Involvement of estrogen receptor-alpha in lambda-cyhalothrin and cypermethrin-induced cancer growth in BG-1 ovarian cancer cells expressing estrogen receptor

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ABSTRACT

Synthetic pyrethroids (SPs) are the most common pesticides which are recently used for indoor pest control. The widespread use of SPs has resulted in the increased exposure to wild animals and humans. Recently, some SPs are suspected as endocrine disrupting chemicals (EDCs) and have been assessed for their potential estrogenicity by adopting various analyzing assays. In this study, we examined the estrogenic effects of lambda-cyhalothrin (LCT) and cypermethrin (CP), the most commonly used pesticides in Korea, in BG-1 ovarian cancer cells expressing estrogen receptors (ERs). To evaluate the estrogenic activities of two SPs, LCT and CP, we performed MIT assay and reverse-transcription polymerase chain reaction (RT-PCR) for LCT or CP treated BG-1 ovarian cancer cells. In MIT assay, LCT (10^-4 M) and CP (10^-4 M) significantly induced the growth of BG-1 cancer cells in a dose-dependent manner. LCT or CP-induced cell growth was reversed by addition of ICI 182,780 (10^-4 M), an ER antagonist, suggesting that this effect appears to be mediated by an ER-dependent manner. Moreover, RT-PCR results showed that transcriptional level of ERs was significantly downregulated by LCT and CP. Taken together, these results indicate that LCT and CP may possess estrogenic potentials to stimulate the growth of ovarian cancer cells expressing ERs via an ER-dependent manner. Based on the observations from these in vitro results, we will examine in vivo estrogenicity of LCT and CP in a xenografted mouse model transplanted with human BG-1 ovarian cancer cells.

RESULTS

- **Figure 1.** Cell proliferation by E2, CP or LCT-treatment in BG-1 cells for 8 days, cell growth was measured using MIT assay at 540nm. Data represent the means ± SD of triple experiment. * P<0.05, ** P<0.01 compared to a vehicle treated with DMSO.

- **Figure 2.** Cell proliferation by E2, CP-treatment with ICI 182,780 in BG-1 cells for 8 days, and the number of viable cells was measured using MIT assay at 540nm. Data represent the means ± SD of triple experiment. * P<0.05, ** P<0.01 compared to a vehicle treated with DMSO.

- **Figure 3.** Cell proliferation by E2, LCT-treatment with ICI 182,780 in BG-1 cells for 8 days, and the number of viable cells was measured using MIT assay at 540nm. Data represent the means ± SD of triple experiment. * P<0.05, ** P<0.01 compared to a vehicle treated with DMSO.

CONCLUSION

1. CP or LCT induced the BG-1 cell proliferation was gradually increased in a 10^-5 M to 10^-4 M compared to DMSO in a dose-dependent manner as well as E2 did. However CP-treatment was weakly increased cell proliferation compared to DMSO.

2. Expression of human estrogen receptor α was down-regulated by treatment of CP or LCT at 10^-4 M. Co-treatment with LCT and ICI 182,780 showed no obvious alteration of the ERα mRNA expression.

3. Taken together, these results indicate that LCT and CP may possess estrogenic potentials to stimulate ovarian cancer cells expressing ERs via an ER-dependent manner, and these collective results confirm the carcinogenicity of these EDCs.

4. Based on observations from these in vitro results, we will examine the estrogen activities of LCT and CP in a xenografted mouse model transplanted with human BG-1 ovarian cancer cells.

REFERENCES


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