotin to promote lactobacilli growth<sup>25,26</sup>.

### *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<sup>27</sup>.



### *Faecalicoccus* sp.

- A Gram positive anaerobic coccobacillus that grows optimally at pH 6, 38C. Major end products from glucose and mannose fermentation is lactic acid. Strains from this genus have been isolated from avian caecum<sup>28</sup>.

### *Peptoniphilus* sp.

- A member of the commensal gastrointestinal microbiota, previously classified as *Peptostreptococcus*. The organism does not ferment carbohydrates but uses amino acids ( L-glutamate, L-glutamine, L-histidine and L-arginine) as growth substrates and energy sources<sup>29</sup>. The major fermentation products are acetate and butyrate with a small amount of propionate.

## Faecal Fungi

- Undetectable levels of faecal fungi in the sample.

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

Report authorised 23<sup>rd</sup> November, 2022 by Dr Henry Butt.

Bioscreen Pty Ltd.

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