Correction to: Effects of endocrine disruptors on fetal testis development, male puberty, and transition age

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Published online: 4 January 2021

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Correction to: Endocrine

<https://doi.org/10.1007/s12020-020-02436-9>

Citation error in the article has been corrected.

The original article has been corrected.

In the original publication, a reference was mistakenly omitted during manuscript preparation. The authors added a missing citation.

Authors ref number has been changed in table 3, 4 and 5.
The corrected tables are given below.

Reference

57. C.L. Schwartz, S. Christiansen, A.M. Vinggaard, M. Axelstad, U. Hass, T. Svingen, Anogenital distance as a toxicological or clinical marker for fetal androgen action and risk for reproductive disorders. *Arch. Toxicol.* **93**(2), 253–272 (2019)

The original article can be found online at <https://doi.org/10.1007/s12020-020-02436-9>.

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Table 3 Main studies that investigated EDs effect on male anogenital distance (AGD)

Authors [ref. No.]	Caseload	Analyzed EDs	Biological Sample	Investigated time of exposure	Main findings
Swan et al. [89]	134 US newborns (aged 2–36 months)	Phthalates (9 metabolites)	Maternal urine (1 st trimester)	Prenatal	MEP, MBP, MBzP and MiBP inversely related to anogenital index (AGD/weight)
Torres-Sanchez et al. [95]	37 Mexican infants (aged 3, 6, 12, 18 months)	DDT/DDE	Maternal blood during pregnancy	Prenatal	Significant reduction in AGD due to the prenatal DDE exposure, specifically during the first trimester of pregnancy (AGD reduction for doubling increase of maternal DDE)
Huang et al. [97]	33 Taiwanese newborns	Phthalates (5 metabolites)	Maternal urine and amniotic fluid	Prenatal	No correlation between in utero phthalates exposure and male AGD
Miao et al. [94]	153 Chinese boys (aged 0–17 years, 81% <10 years old)	BPA	Parental urine. Personal air sample monitoring also carried out	Prenatal	Parental occupational exposure to BPA during pregnancy associated with shortened AGD (stronger for maternal exposure: AGD 8.11 mm shorter for boys with maternal exposure)
Suzuki et al. [88]	111 Japanese male newborns (aged 1–3 days)	Phthalates (7 metabolites)	Maternal urine (9th to 40th week of gestation)	Prenatal	Significant inverse association between MEHP and reduced anogenital index (AGD/weight)
Bustamante-Montes et al. [87]	73 Mexican newborns (24 and 48 h after birth)	Phthalates (4 metabolites)	Maternal urine (3 rd trimester)	Prenatal	Significant inverse association between total phthalate exposure and AGD
Vafeiadi et al. [92]	119 newborn and 239 infants (aged 16 months) from Greece and Spain	Dioxins and dioxin-like compounds	Maternal blood (after delivery)	Prenatal	Plasma dioxin-like activity negatively associated with AGD in male newborns (AGD reduced 0.44 mm per 10 pg toxic equivalent increase). Non-significant negative association in young boys
Bornehag et al. [86]	196 Swedish infants (aged 21 months)	Phthalates (10 metabolites)	Maternal urine (1 st trimester)	Prenatal	Strongest and most significant inverse associations with DiNP metabolites, though with a small reduction in AGD
Swan et al. [90]	366 US newborns (aged 1–3 days)	Phthalates (11 metabolites)	Maternal urine (1 st trimester)	Prenatal	Three metabolites of DEHP (MEHP, MEOHP, MEHHP) significantly and inversely associated with AGD
Jensen et al. [96]	245 Danish infants (aged 3 months)	Phthalates (12 metabolites)	Maternal urine around week 28 of gestation	Prenatal	No significant trends towards shorter AGD in boys with higher phthalates exposures
Bormann et al. [98]	344 infants from South Africa (visits at birth and 1-year)	DDT/DDE	Maternal blood	Prenatal	No associations between DDT /DDE congeners and AGD
Lassen et al. [99]	252 Danish infants (aged 2–7 months)	Triclorosan	Maternal urine during pregnancy (at approximately gestational week 28)	Prenatal	No significant association with a reduced AGD at 3 months of age in boys
Lind et al. [100]	316 Danish newborns (at age 3 months)	PFAS	Maternal blood during pregnancy (gestational week 5–12)	Prenatal	No association between PFAS and AGD in boys
Cremonese et al. [104]	Young Brazilian men, aged 18–23 years, from two different areas, rural (99 men) and urban (36 men).	Pesticides	No direct dosage, exposure evaluated through a questionnaire	Prenatal and postnatal	In rural men, AGD 9% larger (data not shown). Significant increase in AGD (5%) among men born to women who worked in agriculture during pregnancy

Table 3 (continued)

Authors [ref. No.]	Caseload	Analyzed EDs	Biological Sample	Investigated time of exposure	Main findings
Di Nisio et al. [91]	Italian young boys, 171 controls (mean age 18.7 ± 1.0 years) and 212 exposed subjects (mean age 18.5 ± 0.8 years)	PFAS	Blood and seminal fluid (50 controls and 50 exposed males)	Prenatal/postnatal	Significant reduction in exposed group: AGD 0.4 mm shorter (4.5 mm vs 4.1 mm); penile length 1.1 cm shorter (9.7 cm vs 8.6 cm)
Mammadov et al. [93]	72 newborns aged 1–3 days from Cyprus	BPA	Umbilical cord specimen taken at birth	Prenatal	Significant association between high cord blood BPA levels and shortened AGD in male newborns (4.6 mm shorter between higher and lower exposed group)
Dalsager et al. [101]	420 Danish newborns (at age 3 months)	Pesticides	Maternal urine during pregnancy (at approximately gestational week 28)	Prenatal	No association between maternal urinary concentrations of pesticide metabolites and AGD in the offspring
Arbuckle et al. [103]	198 Canadian infants (aged 6 months)	Phthalates (11 metabolites), BPA, triclorosan	Maternal urine during pregnancy (1 st trimester)	Prenatal	Long AGD measure positively associated with MBP and the molar sum of low molecular weight phthalates
MEP mono-ethyl phthalate, MBP mono-butyl phthalate, MBzP mono-benzyl phthalate, DDT dichlorodiphenyltrichloroethane, DDE dichlorodiphenylidichloroethylene, BPA bisphenol A, MEHP monoethylhexyl phthalate, DiNP diisononyl phthalate, MEOHP mono(2-ethyl-5-oxohexyl) phthalate, MEHHP mono(2-ethyl-5-hydroxyhexyl) phthalate, PFAS per- and poly-fluoroalkyl substances					

Table 4 Studies that investigated EDs effect on testicular volume (TV) in pubertal/transition age boys

Authors [ref. No.]	Caseload	Analyzed EDs	Biological Sample	Investigated time of exposure	Main findings
Mol et al. [110]	176 children born in 1986–1987 in Faroe Islands, examined approximately at mid puberty (mean age 13 years and 9 months)	PCBs (3 congeners)	Umbilical cord specimen taken at birth	Prenatal	No significant difference in mean TV
Den Hond et al. [51]	80 Belgian adolescents (mean age 17.3 ± 0.8 years), 40 from rural area, 40 from urban areas	PCBs (3 congeners) and dioxin-like compounds	Blood	Postnatal	Significant difference in TV between the areas, even after adjustment for genital stage (left plus right TV 46.8 mL in rural area vs 44.1 mL and 41.4 mL in the two polluted area). TV did not correlate with any of the biomarkers of exposure investigated.
Leijis et al. [53]	15 Dutch boys (14–18.7 years of age)	PCBs (3 congeners) and dioxin-like compounds (PCDD/F)	Blood; PCDD/F also dosed in mothers' milk	Prenatal/Perinatal (PCDD/F also dosed in mothers' milk) and postnatal	No association with exposure and TV (results not shown)
Durmaz et al. [109]	40 newly diagnosed pubertal gynecomastia cases, aged 11–15 years (mean age 13.2 ± 0.9 years) vs 21 controls	Phthalates (2 metabolites)	Blood	Postnatal	Plasma levels of DEHP and MEHP significantly higher in the pubertal gynecomastia group; no significant association between their concentration and TV
Grandjean et al. [112]	438 14-years old boys born in 1986–1987 in Faroe Islands	PCBs (3 congeners)	Umbilical cord specimen taken at birth	Prenatal	Non-significant inverse association with TV
Vested et al. [107]	169 young male, aged 19–21 years, from a Danish pregnancy cohort established in 1988–1989	PFAS	Maternal blood (pregnancy week 30)	Prenatal	No significant differences in TV between all groups of exposure
Joensen et al. [111]	247 Danish men (mean age 19.6 ± 1.4 years)	PFAS	Blood	Postnatal	No association between TV and serum PFAS levels (results not shown)
Axelsson et al. [108]	112 young Swedish men, aged 17–20 years (mean age 18.3 ± 0.41 years).	Phthalates (6 metabolites)	Maternal blood (69% of samples between 8 and 14 gestational weeks)	Prenatal	Significant smaller TV in the highest tertile of prenatal MCiOP exposure than men in the lowest (left plus right 41 ml vs 45 mL)
Cremonese et al. [104]	Young Brazilian men, aged 18–23 years, from two different areas, rural (99 men) and urban (36 men).	Pesticides	No direct dosage, exposure evaluated through a questionnaire	Prenatal and postnatal	In rural men, testicles 31% larger (mean TV 26.3 vs 19.2 mL), also increased in men using pesticides for more than one year. A significant increase in TV (16%) observed among men born to women who worked in agriculture during pregnancy
Di Nisio et al. [91]	Italian young boys, 171 controls (mean age 18.7 ± 1.0 years) and 212 exposed subjects (mean age 18.5 ± 0.8 years)	PFAS	Blood and seminal fluid (50 controls and 50 exposed males)	Prenatal/postnatal	Smaller mean TV in exposed group (14.7 vs 16.1 mL). Both serum and semen PFOA, but not PFOS, associated with reduced TV

PCBs polychlorinated biphenyls, PCDD/F polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans, DEHP di-2-ethylhexyl phthalate, MEHP mono-ethyl-hexyl phthalate, PFAS per- and poly- fluoroalkyl substances, MCiOP mono-(carboxy-iso-octyl) phthalate, PFOA perfluorooctanoic acid, PFOS perfluorooctanesulfonic acid

Table 5 Studies that investigated EDs effect on testicular cancer (TC) in pubertal/transition age boys

Authors [ref. No.]	Caseload	Analyzed EDs	Biological Sample	Investigated time of exposure	Main findings
Koifman et al. [122]	Brazilian men, divided in two age-specific groups: 0–14 and 15–49 years old (number of patients not shown)	Pesticides	No direct dosage. Pesticides sales in 1985 compared with TC hospitalization in 1995–1997 and TC chemotherapy in 1999–2000	Prenatal	No significant correlation for TC hospitalization in both age groups
Hardell et al. [128, 129]	58 Swedish TC patients aged 18–45 vs 61 controls. 44 cases' mothers vs 45 controls' mothers	PCBs (37 congeners), HCB, DDE and chlordanes (6 congeners)	Blood	Prenatal and postnatal	In cases significantly increased concentration of <i>cis</i> -nonachlordane; significantly increased concentrations of the sum of PCBs, HCB, <i>trans</i> - and <i>cis</i> -nonachlordane, and the sum of chlordanes in cases' mothers
Biggs et al. [126]	272 US TC patients aged 18–44 years after the first course of cancer treatment (13,4% aged 18–24 years) vs 630 controls	PCBs (36 congeners), DDE, HCB and other pesticides	Blood	Postnatal	Similar TC risk across categories of serum PCB concentration, no trend with increasing serum pesticide levels
McGlynn et al. [124]	US military personnel. 915 controls and 739 cases (8,7% 18–20 years old, 32,5% 21–25 years old)	DDE, HCB and other organochlorine compounds	Blood (previously stored)	Postnatal	TC risk associated with higher plasma levels of DDE and of two chlordanes components, <i>cis</i> -nonachlor and <i>trans</i> -nonachlor
McGlynn et al. [125]	US military personnel. 913 controls and 736 cases (8,7% 18–20 years old, 32,3% 21–25 years old)	PCBs (15 congeners)	Blood (previously stored)	Postnatal	Statistically significant decreased risk of TC in association with eight PCBs and with overall sum.
Le Cornet et al. [123]	9569 North European men aged 14–49 years at TC diagnosis (85% 20–40 years old) vs 32028 controls.	Pesticide, fungicide, herbicide and insecticide	No direct dosage. Parental occupation collected and converted into a pesticide exposure index	Prenatal	No association between parental exposure and TC
Paoli et al. [127].	125 Italian TC patients (aged 29,6 ± 5,9 years) vs 103 controls	PCBs (9 congeners), HCB	Blood	Postnatal	Statistically significant increase in TC risk in cases with detectable values of total PCB)

PCBs polychlorinated biphenyls, HCB hexachlorobenzene, DDE dichlorodiphenyldichloroethylene