Introduction

• Estrogen (E2) dependent breast cancer risk continues to rise post menopause.
• Increased E2 production in postmenopausal breast through the increased aromatase expression and activity is implicated.1 2 3
• Local E2 production is in part regulated by the factors modifying breast microenvironment; enhanced Nrf2 antioxidant responses limit inflammation which can otherwise elevate aromatase expression.2 4
• Preventing breast cancer using strategies modulating the breast microenvironment and with greater acceptability than endocrine therapies among at risk but healthy women is desired.
• Botanicals such as three licorice species (GG, GU, GI), and their bioactive compounds, LigF, 8-PA, LicA, and LigC might have chemopreventive potential through limiting E2 exposure and promoting antioxidant response in the breast.5 6

Objective

To evaluate how licorice and its bioactive compounds limit aromatase and promote Nrf2 dependent pathways which could lead to a tumor preventive environment in the breast. The outcome could suggest a basis for future studies establishing an alternative breast cancer prevention approach with greater acceptability among high-risk but otherwise healthy postmenopausal women.

Results

Figure 1. Licorice species and their bioactive compounds inhibit aromatase activity.

Figure 2. Phytoestrogens of GI, LigF and 8-PA bind to aromatase like letrozole.

Figure 3. Licorice and LicA activate Nrf2-dependent NQO1.

Conclusions

• Licorice GI and its phytosterogens are potent aromatase inhibitors, behaving like letrozole.
• GI and its marker compound LicA enhance NQO1 activity through the Nrf2 dependent antioxidant pathway in cells.
• They also suppress aromatase and enhance NQO1 in the breast tissue of high-risk postmenopausal women.
• These effects could lead to a tumor preventive environment in the breast through limiting E2 exposure, oxidative damage, and inflammation.
• In vivo MIND model studies can further elucidate their efficacy in preventing breast tumor formation, suggesting a potential prevention approach with better acceptability among high-risk but healthy postmenopausal women.

References


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The potential role of licorice and its bioactive compounds in promoting a tumor preventive environment in the breast

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