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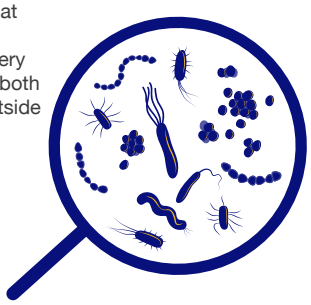
Microbiology: The Basics

What are bacteria?

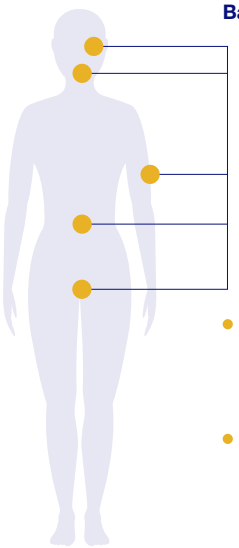
- Bacteria are ubiquitous and can be found in **water**, **the environment**, as well as in **the human body**[1]
- Bacteria are **microscopic, single-celled organisms** that exist in the millions, in every environment, both inside and outside of the body[2]
- They play an important role in ensuring the health and balance of all organisms. They are **integral to a healthy ecosystem and to human life**



- Bacteria come in **three basic shapes**[3]:
  - **rod-shaped** (bacilli)
  - **spherical** (cocci)
  - **helical** (spirilla)
- On average, our bodies are home to an estimated **100 trillion bacteria**[4]

Good (commensal) bacteria

- So called '**good bacteria**' such as lactobacillus and bifidobacteria play a role in:
  - fighting off infection
  - digestion & optimal gut health
  - wound healing
  - protecting against 'harmful bacteria'[5]



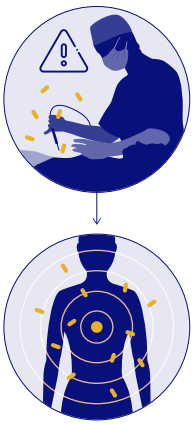
Bacteria 'hotspots'[6]

- Eyes
- Mouth
- Skin
- Gastrointestinal tract
- Genitals

- Bacteria are found both **on the inside and outside** of the body
- Typically, a person has around **1,000 different species** of bacteria **on their skin alone**[6]

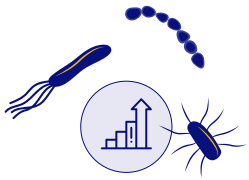
Harmful (pathogen) bacteria

- To determine if **bacteria is harmful** depends whether it is naturally harboured in a specific area of the body or **translocated from other areas** (endogenous infection) or resulting from **contamination** (exogenous infection)
- Harmful bacteria such as *Salmonella, EHEC (enterohemorrhagic Escherichia coli)* can cause **infection and illness**[5]
- Harmful bacteria are especially problematic when **introduced during invasive medical or surgical procedures**, as they can cause bacterial infections (exogenous infection)
- Bacteria can infect any area of the body. If untreated, these **infections can be life-threatening**[7]



Bacterial infections

- A bacterial infection is a **spread of a harmful strain of bacteria** on, or inside, the body[7]
- A bacterial infection occurs when harmful bacteria enter the body and multiply, **causing a reaction in the body**[7]
- **Most hospital acquired infections are related to bacteria** e.g. urinary tract infections (UTI) or wound infections[9]



- In recent years some **bacteria have evolved, leading to antibiotics becoming ineffective** (i.e. no longer able to kill or prevent the growth of bacteria). This is known as **antibiotic resistance**[8]
- We are now facing an antibiotic crisis, as **without effective antibiotics,** bacterial infections are **hard to control/eradicate**[9]

Minimizing risk in endoscopy

Over 75 million endoscopies are carried out each year in the US alone[10]

Endoscopes are extremely useful clinical tools, and if processed and used properly, **present no increased risk of infection** compared to other clinical tools[11]

Processing protocols are designed in such a way to ensure patients are not placed at unnecessary risk of infection during routine health procedures[11]

Adherence to processing protocols and the **elimination of external contamination** are key to reducing the risk of infection[11]

Further information can be found:
www.infectionprevention.olympus.com

1. Available at: https://www.biologyonline.com/dictionary/bacteria. Last accessed: April 2022 **2.** Available at: Bacteria: Types, characteristics, where they live, hazards, and more (medicalnewstoday.com). Last accessed: April 2022 **3.** Available at: https://www.medicalnewstoday.com/articles/157973#types. Last accessed: April 2022 **4.** Hill DA, Artis D. Intestinal bacteria and the regulation of immune cell homeostasis. Annu Rev Immunol. 2010;28:623-67. doi: 10.1146/annurev-immunol-030409-101330. PMID: 20192812; PMCID: PMC5610356. **5.** Available at: https://www.healthline.com/health/cold-flu/good-bad-germs. Last accessed: April 2022 **6.** Available at: https://www.medicalnewstoday.com/articles/307998#what-are-the-human-microbiota-and-microbiome. Last accessed: April 2022 **7.** Available at: Bacterial infections - symptoms, causes and treatments | healthdirect. Last accessed: April 2022 **8.** Available at: https://www.ecdc.europa.eu/en/antimicrobial-resistance. Last accessed: April 2022
9. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4378521/ Last accessed: April 2022
10. Available at: https://www.beckersasc.com/gastroenterology-and-endoscopy/gi-endoscopies-make-up-68-of-all-endoscopies-in-u-s-5-market-trends.html. Last accessed: April 2022
11. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4087702/ Last accessed: October 2023

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