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Abstract Topic: - Cancer

Abstract Title: - Mutational profiling of the genes involved in cadmium toxicity - An in-silico study.

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Aims: - We aim to elucidate the impact of long-term cadmium exposure on genomic instability.

Methods: - In silico tools were used to explore the mechanisms through which cadmium exposure altered the gene expression and trigger initial hallmarks of cancer. Differentially expressed genes were mined from GEO databases and an interactome was drawn between these genes and genes of major repair pathways. For each of the toxicity related genes we carried out structural and functional mutational profiling of nsSNP retrieved from COSMIC database. Further docking revealed destabilizing effect of the mutations on gene functions. Finally, we docked certain vitamins C, D, E with these genes to assess their protective role and regaining normalcy after Cd-toxicity.

Results: - Preliminary analysis revealed about 40 mutations in 7 genes were potentially damaging to their functions. COSMIC revealed that they were mainly dysregulated in blood cancers. The normal dynamics of mutants with their interacting repair partner was altered. We presume that downstream repair mechanisms can become weaken due to altered expression or mutation in Cd-related genes. Impaired repair overtime can impact genomic stability and lead to cancers. To check the affinity of the genes involved in Cd-toxicity towards ameliorative agents, we further docked them with vitamins. Affinity scores affirmed a protective effect of vitamins on molecular toxicity induced by cadmium.

Conclusions: - Early hallmarks of cancer are triggered by chronic exposure to Cd and disturbed dynamics of DNA repair with the gene involved in toxicity. A protect role of dietary supplements is suggested in this study.

Keywords: - Preliminary analysis revealed about 40 mutations in 7 genes were potentially damaging to their functions. COSMIC revealed that they were mainly dysregulated in blood cancers. The normal dynamics of mutants with their interacting repair partner was altered. We presume that downstream repair mechanisms can become weaken due to altered expression or mutation in Cd-related genes. Impaired repair overtime can impact genomic stability and lead to cancers. To check the affinity of the genes involved in Cd-toxicity towards ameliorative agents, we further docked them with vitamins. Affinity scores affirmed a protective effect of vitamins on molecular toxicity induced by cadmium.