ESTROGENIC ENDOCRINE DISRUPTOR POTENCY OF ORGANOCHLORINE PESTICIDES DETECTED USING THE LUMI-CELL™ ER BIOASSAY

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Organochlorine pesticides are found in many ecosystems worldwide, which have resulted in the contamination of the food chain. Endocrine disruptor compounds (EDCs) can have a significant detrimental effect on the endocrine and reproductive systems of both humans and animals. Identification of EDC pesticides requires a relevant bioassay, which can detect these chemicals, and provide a relevant estimate of their endocrine disrupting potency. To detect EDCs, BG-1 cells were stably transfected with an estrogen-responsive luciferase reporter gene plasmid (pGudLuc7ere). The resulting cell line, the LUMI-CELL™ ER bioassay, responds to estrogenic chemicals in a time-, dose dependent- and chemical-specific manner with the induction of luciferase gene expression. Thirteen organochlorine pesticides suspected of possessing estrogenic endocrine disrupting potential were tested. All of the compounds with historical data demonstrating estrogenic activity were shown to possess estrogenic activity. When comparing the estrogenic potency of the pesticides, the order of induction of activity with respect to their EC50 values is: α-Chlordane > Kepone > DDD > pp' DDT > Methoxychlor > ψ-Chlordane > pp' DDE > Fenarimol > 2,4,5-Trichlorophenoxyacetic Acid > Dieldrin > Linuron > Mirex = Vinclozolin. The average minimal effective dose for organochlorine pesticides in animals appears to be 5 ppm or greater. The LUMI-CELL™ ER bioassay is capable detecting organochlorine pesticides at <1ppm (with a lower limit of detection of <0.1ppt). This data clearly demonstrates that the LUMI-CELL™ ER high-throughput bioassay system is a fast, reliable, and relatively inexpensive method for detection of environmental EDCs, and could refine, reduce or replace animals in many tests. Meeting requirements mandated by the EPA and ICCVAMs Tier I requirements for EDC detection assays. Supported by NIEHS SBIR grant ES10533-03 and Superfund Basic Research Grant ES04699.