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Letter to the Editor

Licochalcone B: A New Drug for the Prevention and Treatment of Radiation Damage

Jiaqi Wu, Tongtong Lv, Wenxi Liu and Xiaochun Peng*

Department of Pathophysiology, Laboratory of Oncology, Center for Molecular Medicine, School of Basic Medicine, Health Science Center, Yangtze University, Jingzhou 434023, Hubei, China

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Dear Editors,

Radiation can result in DNA damage, excessive oxidative stress, inflammatory responses, and impaired immune function,[1] further leading to damage to different systems. For example, radiation exposure during Computed Tomography increases the risk of leukemia in children.[2] In addition, radiation therapy is one of the common treatment methods for cancer patients. However, radiation during the treatment process may cause upper and lower gastrointestinal mucositis, which can seriously affect the effectiveness of tumor treatment.[3] At present, antiradiation drugs on the market include amifostine, sargramostim, and potassium iodide. However, these chemically synthesized drugs have certain side effects, such as hypotension, nausea, and vomiting.[4] Therefore, in recent years, natural compounds with lower toxicity have attracted much attention as potential therapeutic agents against radiation damage.[5] Licochalcone B, the main active substance of licorice (Glycyrrhiza uralensis Fisch.), has a variety of biological activities and pharmacological effects, including antioxidant, anti-inflammatory, anti-tumor, and immunomodulatory properties.[6] Therefore, Licochalcone B may be a potential therapeutic agent against radiation damage.

We recently read an article titled "Radioprotective Effects of Licochalcone B: DNA Protection, Cytokine Inhibition, and Antioxidant Boost" by Ren *et al*.[7] The purpose of this study was to investigate the protective effect of Licochalcone B on radiation injury and to provide a theoretical basis for its application in the treatment of radiation injury. In addition, the authors revealed that Licochalcone B provides a degree of protection against radiation damage through a variety of pathways, such as reducing DNA damage, clearing reactive oxygen species, and inhibiting inflammatory responses. Ren *et al*.[7] demonstrated for the first time the therapeutic potential of Licochalcone B as an anti-radiation damage drug. Their work provides a theoretical basis for the application of Licochalcone B in the treatment and prevention of radiation damage.

***Correspondence to:** Xiaochun Peng, Department of Pathophysiology, Laboratory of Oncology, Center for Molecular Medicine, School of Basic Medicine, Health Science Center, Yangtze University, Jingzhou 434023, Hubei, China. ORCID: https://orcid.org/000-0001-9443-0439. Tel: +86-15827776908, E-mail: pxcwd789@sina.com

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Recently, studies have shown that natural compounds such as curcumin and resveratrol, which have antioxidant or anti-inflammatory properties, can also prevent and treat radiation damage.[3] Curcumin, a common phenolic antioxidant and anti-inflammatory agent, can alleviate oral mucositis caused by chemotherapy and radiotherapy by regulating reactive oxygen species to reduce oxidative stress and regulating nuclear factor kappa-B to reduce the inflammatory response.[8] Resveratrol is also a natural polyphenolic compound that can alleviate radiation-induced skin DNA damage.[9] Meanwhile, Epimedium and Lycium barbarum pills, which have similar biological activity, are also known to treat radiation-induced damage.[10,11] Therefore, Ren *et al*.'s study also provides a basis for the development of other drugs with similar effects.[7]

Although Ren *et al*.[7] investigated the mechanism of action of Licochalcone B for the prevention and treatment of radiation damage and examined the effect of a certain dose of Licochalcone B (40 mg/kg) on the survival of radiation-induced mice, they did not indicate whether this dose is safe to use. A recent study has shown that Licochalcone B is toxic to humans and rats 11β-hydroxysteroid dehydrogenase type 2 with half-maximal drug inhibitory concentration values of 31.85 μM and 56.56 μM, respectively.[12] Therefore, in future studies, researchers need to further explore the safety of Licochalcone B.

At the same time, Ren *et al*.[7] inflicted radiation damage on mice with a dose of 8 Gray (Gy) or a combined dose of 6 Gy + 8 Gy, though they did not explain why either dose was chosen. Additionally, they did not show the difference between the two radiation doses. Hosseinimehr *et al*.[13] showed that 8.5 Gy gamma radiation is the lethal dose in mice. Therefore, it is necessary to clarify the dose of radiation administered and its significance in future radiation damage studies.

In summary, this section discusses the potential of the natural compound Licochalcone B as an antiradiation therapeutic agent. The aim was to promote the development and application of Licochalcone B, a drug with antioxidant and anti-inflammatory activity, in the field of radiation damage and to address the limitations of the current research process on Licochalcone B. While Licochalcone B shows promising potential as a radioprotectant, further research is necessary to establish its safety profile and therapeutic efficacy across various contexts. Looking ahead, researchers need to explore the therapeutic index of Licochalcone B, including its dose-dependent effects and comparisons with other natural radioprotective agents.

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Conflict of interest

XCP has been an editorial board member of *Future Integrative Medicine* since November 2021. The other authors have no conflicts of interest related to this publication.

Author contributions

Study concept and design (JQW, XCP), funding acquisition (XCP), drafting of the manuscript (JQW, XCP), critical revision of the manuscript for important intellectual content (JQW, TTL, WXL, XCP), and study supervision (XCP). All authors have made significant contributions to this study and have approved the final manuscript.

References

[1] Helm JS, Rudel RA. Adverse outcome pathways for ionizing radiation and breast cancer involve direct and indirect DNA damage, oxidative stress, inflammation, genomic instability, and interaction with hormonal regulation of the breast. Arch Toxicol 2020;94(5):1511–1549. doi:10.1007/s00204-020-02752-z, PMID:32399610.

[2] Gale RP. Radiation and leukaemia: Which leukaemias and what doses? Blood Rev 2023;58:101017. doi:10.1016/j.blre.2022.101017, PMID:36220737.

[3] Altomare A, Fiore M, D'Ercole G, Imperia E, Nicolosi RM, Della Posta S, *et al*. Protective Role of Natural Compounds under Radiation-Induced Injury. Nutrients 2022;14(24):5374. doi:10.3390/nu14245374, PMID:36558533.

[4] Yu YX, Tian HQ. Research progress on clinical application of radiation protection agents. Shandong Medical Journal 2022;62(1):111–114. doi:10.3969/j.issn.1002-266X.2022.01.027.

[5] Hosseinimehr SJ. Trends in the development of radioprotective agents. Drug Discov Today 2007;12(19-20):794–805. doi:10.1016/j.drudis.2007.07.017, PMID:17933679.

[6] Shaikh S, Lee EJ, Ahmad K, Choi I. Therapeutic potential and action mechanisms of licochalcone B: a mini review. Front Mol Biosci 2024;11:1440132. doi:10.3389/fmolb.2024.1440132, PMID:39021879.

[7] Ren B, Jin J, Wang Y, Xu X, Liu Y, Ding H, *et al*. Radioprotective Effects of Licochalcone B: DNA Protection, Cytokine Inhibition, and Antioxidant Boost. Future Integr Med 2024;3(4):239–250. doi:10.14218/FIM.2024.00031.

[8] Dipalma G, Inchingolo AM, Latini G, Ferrante L, Nardelli P, Malcangi G, *et al*. The Effectiveness of Curcumin in Treating Oral Mucositis Related to Radiation and Chemotherapy: A Systematic Review. Antioxidants (Basel) 2024;13(10):1160. doi:10.3390/antiox13101160, PMID:39456414.

[9] Jin Y, Liu X, Liang X, Liu J, Liu J, Han Z, *et al*. Resveratrol rescues cutaneous radiation-induced DNA damage via a novel AMPK/SIRT7/HMGB1 regulatory axis. Cell Death Dis 2023;13(10):847. doi:10.1038/s41419-022-05281-y, PMID:36587031.

[10] Wang SW, Ren BX, Qian F, Luo XZ, Tang X, Peng XC, *et al*. Radioprotective effect of epimedium on neurogenesis and cognition after acute radiation exposure. Neurosci Res 2019;145:46–53. doi:10.1016/j.neures.2018.08.011, PMID:30145270.

[11] Yin G, Wang Q, Lv T, Liu Y, Peng X, Zeng X, *et al*. The Radioprotective Effect of LBP on Neurogenesis and Cognition after Acute Radiation Exposure. Curr Radiopharm 2024;17(3):257–265. doi:10.2174/0118744710274008231220055033, PMID:38204264.

[12] Lin H, Su M, Wen C, Tang Y, Li H, Wu Y, *et al*. Chalcones from plants cause toxicity by inhibiting human and rat 11β-hydroxysteroid dehydrogenase 2: 3D-quantitative structure-activity relationship (3D-QSAR) and in silico docking analysis. Food Chem Toxicol 2024;184:114415. doi:10.1016/j.fct.2023.114415, PMID:38141941.

[13] Hosseinimehr SJ, Zakaryaee V, Ahmadi A, Akhlaghpoor S. Radioprotective effects of chlorogenic acid against mortality induced by gamma-irradiation in mice. Methods Find Exp Clin Pharmacol 2008;30(1):13–16. doi:10.1358/mf.2008.30.1.1134339, PMID:18389093.