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REVIEWER'S REPORT

Manuscript No.: IJAR-53030 Date: 28.07.25

Title: Plasma-Induced DNA Damage and Repair Mechanisms: Investigating Genetic Impact and Cellular Response Pathways,

Recommendation:

Accept as it is ..... YES ....

Accept after minor revision...

Accept after major revision .....

Rating	Excel.	Good	Fair	Poor
Originality			√	
Techn. Quality		√		
Clarity			√	
Significance		√		

Reviewer Name: PROF DR DILLIP KUMAR MOHAPATRA **Date:** 28.07.25

Reviewer's Comment for Publication.

(*To be published with the manuscript in the journal*)

The reviewer is requested to provide a brief comment (3-4 lines) highlighting the significance, strengths, or key insights of the manuscript. This comment will be Displayed in the journal publication alongside with the reviewers name.

Detailed Reviewer's Report

This comprehensive review explores the complex interactions between Cold Atmospheric Plasma (CAP) and DNA, focusing on the mechanisms of DNA damage and repair. CAP's potential applications in biomedicine, including cancer therapy and wound healing, are highlighted, along with the associated genotoxic risks.

Key Findings

- CAP-induced DNA damage: *CAP generates reactive oxygen and nitrogen species (RONS) that can cause various types of DNA lesions, including single-strand breaks (SSBs), double-strand breaks (DSBs), base modifications, and crosslinks.*

- DNA repair mechanisms: *Cells employ sophisticated DNA repair pathways, including base excision repair (BER), nucleotide excision repair (NER),*

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homologous recombination (HR), and non-homologous end joining (NHEJ), to counteract CAP-induced DNA damage.
- Therapeutic potential: *CAP's genotoxic effects can be harnessed to selectively kill cancer cells, while minimizing damage to healthy tissues.*
Strengths
- Comprehensive overview: *The review provides a thorough examination of the molecular mechanisms underlying CAP-induced DNA damage and repair.*
- Interdisciplinary approach: *The article highlights the intersection of plasma physics, molecular biology, and clinical medicine in understanding CAP's biological effects.*

Weaknesses
- Complexity: *The review's technical nature may limit its accessibility to non-experts.*
- Future directions: *Further research is needed to fully elucidate the mechanisms of CAP-induced DNA damage and repair, and to optimize CAP's therapeutic applications.*

Publication Recommended
Conclusion
This review provides a valuable contribution to the field of plasma biology, highlighting the complex interactions between CAP and DNA. By understanding the mechanisms of CAP-induced DNA damage and repair, researchers can optimize CAP's therapeutic applications while minimizing genotoxic risks.