

Estimation of Estrogenic Activity of Polyvinyl Chloride Films for Food-wrapping by Estrogen Receptor Binding Assay

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Koichi Inoue^{a)}, Nao Kobayashi^{a)}, Yoshihiro Yoshimura^{a)},
Masakazu Horie^{b)} and Hiroyuki Nakazawa^{a)}

a) Department of Analytical Chemistry, Faculty of Pharmaceutical Sciences, Hoshi University

b) Saitama Prefectural Institute of Public Health

Abstract

The polyvinyl chloride (PVC) films are widely used in various fields including food industry and in house for food wrapping. When some estrogenic compounds were reported to be leached out from such PVC films, PVC film manufacturers responded by checking and reporting the transfer properties of remnant plasticizers in PVC film products to the wrapped food. Now, PVC manufacturers have substituted the PVC film products to new type from which much less remnant chemicals are released. However, intensive comparison of release of estrogenic compound from new and old type PVC films have not been conducted. The present study compares the estrogenic activity of extraction solutions from PVC films before and after the substitution. First, the extracts were analyzed by GC/MS and liquid chromatography - electrochemical detection (LC/ED) for identification the compounds, and then the estrogen receptor binding assay for its estrogenic activity. The extracts from the old PVC products are shown to contain diisononyl adipate (DINA) and 4-nonylphenol (NP), and to bind competitively to the estrogen receptor. The extracts from the new products contained DINA but NP was below detection level, and was negative for estrogen binding ability. The present study suggests that the estrogen receptor-binding component in the old type PVC films was NP, and shows that the new type PVC films are negative for extractable NP and for estrogen-receptor binding ability.