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Short running head: Bone mineral density in East Greenland polar bears.

Key words: Polar bear, *Ursus maritimus*, PCBs, DDTs, CHLs, dieldrin, endocrine disruption, osteoporosis, bone mineral density, BMD.

Abbreviations:

∑	Sum of congeners
BMD	Bone Mineral Density
CHLs	CHLordanes
CYP	Cytochrome P-450 isozymes
DDD	Dichloro Diphenyl Dichloroethane
DDE	Dichloro Diphenyl Dichloroethylene
DDT	Dichloro Diphenyl Trichloroethane
DXA	Dual X-ray Absorptiometry
HCB	HexaChloroBenzene
HCHs	HexachloroCycloHexanes
HPA	Hypothalamic-Pituitary-Adrenal

PBDEs	PolyBrominated DiphenylEthers
PCBs	PolyChlorinated Biphenyls
PCDDs	PolyChlorinated DibenzoDioxin
PCDFs	PolyChlorinated DibenzoFurans
*p*QCT	*p*eripheral Quantitative Computed Tomography

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Abstract

Bone mineral density (BMD) in polar bear (*Ursus maritimus*) skulls (n=139) from East Greenland sampled during 1892-2002 was analysed. The primary goal was to detect possible changes in bone mineral content (osteopenia) due to elevated exposure to organochlorine (PCBs, DDTs, CHLs, dieldrin, HCHs, HCB) and PBDE compounds. To ensure that the BMD in skull represented the mineral status of the skeletal system in general, BMD in femur and three lumbar vertebrae were compared in a subsample. Highly significant correlations between BMD in skull and femur (r=0.99; p<0.001; n=13), and skull and vertebrae (r=0.97; p<0.001; n=8) were detected. BMD in skulls sampled in the supposed pre-organochlorine and PBDE period (1892-1960) was significantly higher than in the supposed pollution period (1961-2002) for subadult females, subadult males and adult males (all: p<0.05) but not adult females (p=0.94). Negative correlation between organochlorines and the skull BMD was in subadults found for Σ-PCBs (p<0.04) and Σ-CHLs (p<0.03) and in adult males for dieldrin (p<0.002) and Σ-DDTs (p<0.02) (indications for Σ-PBDEs in subadults; p=0.06). In conclusion, the strong correlative relationships suggested that disruption of the bone mineral composition in East Greenland polar bears may have been caused by organochlorine exposure.