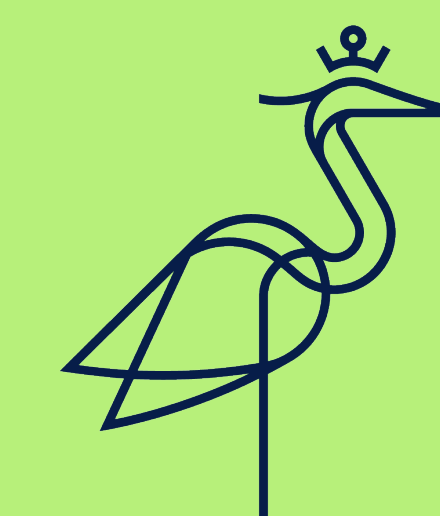




ANTI-MICROBES AND MEDICAL CARTS

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INTRODUCTION

- Microorganisms are all around us. In clinical settings, if a certain microbial level is reached, it can impact the efficiency of patient care.
- One method to combat this is antimicrobial technology: helps reduce growth rate of bacteria on surfaces.
- Frequently Touched Surfaces (FTS) such as medical carts can serve as a breeding ground for microbes (Cunliffe *et al*, 2021).
- Anaesthesia Medical Carts – carry and store necessary supplies and equipment for operating rooms. The coatings should not interfere with the condition of the medical cart so that it is faulty.
- Medical carts consist of materials such as stainless steel, plastic and aluminium.
- Here we'll be discussing the effectiveness of antimicrobial coatings, specifically copper and silver nanoparticles, while discussing the suitability of the cleaning regulations followed in hospitals.

DATA

Disk	Mean	SD	Log10 reduction	Log10 reduction re:SS	% efficiency re:SS
			30min post inoculation		
SS	50667	4041	1.55		
PCu	1653	1120	3.04	1.49	96.7
			60min post inoculation		
Ss	58000	12490	1.49		
PCu	2787	2449	2.81	1.32	95.2
			120min post inoculation		
Ss	82333	18009	1.34		
PCu	231	256	3.89	2.55	99.7

Figure 2: shows the microbial activity on stainless steel compared to stainless steel with a pure copper coating showing a significant decrease in microbial activity with the copper coating.

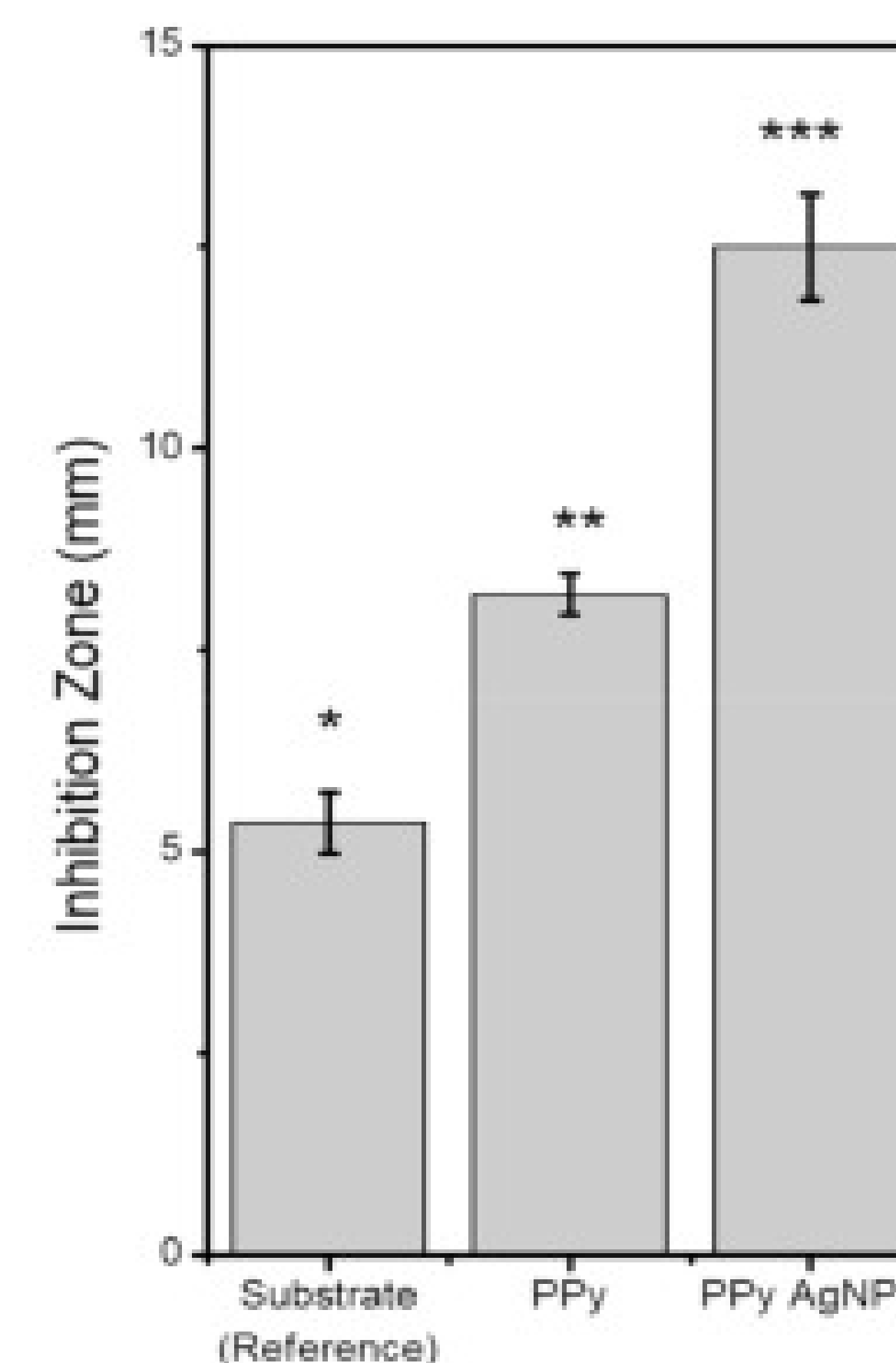


Figure 3: inhibition test results comparing an AgNP coating compared to a medical cart with no coating which shows a significant difference in the inhibition zone making silver a suitable antimicrobial coating.

CONCLUSION

- After considering both coatings, it was found copper is a better choice than silver for antimicrobial coatings, especially on frequently touched surfaces like carts.
- Copper is more economically friendly, and reduces a broad range of microbial activity.
- In contrast, silver needs increased concentration for enhanced effectiveness and has limited antimicrobial activity range.
- The experiment performed (Bryce, et al 2022) shows that copper is more appropriate to use as a direct coating rather than part of an alloy in the material used for medical carts.
- Therefore, copper is the superior choice for practical application in antimicrobial coatings.
- Current (limited) data provides us with a bias, but in-depth research and comparisons are needed to fully understand if silver or copper is better as an antimicrobial coating for medical carts.

DISCUSSION: COPPER vs SILVER

COPPER

- Copper is cheaper than silver and is durable.
- Copper is more environmentally friendly as it has a significantly lower rate of seeping compared to silver.
- Test conducted (Bryce, et al 2022) of different methods of adding copper to coating. Two of them being; adding copper to another metal as an alloy, or as a coating to spray on cart.
- Overall showed the copper coating to be highly effective in reducing microbe activity.
- Between clinical and lab settings, coating was more effective in clinical setting due to the routine of disinfecting less, whereas lab is required to be cleaned frequently. This is debated on.
- When in contact with microbes, copper will oxidise (Siddiqui et al, 2021) and release ions which help to break down the microorganisms.
- Use of copper on medical carts passed regulations (cart was usable, portable, not damaged).

SILVER NANOPARTICLES

- Considered due to silver's superior chemical and physical properties.
- It is cost-friendly and abundant (Lee et al, 2019).
- In research, it is suggested that increasing the concentration of AgNPs can enhance antimicrobial treatment.
- Able to stop cellular respiration, leading to cell death. This is useful in destroying microbes.
- However, AgNPs are found to be affective on a limited array of bacteria. For instance, E. coli is more susceptible to Ag ions than S. aureus.

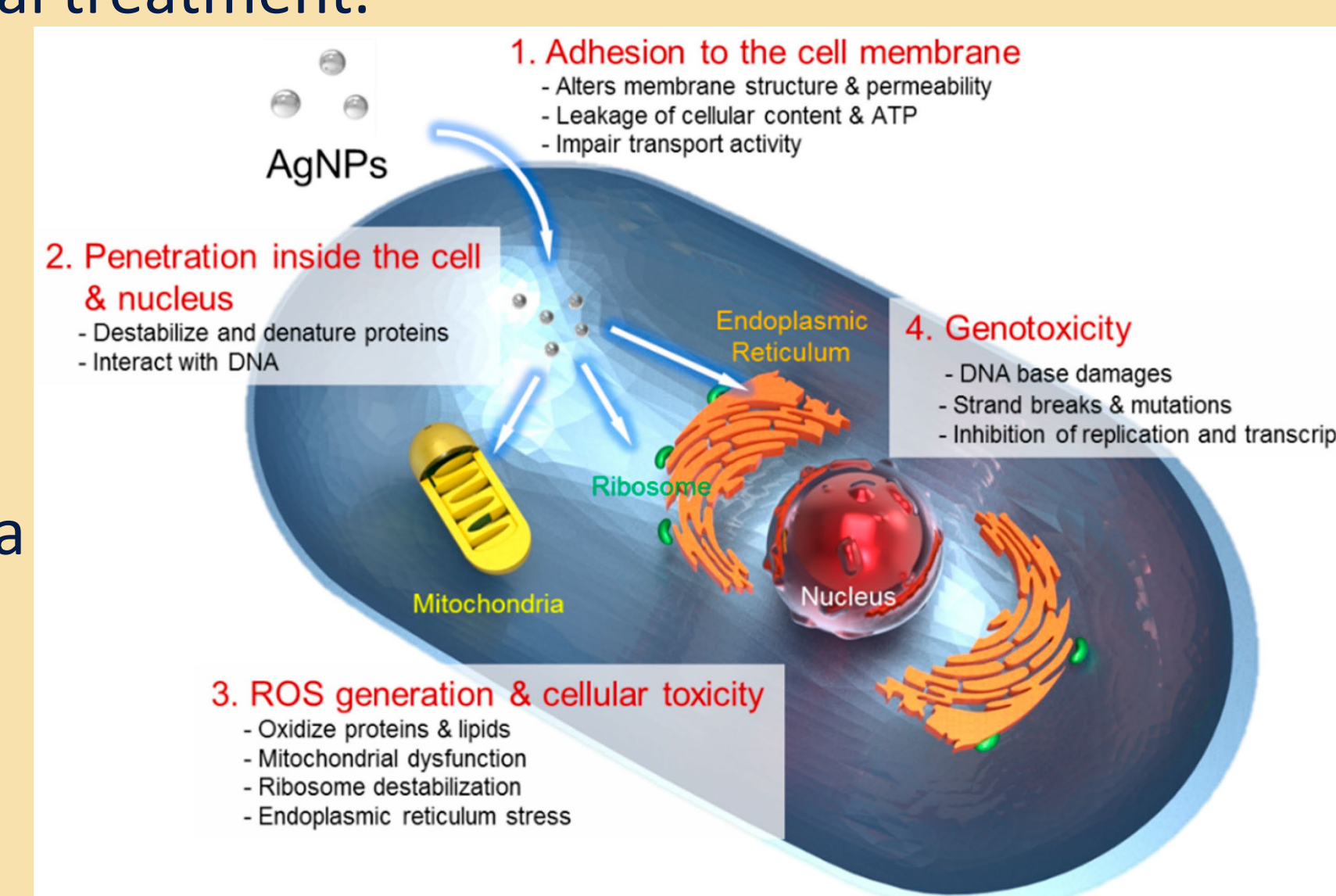


Figure 1: AgNPs adhere to the cell surface, damaging its membrane and altering the transport activity

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