**SUPPLEMENTAL MATERIAL**

**TITLE: POLYBROMINATED DIPHENYL ETHER (PBDE) EXPOSURE AND REPRODUCTIVE HORMONES IN NORTH AMERICAN MEN**

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**Supplemental Material, Table S1**. Summary of key human studies examining PentaBDE exposure and reproductive function in adult males.

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| --- | --- | --- | --- | --- | --- | --- | --- |
| First Author (Year)  | Study Location | No of Subjects | Median PBDE Level (unit, matrix) | T, fT | FSH Inhibin-B,  | LHProlactinSHBG  | Other Repo. Endpoints |
| Main, K.M. (2007) [1} | DenmarkFinland | 130 | BDE-47 (1.27) BDE-99 (0.42) BDE-100 (0.29) BDE-153 (0.85) (ng/g, breast milk fat) | − T− fT | − FSH− Inhibin-B |  LHNM Prolactin− SHBG | cryptorchidism in newborns  |
| Turyk, M, (2008) [2] | USA | 308 | BDE-47 (0.11), BDE-99 (0.03), BDE-100 (0.01), BDE-153 (0.03) (ng/g serum) |  T | NM | − SHBG |  SHBG-bound T |
| Meeker, JD (2009) [3] | USA | 24 | BDE-47 (500) BDE-99 (838) BDE-100(180) (ng/g, dust)  |  T  | FSH Inhibin-B |  LHProlactin SHGB |  FAI estradiol |
| Abdelouahab, N. (2011) [4] | Canada | 52 | BDE-47 (0.186) BDE-99 (0.053) BDE-100 (0.030) BDE-153 (0.004) (ng/ml serum) | NM | NM | NM |  semen mobility\* |
| Johnson, PI. (2013) [5] | USA | 38 | PentaBDE (47, 99, 100) 1049 (ng/g, dust) |  T  | FSH Inhibin-B |  LH  Prolactin SHBG  |  estradiol FAI  |
| Toft, G. (2013) [6] | GreenlandPolandUkraine | 299 | BDE-47 (0.2 – 2.0), BDE-153 (2.7 to 0.3). (ng/g serum lipid)  |  T |  inhibin-B− FSH | − SHBG− LH |  estradiol FAI semen quality |
| Makey, CM. (2015)This study | USA | 27 | BDE-47 (9.4), BDE-99 (1.9), BDE-100 (1.8), BDE-153 (8.6) (ng/g serum lipid) | − T− fT |  inhibin-B FSH | − LH− Prolactin− SHBG |  Inhibin-B/FSH ratio FAI  |

An upward facing arrow () indicates PBDE exposure was associated with an increase in the outcome parameter. A downward facing arrow () indicates PBDE exposure was associated with a decrease in the outcome parameter. A horizontal bar (**−**) indicates no relationship between PentaBDE exposure and outcome parameter. (**NM**) indicates the outcome parameter was not measured.
Abbreviations: NM, not measured; RFT, reproductive function test; TT, total testosterone; fT, testosterone; FSH, follicular stimulating hormone; LH, luteinizing hormone; FAI, free androgen index; SHBG, sex hormone binding globulin.

**Supplemental Material, Table S2.** Spearman correlation coefficients of major serum PBDE congeners in 27 men. Data from Round 2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | BDE-47 | BDE-99 | BDE-100 | BDE-153 |
| BDE-47 | 1 | *r*=0.096*p*<0.0001 | *r*=0.94*p*<0.0001 | *r*=0.40*p*=0.048 |
| BDE-99 |  | 1 | *r*=0.97*p*<0.0001 | *r*=0.45*p*=0.40 |
| BDE-100 |  |  | 1 | *r*=0.56*p*=0.004 |
| BDE-153 |  |  |  | 1 |

Abbreviations: *r* (Spearman correlation coefficient), *p* (p-value).

**Supplemental Material, Table S3.** Polybrominated diphenyl ethers analyzed and detection rates in men of the FlaRE study.



**Supplemental Figure S1.** Cross-sectional relationship, stratified by age group, showing relationshipbetween BDE-47 and RHs in Round 2 (27 men, 27 serum samples).



**References:**

[1]K.M. Main, H. Kiviranta, H.E. Virtanen, E. Sundqvist, J.T. Tuomisto, J. Tuomisto et al. 2007. Flame retardants in placenta and breast milk and cryptorchidism in newborn boys, Environ. Health. Perspect. 115 (2007) 1519-1526.

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[3]J.D. Meeker, P.I. Johnson, D. Camann, R. Hauser, Polybrominated diphenyl ether (PBDE) concentrations in house dust are related to hormone levels in men, Sci. Total Environ. 407 (2009) 3425-3429.

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 [6]G. Toft, V. Lenters, R. Vermeulen, D. Heederik, C. Thomsen, G. Becher, et al, Exposure to Polybrominated Diphenyl Ethers and Male Reproductive Function in Greenland, Poland and Ukraine, Reprod Toxicol. 43 (2013) 1-7.