

Use of Humanin for Cardio-Protection during Chemotherapy

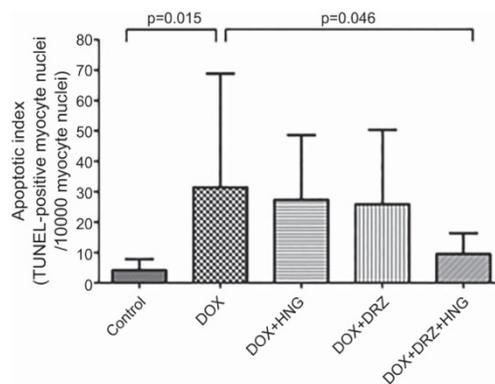
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Background

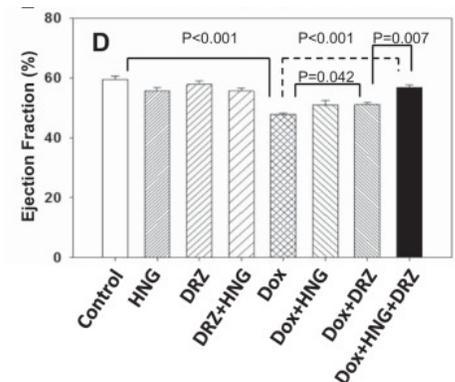
- The CDC estimates that 650,000 cancer patients receive chemotherapy in the U.S. every year.
- Despite the benefit of chemotherapeutic drugs in killing cancer cells and reducing tumor size, **chemotherapy can result in cardiotoxicity (damage to the heart and its valves).**
- Cardiotoxicity is a serious, common side effect of chemotherapy that contributes to cardiovascular disease, morbidity, and mortality in cancer survivors.
- For example, doxorubicin (DOX) is commonly used for treating a wide range of cancers but cumulative **dosage-dependent cardiotoxicity often limits its clinical applications.**
- Available therapies to reduce chemotherapy-induced cardiotoxicity are limited to specific cancers or exhibit their own adverse side effects.
- For example, dexrazoxane (DRZ) is an iron chelator approved to limit chemotherapy-induced cardiotoxicity. However, studies show that high doses of DRZ may result in second malignant neoplasms.
- **Additional cardioprotectants that can be administered to a patient before, during, or after chemotherapy to reduce cardiotoxicity would greatly improve cancer patient survival and quality of life.**

Innovation

- Dr. Ronald Swerdloff's laboratory has discovered that the **humanin analog HNG**, when combined with DRZ, **reduces chemotherapy-induced cardiotoxicity and preserves cardiac function.**
 - Humanin is a 24-amino acid peptide that is well-characterized and known to have cytoprotective, anti-inflammatory, and antioxidative properties in many cell types.
 - **HNG is a synthetic analog of humanin that is significantly more potent.**
- HNG promotes maturation and proliferation of cardiac cells in patients that are administered chemotherapeutic agents.
- HNG does not interfere with the efficacy of anti-cancer agents.
- *In vivo* experiments show that HNG prevents chemotherapy-induced cardiac impairment when combined with DRZ.



Bar graph shows that chemotherapeutic agent DOX significantly increases cardiomyocyte apoptosis. HNG, when co-administered with intracellular iron chelator DRZ, significantly reduces DOX-induced cardiomyocyte apoptosis.



Bar graph shows that DOX significantly decreases cardiomyocyte ejection fraction in mice. HNG, when co-administered with DRZ, restores the ejection fraction to normal levels.

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Advantage

- HNG protects cardiovascular tissue from chemotherapy-induced damage, which can improve patient survival and quality of life.
- HNG does not substantially reduce or inhibit the efficacy or activity of anti-cancer agents.
- This technology is not limited to specific cancers and has exhibited no side effects to date.

Applications

- Co-treatment of HNG with DRZ to reduce chemotherapy-induced cardiotoxicity

Lead Inventor: Ronald Swerdloff, MD

IP Status

- U.S. Patent No. 10,792,331 issued on October 6, 2020.

Related Publications:

- Lue Y, Gao C, Swerdloff R, et al. Humanin analog enhances the protective effect of dexrazoxane against doxorubicin-induced cardiotoxicity. *Am J Physiol Heart Circ Physiol.* 2018;315(3):H634-H643.