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SILVER IODIDE IN BIOTECHNOLOGY: INNOVATIONS AND CHALLENGES

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Abstract: Silver iodide (AgI) is essential in biotechnology, extending beyond cloud seeding. Its antimicrobial properties are crucial in medical settings for wound dressings and coatings on medical devices to prevent infections. In diagnostic imaging, AgI is used in X-ray films and advanced techniques due to its light sensitivity. Additionally, AgI nanoparticles are being developed for biosensors to detect pathogens and pollutants and for targeted drug delivery systems. Challenges include potential toxicity and high costs, prompting ongoing research to optimize its applications

• Introduction

AgI is prominently used in weather modification, specifically cloud seeding, but its applications in biotechnology extend beyond that.

• Applications of Silver Iodide in Biotechnology

✓ Antimicrobial properties

- **Wound dressings:** Silver ions (as AgI), are known for their antimicrobial properties. They are used in wound dressings to prevent infections and promote healing. The release of silver ions can effectively kill a broad spectrum of bacteria and fungi.
- **Coatings:** Medical devices and implants are often coated with AgI to reduce the risk of infections.

Diagnostic imaging

- **Radiography:** AgI is used in photographic films for X-ray imaging. The compound's sensitivity to light and radiation makes it suitable for capturing detailed images, which are crucial for medical diagnostics.
- **Advanced imaging techniques:** Research is ongoing to develop novel imaging agents that incorporate AgI nanoparticles for enhanced contrast in diagnostic imaging techniques such as CT scans.

✓ Biosensors

- **Detection of pathogens:** AgI nanoparticles are being explored for use in biosensors to detect pathogens. The biosensors can provide rapid and accurate diagnostics for infectious diseases by leveraging the unique optical and electrical properties of AgI.
- **Environmental monitoring:** In environmental biotechnology, AgI-based sensors can detect pollutants and toxic substances in water and soil, ensuring safety and compliance with environmental regulations. Also, cloud seeding is already used against hail formation, protecting the culture.

✓ Nanotechnology

- **Drug Delivery:** AgI nanoparticles are being studied for their potential in targeted drug delivery systems. These nanoparticles can be engineered to deliver drugs directly to specific cells or tissues, minimizing side effects and improving therapeutic efficacy
- **Nanocomposites:** AgI is used to create nanocomposites with unique properties for applications in medical devices, tissue engineering, and regenerative medicine.

✓ Conclusions

- AgI antimicrobial, diagnostic, and nanotechnological applications underscore its significance in biotechnology. While there are challenges related to toxicity and cost, ongoing research and technological advancements aim to address these issues, paving the way for safer and more effective biotechnological solutions.

