

CENTER FOR HORMONFORSTYRENDE STOFFER

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Humane studier ved Afd. for Vækst og Reproduktion, Rigshospitalet

Søgning er udført på PubMed og dækker perioden 12. november – 14. marts 2017

Følgende søgeprofil er benyttet:

Bisphenol A
Phthalat*
Paraben*
(perfluor* OR polyfluor*)
Triclocarban
Triclosan
(Flame retardant)
tributyltin
endocrine disrupters

kombineret med nedenstående tekst:

AND expos* AND (human OR men OR women OR child* OR adult* OR adolescen* OR infan*)

Limits: title/abstract, English language

I den listede bruttoliste er dobbeltgængere fjernet, ligesom hits der hører under kategorierne in vivo studier, in vitro studier eller wildlife er frasorteret. Endelig er rene metodeartikler til hvordan stoffer måles udeladt. De kommenterede artikler er highlightet.

De første to udvalgte artikler er baseret på samme studiemateriale og omhandler effekter af prænatal eksponering til perflourerede stoffer (artikel 1) og phthalater (artikel 2) i relation til androgen- og glucocorticoidniveauet målt i navlestrengsblod. Desuden er udvalgt en artikel omhandlende udsættelsen for phthalater og andre plastblødgørere i svenske børneinstitutioner med fokus på kildeeksponering (artikel 3), og slutteligt er en sidste artikel udvalgt med fokus på sammenhængen mellem PFAS-niveau og risikoen for brystkræft, hvor information om genetiske varianter relevante for brystkræft desuden er inkluderet (artikel 4). Desuden er en enkelt artikel (artikel 5) desuden vist med abstract.

God læselyst

Udvalgte artikler

The Association of Prenatal Exposure to Perfluorinated Chemicals with Glucocorticoid and Androgenic Hormones in Cord Blood Samples: The Hokkaido Study

Goudarzi H, Araki A, Itoh S, Sasaki S, Miyashita C, Mitsui T, Nakazawa H, Nonomura K, Kishi R.
Environ Health Perspect. 2017 Jan;125(1):111-118. doi: 10.1289/EHP142. Epub 2016 May 24.

Abstract

BACKGROUND: Perfluorinated chemicals (PFCs) disrupt cholesterol homeostasis. All steroid hormones are derived from cholesterol, and steroid hormones such as glucocorticoids and androgenic hormones mediate several vital physiologic functions. However, the in utero effects of PFCs exposure on the homeostasis of these steroid hormones are not well understood in humans.

OBJECTIVES: We examined the relationship between prenatal exposure to perfluorooctane sulfonate (PFOS)/perfluorooctanoate (PFOA) and cord blood levels of glucocorticoid and androgenic hormones.

METHODS: We conducted a hospital-based birth cohort study between July 2002 and October 2005 in Sapporo, Japan (n = 514). In total, 185 mother-infant pairs were included in the present study. Prenatal PFOS and PFOA levels in maternal serum samples were measured using liquid chromatography-tandem mass spectrometry (LC-MS-MS). Cord blood levels of glucocorticoid (cortisol and cortisone) and androgenic hormones [dehydroepiandrosterone (DHEA) and androstenedione] were also measured in the same way.

RESULTS: We found a dose-response relationship of prenatal PFOS, but not PFOA, exposure with glucocorticoid levels after adjusting for potential confounders. Cortisol and cortisone concentrations were -23.98-ng/mL (95% CI: -0.47.12, -11.99; p for trend = 0.006) and -63.21-ng/mL (95% CI: -132.56, -26.72; p for trend < 0.001) lower, respectively, in infants with prenatal PFOS exposure in the fourth quartile compared with those in the first quartile. The highest quartile of prenatal PFOS exposure was positively associated with a 1.33-ng/mL higher DHEA level compared with the lowest quartile (95% CI: 0.17, 1.82; p for trend = 0.017), whereas PFOA showed a negative association with DHEA levels (quartile 4 vs. quartile 1: -1.23 ng/mL, 95% CI: -1.72, -0.25; p for trend = 0.004). We observed no significant association between PFCs and androstenedione levels.

CONCLUSIONS: Our results indicate that prenatal exposure to PFCs is significantly associated with glucocorticoid and DHEA levels in cord blood.

Prenatal di(2-ethylhexyl) phthalate exposure and disruption of adrenal androgens and glucocorticoids levels in cord blood: The Hokkaido Study

Araki A, Mitsui T, Goudarzi H, Nakajima T, Miyashita C, Itoh S, Sasaki S, Cho K, Moriya K, Shinohara N, Nonomura K, Kishi R.

Sci Total Environ. 2017 Mar 1;581-582:297-304. doi: 10.1016/j.scitotenv.2016.12.124. Epub 2016 Dec 30.

Abstract

Di(2-ethylhexyl) phthalate (DEHP) is known for its endocrine disrupting properties. We previously demonstrated that prenatal DEHP exposure is associated with decreased progesterone levels and

testosterone/estradiol ratio in the cord blood. However, evidence of the effects of prenatal DEHP exposure on adrenal androgen and glucocorticoids in infants is scarce. Thus, the objectives of this study were to investigate the association between prenatal DEHP exposure and adrenal androgen and glucocorticoids, and to discuss its effects on steroid hormone profiles in infants. This is part of a birth cohort study: The Hokkaido Study on Environment and Children's Health, Sapporo Cohort. Among the 514 participants, 202 mother-infant pairs with available data on maternal mono(2-ethylhexyl) phthalate (MEHP), adrenal androgen (dehydroepiandrosterone [DHEA] and androstenedione) and glucocorticoid (cortisol and cortisone) cord blood levels were included in this study. After adjusting for potential confounders, a linear regression analysis showed that maternal MEHP levels were associated with reduced cortisol and cortisone levels and glucocorticoid/adrenal androgen ratio, whereas increased DHEA levels and DHEA/androstenedione ratio. In a quartile model, when comparing the adjusted least square means in the 4th quartile of MEHP with those in the 1st quartile, cortisol and cortisone levels and glucocorticoid/adrenal androgen ratio decreased, whereas DHEA/androstenedione and cortisol/cortisone ratios increased. Significant p-value trends for cortisol and cortisone levels, cortisol/cortisone ratio, and glucocorticoid/adrenal androgen ratio were observed. In combination with the previous results of reduced progesterone levels and testosterone/estradiol ratio, prenatal exposure to DEHP altered the steroid hormone profiles of infants. Further studies investigating the long-term effects of DEHP exposure on growth, neurodevelopment, and gonad and reproductive function are required.

Phthalates, non-phthalate plasticizers and bisphenols in Swedish preschool dust in relation to children's exposure

Larsson K, Lindh CH, Jönsson BA, Giovanoulis G, Bibi M, Bottai M, Bergström A, Berglund M.
Environ Int. 2017 Mar 5. doi: 10.1016/j.envint.2017.02.006.

Abstract

Children are exposed to a wide range of chemicals in their everyday environments, including the preschool. In this study, we evaluated the levels of phthalates, non-phthalate plasticizers and bisphenols in dust from 100 Swedish preschools and identified important exposure factors in the indoor environment. In addition, children's total exposure to these chemicals was determined by urine analysis to investigate their relation with dust exposure, and to explore the time trends by comparing with children who provided urine fifteen years earlier. The most abundant plasticizers in preschool dust were the phthalates diisononyl phthalate (DiNP) and di-(2-ethylhexyl) phthalate (DEHP) with geometric mean levels of 450 and 266µg/g dust, respectively, and the non-phthalate plasticizers bis(2-ethylhexyl) terephthalate (DEHT) and diisononylcyclohexane-1,2-dicarboxylate (DiNCH) found at 105 and 73µg/g dust, respectively. The levels of several substitute plasticizers were higher in newer preschools, whereas the levels of the strictly regulated phthalate di-n-butyl phthalate (DnBP) were higher in older preschools. The presence of foam mattresses and PVC flooring in the sampling room were associated with higher levels of DiNP in dust. Children's exposure from preschool dust ingestion was below established health based reference values and the estimated exposure to different phthalates and BPA via preschool dust ingestion accounted for 2-27% of the total exposure. We found significantly lower urinary levels of BPA and metabolites of strictly

regulated phthalates, but higher levels of DiNP metabolites, in urine from the children in this study compared to the children who provided urine samples fifteen years earlier.

Polymorphism in xenobiotic and estrogen metabolizing genes, exposure to perfluorinated compounds and subsequent breast cancer risk: A nested case-control study in the Danish National Birth Cohort

Ghisari M, Long M, Røge DM, Olsen J, Bonefeld-Jørgensen EC.

Environ Res. 2017 Apr;154:325-333. doi: 10.1016/j.envres.2017.01.020.

Abstract

In the present case-cohort study based on prospective data from Danish women, we aimed to estimate the main effect of polymorphisms in genes known to be involved in the steroid hormone metabolic pathway and xenobiotic metabolism on the risk of developing breast cancer. We also studied a possible effect measure modification between genotypes and levels of serum perfluoroalkylated substances (PFASs) on the risk to breast cancer. We have previously reported a weak association between serum PFASs levels and the risk of breast cancer for this study population of Danish pregnant nulliparous women as well as in a smaller case-control study of Greenlandic women. The study population consisted of 178 breast cancer cases and 233 controls (nulliparous and frequency matched on age) nested within the Danish National Birth Cohort (DNBC), which was established in 1996-2002. Blood samples were drawn at the time of enrollment (6-14 week of gestation). Serum levels of 10 perfluorocarboxylated acids (PFCAs), 5 perfluorosulfonated acids (PFSAs) and 1 sulfonamide (perfluorooctane-sulfonamide, PFOSA) were measured. Genotyping was conducted for CYP1A1 (Ile462Val; rs1048943), CYP1B1 (Leu432Val; rs1056836), COMT (Val158Met; rs4680), CYP17A1 (A1→ A2; rs743572); CYP19A1 (C→T; rs10046) by the TaqMan allelic discrimination method. In overall, no significant associations were found between the investigated polymorphisms and the risk of breast cancer in this study among Danish women. The previously found association between PFOSA and risk of breast cancer did vary between different genotypes, with significantly increased risk confined to homozygous carriers of the following alleles: COMT (Met), CYP17 (A1) and CYP19 (C).

CONCLUSION: Our results indicate that polymorphisms in COMT, CYP17 and CYP19 which are involved in estrogen biosynthesis and metabolism can modulate the potential effects of PFOSA exposure on the development of breast cancer.

Ibuprofen results in alterations of human fetal testis development

Ben Maamar M, Lesné L, Hennig K, Desdoits-Lethimonier C, Kilcoyne KR, Coiffec I, Rolland AD1, Chevrier C, Kristensen DM, Lavoué V, Antignac JP, Le Bizec B, Dejucq-Rainsford N, Mitchell RT, Mazaud-Guittot S, Jégou B.

Sci Rep. 2017 Mar 10;7:44184. doi: 10.1038/srep44184.

Abstract

Among pregnant women ibuprofen is one of the most frequently used pharmaceutical compounds with up to 28% reporting use. Regardless of this, it remains unknown whether ibuprofen could act as an endocrine disruptor as reported for fellow analgesics paracetamol and aspirin. To investigate this, we exposed human fetal testes (7-17 gestational weeks (GW)) to ibuprofen using ex vivo culture and xenograft systems. Ibuprofen suppressed testosterone and Leydig cell hormone INSL3 during culture of 8-9 GW fetal testes with concomitant reduction in expression of the steroidogenic enzymes CYP11A1, CYP17A1 and HSD17B3, and of INSL3. Testosterone was not suppressed in testes from fetuses younger than 8 GW, older than 10-12 GW, or in second trimester xenografted testes (14-17 GW). Ex vivo, ibuprofen also affected Sertoli cell by suppressing AMH production and mRNA expression of AMH, SOX9, DHH, and COL2A1. While PGE2 production was suppressed by ibuprofen, PGD2 production was not. Germ cell transcripts POU5F1, TFAP2C, LIN28A, ALPP and KIT were also reduced by ibuprofen. We conclude that, at concentrations relevant to human exposure and within a particular narrow 'early window' of sensitivity within first trimester, ibuprofen causes direct endocrine disturbances in the human fetal testis and alteration of the germ cell biology.

Bruttoliste

1. Ibuprofen results in alterations of human fetal testis development.

Ben Maamar M, Lesné L, Hennig K, Desdoits-Lethimonier C, Kilcoyne KR, Coiffec I, Rolland AD1, Chevrier C, Kristensen DM, Lavoué V, Antignac JP, Le Bizec B, Dejuçq-Rainsford N, Mitchell RT, Mazaud-Guittot S, Jégou B. *Sci Rep.* 2017 Mar 10;7:44184. doi: 10.1038/srep44184.

2. Phthalates, non-phthalate plasticizers and bisphenols in Swedish preschool dust in relation to children's exposure.

Larsson K, Lindh CH, Jönsson BA, Giovanoulis G, Bibi M, Bottai M, Bergström A, Berglund M. *Environ Int.* 2017 Mar 5. pii: S0160-4120(16)30792-9. doi: 10.1016/j.envint.2017.02.006. [Epub ahead of print]

3. Exposure to phthalates and bisphenol A are associated with atopic dermatitis symptoms in children: a time-series analysis.

Kim EH, Jeon BH, Kim J, Kim YM, Han Y, Ahn K, Cheong HK. *Environ Health.* 2017 Mar 9;16(1):24. doi: 10.1186/s12940-017-0225-5.

4. Recent advances on bisphenol-A and endocrine disruptor effects on human prostate cancer.

Di Donato M, Cerneria G, Giovannelli P, Galasso G, Bilancio A, Migliaccio A, Castoria G. *Mol Cell Endocrinol.* 2017 Feb 28. pii: S0303-7207(17)30158-2. doi: 10.1016/j.mce.2017.02.045. [Epub ahead of print]

5. Low-Dose Bisphenol A Exposure: A Seemingly Instigating Carcinogenic Effect on Breast Cancer.

Wang Z, Liu H, Liu S. *Adv Sci (Weinh).* 2016 Nov 21;4(2):1600248. doi: 10.1002/advs.201600248. Review.

6. Endocrine Disruptors and Obesity.

Darbre PD. *Curr Obes Rep.* 2017 Feb 15. doi: 10.1007/s13679-017-0240-4. [Epub ahead of print] Review.

7. Legacy and alternative flame retardants in Norwegian and UK indoor environment: Implications of human exposure via dust ingestion.

Kademoglou K, Xu F, Padilla-Sanchez JA, Haug LS, Covaci A, Collins CD. *Environ Int.* 2017 Feb 9. pii: S0160-4120(16)30551-7. doi: 10.1016/j.envint.2016.12.012. [Epub ahead of print]

8. Bisphenol A concentration in human saliva related to dental polymer-based fillings.

Berge TL, Lygre GB, Jönsson BA, Lindh CH, Björkman L. *Clin Oral Investig.* 2017 Feb 9. doi: 10.1007/s00784-017-2055-9. [Epub ahead of print]

9. Identification of exposure to environmental chemicals in children and older adults using human biomonitoring data sorted by age: Results from a literature review.

Choi J, Knudsen LE, Mizrak S, Joas A. *Int J Hyg Environ Health.* 2016 Dec 21. pii: S1438-4639(16)30280-2. doi: 10.1016/j.ijheh.2016.12.006. [Epub ahead of print]

10. Associations between urinary phthalate metabolites and bisphenol A levels, and serum thyroid hormones among the Korean adult population - Korean National Environmental Health Survey (KoNEHS) 2012-2014.

Park C, Choi W, Hwang M, Lee Y, Kim S, Yu S, Lee I, Paek D, Choi K.

Sci Total Environ. 2017 Jan 30. pii: S0048-9697(17)30154-7. doi: 10.1016/j.scitotenv.2017.01.144. [Epub ahead of print]

11. Exposure to phthalates is associated with lipid profile in peripubertal Mexican youth.
Perng W, Watkins DJ, Cantoral A, Mercado-García A, Meeker JD, Téllez-Rojo MM, Peterson KE.
Environ Res. 2017 Apr;154:311-317. doi: 10.1016/j.envres.2017.01.033.

12. Gender differences in the associations between urinary bisphenol A and body composition among American children: The National Health and Nutrition Examination Survey, 2003-2006.
Li J, Lai H, Chen S, Zhu H, Lai S.
J Epidemiol. 2017 Jan 27. pii: S0917-5040(16)30163-0. doi: 10.1016/j.je.2016.12.001. [Epub ahead of print]

13. Prenatal exposure to bisphenol A and risk of allergic diseases in early life.
Zhou A, Chang H, Huo W, Zhang B, Hu J, Xia W, Chen Z, Xiong C, Zhang Y, Wang Y, Xu S, Li Y.
Pediatr Res. 2017 Jan 31. doi: 10.1038/pr.2017.20. [Epub ahead of print]

14. Bisphenol A Metabolites and Bisphenol S in Paired Maternal and Cord Serum.
Liu J, Li J, Wu Y, Zhao Y, Luo F, Li S, Yang L, Moez EK, Dinu I, Martin JW.
Environ Sci Technol. 2017 Feb 21;51(4):2456-2463. doi: 10.1021/acs.est.6b05718.

15. Univariate predictors of maternal concentrations of environmental chemicals: The MIREC study.
Lewin A, Arbuckle TE, Fisher M, Liang CL, Marro L, Davis K, Abdelouahab N, Fraser WD.
Int J Hyg Environ Health. 2017 Jan 16. pii: S1438-4639(16)30178-X. doi: 10.1016/j.ijheh.2017.01.001. [Epub ahead of print]

16. Exposure to Bisphenols and Phthalates and Association with Oxidant Stress, Insulin Resistance, and Endothelial Dysfunction in Children.
Kataria A, Levine D, Wertenteil S, Vento S, Xue J, Rajendiran K, Kannan K, Thurman JM, Morrison D, Brody R, Urbina E, Attina T, Trasande L, Trachtman H.
Pediatr Res. 2017 Jan 18. doi: 10.1038/pr.2017.16. [Epub ahead of print]

17. Urinary bisphenol A concentration and risk of central obesity in Chinese adults: a prospective study.
Hao M, Ding L, Xuan L, Wang T, Li M, Zhao Z, Lu J, Xu Y, Chen Y, Wang W, Bi Y, Xu M, Ning G.
J Diabetes. 2017 Jan 18. doi: 10.1111/1753-0407.12531. [Epub ahead of print]

18. Urine Levels of Phthalate Metabolites and Bisphenol A in Relation to Main Metabolic Syndrome Components: Dyslipidemia, Hypertension and Type 2 Diabetes. A pilot study.
Piecha R, Svačina Š, Malý M, Vrbík K, Lacinová Z, Haluzík M, Pavloušková J, Vavrouš A, Matějková D, Müllerová D, Mráz M, Matoulek M.
Cent Eur J Public Health. 2016 Dec;24(4):297-301. doi: 10.21101/cejph.a4704.

19. The Association between Exposure to Environmental Bisphenol A and Gonadotropic Hormone Levels among Men.
Liang H, Xu W, Chen J, Shi H, Zhu J, Liu X, Wang J, Miao M, Yuan W.
PLoS One. 2017 Jan 13;12(1):e0169217. doi: 10.1371/journal.pone.0169217.

20. Reproducibility of urinary biomarkers in multiple 24-h urine samples.
Sun Q, Bertrand KA, Franke AA, Rosner B, Curhan GC, Willett WC.

Am J Clin Nutr. 2017 Jan;105(1):159-168. doi: 10.3945/ajcn.116.139758.

21. Bisphenol A and Ovarian Reserve among Infertile Women with Polycystic Ovarian Syndrome.

Zhou W, Fang F, Zhu W, Chen ZJ, Du Y, Zhang J.

Int J Environ Res Public Health. 2016 Dec 27;14(1). pii: E18. doi: 10.3390/ijerph14010018.

22. Maternal Urinary Bisphenol A Concentration During Midterm Pregnancy and Children's Blood Pressure at Age 4.

Bae S, Lim YH, Lee YA, Shin CH, Oh SY, Hong YC.

Hypertension. 2017 Feb;69(2):367-374. doi: 10.1161/HYPERTENSIONAHA.116.08281.

23. The French human biomonitoring program: First lessons from the perinatal component and future needs.

Dereumeaux C, Fillol C, Charles MA, Denys S.

Int J Hyg Environ Health. 2016 Nov 17. pii: S1438-4639(16)30109-2. doi: 10.1016/j.ijheh.2016.11.005. [Epub ahead of print]

24. Diverging temporal trends of human exposure to bisphenols and plastizisers, such as phthalates, caused by substitution of legacy EDCs?

Gyllenhammar I, Glynn A, Jönsson BA, Lindh CH, Darnerud PO, Svensson K, Lignell S.

Environ Res. 2017 Feb;153:48-54. doi: 10.1016/j.envres.2016.11.012.

25. Prenatal phthalate, triclosan, and bisphenol A exposures and child visual-spatial abilities.

Braun JM, Bellinger DC, Hauser R, Wright RO, Chen A, Calafat AM, Yolton K, Lanphear BP.

Neurotoxicology. 2017 Jan;58:75-83. doi: 10.1016/j.neuro.2016.11.009.

26. The Association of Serum Bisphenol A with Thyroid Autoimmunity.

Chailurkit LO, Aekplakorn W, Ongphiphadhanakul B.

Int J Environ Res Public Health. 2016 Nov 17;13(11). pii: E1153.

27. Early-life exposure to EDCs: role in childhood obesity and neurodevelopment.

Braun JM.

Nat Rev Endocrinol. 2017 Mar;13(3):161-173. doi: 10.1038/nrendo.2016.186. Review.

28. A systematic study of the release of bisphenol A by orthodontic materials and its biological effects.

Halimi A, Benyahia H, Bahije L, Adli H, Azeroual MF, Zaoui F.

Int Orthod. 2016 Dec;14(4):399-417. doi: 10.1016/j.ortho.2016.10.005.

29. Second trimester amniotic fluid bisphenol A concentration is associated with decreased birth weight in term infants.

Pinney SE, Mesaros CA, Snyder NW, Busch CM, Xiao R, Aijaz S, Ijaz N, Blair IA, Manson JM.

Reprod Toxicol. 2017 Jan;67:1-9. doi: 10.1016/j.reprotox.2016.11.007.

30. Integrated exposure and risk characterization of bisphenol-A in Europe.

Sarigiannis DA, Karakitsios SP, Handakas E, Simou K, Solomou E, Gotti A.

Food Chem Toxicol. 2016 Dec;98(Pt B):134-147. doi: 10.1016/j.fct.2016.10.017.

31. Exposure of children to BPA through dust and the association of urinary BPA and triclosan with oxidative stress in Guangzhou, China.

- Lv Y, Rui C, Dai Y, Pang Q, Li Y, Fan R, Lu S.
Environ Sci Process Impacts. 2016 Dec 8;18(12):1492-1499.
32. Exposure to endocrine disrupting chemicals among residents of a rural vegetarian/vegan community.
Tordjman K, Grinshpan L, Novack L, Göen T, Segev D, Beacher L, Stern N, Berman T.
Environ Int. 2016 Dec;97:68-75. doi: 10.1016/j.envint.2016.10.018.
33. Repeated measures analysis of associations between urinary bisphenol-A concentrations and biomarkers of inflammation and oxidative stress in pregnancy.
Ferguson KK, Cantonwine DE, McElrath TF, Mukherjee B, Meeker JD.
Reprod Toxicol. 2016 Dec;66:93-98. doi: 10.1016/j.reprotox.2016.10.002.
34. Biomarkers of exposure to environmental contaminants in French pregnant women from the Elfe cohort in 2011.
Dereumeaux C, Saoudi A, Pecheux M, Berat B, de Crouy-Chanel P, Zaros C, Brunel S, Delamaire C, le Tertre A, Lefranc A, Vandentorren S, Guldner L.
Environ Int. 2016 Dec;97:56-67. doi: 10.1016/j.envint.2016.10.013.
35. Possible influence of the environmental pollutant bisphenol A on the cardiometabolic risk factors.
Milošević N, Jakšić V, Sudji J, Vuković B, Ičin T, Milić N, Medić Stojanoska M.
Int J Environ Health Res. 2017 Feb;27(1):11-26. doi: 10.1080/09603123.2016.1246654.
36. Urine bisphenol A and pubertal development in boys.
Wang Z, Li D, Miao M, Liang H, Chen J, Zhou Z, Wu C, Yuan W.
Int J Hyg Environ Health. 2017 Jan;220(1):43-50. doi: 10.1016/j.ijheh.2016.10.004.
37. Higher dermal exposure of cashiers to BPA and its association with DNA oxidative damage.
Lv Y, Lu S, Dai Y, Rui C, Wang Y, Zhou Y, Li Y, Pang Q, Fan R.
Environ Int. 2017 Jan;98:69-74. doi: 10.1016/j.envint.2016.10.001.
38. Randomized Intervention Trial to Decrease Bisphenol A Urine Concentrations in Women: Pilot Study.
Hagobian T, Smouse A, Streeter M, Wurst C, Schaffner A, Phelan S.
J Womens Health (Larchmt). 2017 Feb;26(2):128-132. doi: 10.1089/jwh.2016.5746.
39. Environmental and occupational exposure to bisphenol A and endometriosis: urinary and peritoneal fluid concentration levels.
Simonelli A, Guadagni R, De Franciscis P, Colacurci N, Pieri M, Basilicata P, Pedata P, Lamberti M, Sannolo N, Miraglia N.
Int Arch Occup Environ Health. 2017 Jan;90(1):49-61. doi: 10.1007/s00420-016-1171-1.
40. Exposure to bisphenol A is directly associated with inflammation in healthy Korean adults.
Choi YJ, Ha KH, Kim DJ.
Environ Sci Pollut Res Int. 2017 Jan;24(1):284-290. doi: 10.1007/s11356-016-7806-7.
41. The epidemiologic evidence linking prenatal and postnatal exposure to endocrine disrupting chemicals with male reproductive disorders: a systematic review and meta-analysis.
Bonde JP, Flachs EM, Rimborg S, Glazer CH, Giwercman A, Ramlau-Hansen CH, Hougaard KS, Høyer BB, Hærvig KK, Petersen SB, Rylander L, Specht IO, Toft G, Bräuner EV.

Hum Reprod Update. 2016 Dec;23(1):104-125. Review.

42. Metabolic and endocrine effects of bisphenol A exposure in market seller women with polycystic ovary syndrome. Vahedi M, Saeedi A, Poorbaghi SL, Sepehrimanesh M, Fattahi M. Environ Sci Pollut Res Int. 2016 Dec;23(23):23546-23550.

43. Quantifying bisphenol A in maternal and cord whole blood using isotope dilution liquid chromatography/tandem mass spectrometry and maternal characteristics associated with bisphenol A. Yamamoto J, Minatoya M, Sasaki S, Araki A, Miyashita C, Matsumura T, Kishi R. Chemosphere. 2016 Dec;164:25-31. doi: 10.1016/j.chemosphere.2016.08.001.

44. Serum Testosterone Concentrations and Urinary Bisphenol A, Benzophenone-3, Triclosan, and Paraben Levels in Male and Female Children and Adolescents: NHANES 2011-2012. Scinicariello F, Buser MC. Environ Health Perspect. 2016 Dec;124(12):1898-1904.

45. Detection of phenolic endocrine disrupting chemicals (EDCs) from maternal blood plasma and amniotic fluid in Indian population. Shekhar S, Sood S, Showkat S, Lite C, Chandrasekhar A, Vairamani M, Barathi S, Santosh W. Gen Comp Endocrinol. 2017 Jan 15;241:100-107. doi: 10.1016/j.ygcen.2016.05.025.

46. Predicting Behaviors to Reduce Toxic Chemical Exposures Among New and Expectant Mothers: The Role of Distal Variables Within the Integrative Model of Behavioral Prediction. Mello S, Hovick SR. Health Educ Behav. 2016 Dec;43(6):705-715.

47. Bisphenol A exposure and children's behavior: A systematic review. Ejaredar M, Lee Y, Roberts DJ, Sauve R, Dewey D. J Expo Sci Environ Epidemiol. 2017 Mar;27(2):175-183. doi: 10.1038/jes.2016.8.

48. Children with atopic dermatitis and frequent emollient use have increased urinary levels of low molecular weight phthalate metabolites and parabens. Overgaard LE, Main KM, Frederiksen H, Stender S, Szecsi PB, Williams HC, Thyssen JP. Allergy. 2017 Mar 9. doi: 10.1111/all.13157. [Epub ahead of print]

49. Human biomonitoring pilot study DEMOCOPHES in Germany: Contribution to a harmonized European approach. Schwedler G, Seiwert M, Fiddicke U, Ißleb S, Hölzer J, Nendza J, Wilhelm M, Wittsiepe J, Koch HM, Schindler BK, Göen T, Hildebrand J, Joas R, Joas A, Casteleyn L, Angerer J, Castano A, Esteban M, Schoeters G, Den Hond E, Sepai O, Exley K, Bloemen L, Knudsen LE, Kolossa-Gehring M. Int J Hyg Environ Health. 2017 Feb 6. pii: S1438-4639(16)30427-8. doi: 10.1016/j.ijheh.2017.01.012. [Epub ahead of print]

50. Direct and Air-Mediated Transfer of Labeled SVOCs from Indoor Sources to Dust. Sukiene V, von Goetz N, Gerecke AC, Bakker MI, Delmaar CJ, Hungerbühler K. Environ Sci Technol. 2017 Mar 9. doi: 10.1021/acs.est.6b06051. [Epub ahead of print]

51. Wastewater-based epidemiology as a new tool for estimating population exposure to phthalate plasticizers.

- Gonzalez-Marino I, Rodil R, Barrio I, Cela R, Quintana JB.
Environ Sci Technol. 2017 Feb 27. doi: 10.1021/acs.est.6b05612. [Epub ahead of print]
52. Exposure of children to phthalates and the impact of consumer practices in Slovakia.
Šidlovská M, Petrovičová I, Kolena B, Pilka T, Šovčíková E, Trnovec T.
Rev Environ Health. 2017 Mar 1;32(1-2):211-214. doi: 10.1515/reveh-2016-0028.
53. Indoor air pollutants, ventilation rate determinants and potential control strategies in Chinese dwellings: A literature review.
Ye W, Zhang X, Gao J, Cao G, Zhou X, Su X.
Sci Total Environ. 2017 Feb 16. pii: S0048-9697(17)30288-7. doi: 10.1016/j.scitotenv.2017.02.047. [Epub ahead of print]
54. Oxidative Stress-Related Genetic Variants May Modify Associations of Phthalate Exposures with Asthma.
Wang JJ, Karmaus WJ.
Int J Environ Res Public Health. 2017 Feb 8;14(2). pii: E162. doi: 10.3390/ijerph14020162.
55. Exposure of Portuguese children to the novel non-phthalate plasticizer di-(iso-nonyl)-cyclohexane-1,2-dicarboxylate (DINCH).
Correia-Sá L, Schütze A, Norberto S, Calhau C, Domingues VF, Koch HM.
Environ Int. 2017 Feb 7. pii: S0160-4120(16)31001-7. doi: 10.1016/j.envint.2017.02.001. [Epub ahead of print]
56. Urinary concentrations of 25 phthalate metabolites in Brazilian children and their association with oxidative DNA damage.
Rocha BA, Asimakopoulos AG, Barbosa F Jr, Kannan K.
Sci Total Environ. 2017 Feb 4. pii: S0048-9697(17)30210-3. doi: 10.1016/j.scitotenv.2017.01.193. [Epub ahead of print]
57. Phthalate-induced oxidative stress and association with asthma-related airway inflammation in adolescents.
Franken C, Lambrechts N, Govarts E, Koppen G, Den Hond E, Ooms D, Voorspoels S, Bruckers L, Loots I, Nelen V, Sioen I, Nawrot TS, Baeyens W, Van Larebeke N, Schoeters G.
Int J Hyg Environ Health. 2017 Jan 30. pii: S1438-4639(16)30219-X. doi: 10.1016/j.ijheh.2017.01.006. [Epub ahead of print]
58. Maternal prenatal urinary phthalate metabolite concentrations and visual recognition memory among infants at 27 weeks.
Ipapo KN, Factor-Litvak P, Whyatt RM, Calafat AM, Diaz D, Perera F, Rauh V, Herbstman JB.
Environ Res. 2017 Feb 4;155:7-14. doi: 10.1016/j.envres.2017.01.019. [Epub ahead of print]
59. Three cycles of human biomonitoring in Flanders - Time trends observed in the Flemish Environment and Health Study.
Schoeters G, Govarts E, Bruckers L, Den Hond E, Nelen V, De Henauw S, Sioen I, Nawrot TS, Plusquin M, Vriens A, Covaci A, Loots I, Morrens B, Coertjens D, Van Larebeke N, De Craemer S, Croes K, Lambrechts N, Colles A, Baeyens W.
Int J Hyg Environ Health. 2016 Nov 18. pii: S1438-4639(16)30240-1. doi: 10.1016/j.ijheh.2016.11.006. [Epub ahead of print]
60. Effects of Gender on the Association of Urinary Phthalate Metabolites with Thyroid Hormones in Children: A Prospective Cohort Study in Taiwan.

- Weng TI, Chen MH, Lien GW, Chen PS, Lin JC, Fang CC, Chen PC.
Int J Environ Res Public Health. 2017 Jan 29;14(2). pii: E123. doi: 10.3390/ijerph14020123.
61. Adsorption of Phthalates on Impervious Indoor Surfaces.
Wu Y, Eichler CM, Leng W, Cox SS, Marr LC, Little JC.
Environ Sci Technol. 2017 Mar 7;51(5):2907-2913. doi: 10.1021/acs.est.6b05853.
62. Leaching of plasticizers from polyvinylchloride perfusion lines by different lipid emulsions for premature infants under clinical conditions.
Faessler D, McCombie G, Biedermann M, Felder F, Subotic U.
Int J Pharm. 2017 Mar 30;520(1-2):119-125. doi: 10.1016/j.ijpharm.2017.01.046.
63. Food consumption survey of Shanghai adults in 2012 and its associations with phthalate metabolites in urine.
Dong R, Zhou T, Zhao S, Zhang H, Zhang M, Chen J, Wang M, Wu M, Li S, Chen B.
Environ Int. 2017 Apr;101:80-88. doi: 10.1016/j.envint.2017.01.008.
71. Environmental Pollutants, Limitations in Physical Functioning, and Frailty in Older Adults.
García-Esquinas E, Rodríguez-Artalejo F.
Curr Environ Health Rep. 2017 Mar;4(1):12-20. doi: 10.1007/s40572-017-0128-1. Review.
64. Estimating uptake of phthalate ester metabolites into the human nail plate using pharmacokinetic modelling.
Bui TT, Alves A, Palm-Cousins A, Voorspoels S, Covaci A, Cousins IT.
Environ Int. 2017 Mar;100:148-155. doi: 10.1016/j.envint.2017.01.007.
- 65. Prenatal di(2-ethylhexyl) phthalate exposure and disruption of adrenal androgens and glucocorticoids levels in cord blood: The Hokkaido Study.**
Araki A, Mitsui T, Goudarzi H, Nakajima T, Miyashita C, Itoh S, Sasaki S, Cho K, Moriya K, Shinohara N, Nonomura K, Kishi R.
Sci Total Environ. 2017 Mar 1;581-582:297-304. doi: 10.1016/j.scitotenv.2016.12.124.
66. Identification of chemical mixtures to which Canadian pregnant women are exposed: The MIREC Study.
Lee WC, Fisher M, Davis K, Arbuckle TE, Sinha SK.
Environ Int. 2017 Feb;99:321-330. doi: 10.1016/j.envint.2016.12.015.
67. Exposure to multiple chemicals in a cohort of reproductive-aged Danish women.
Rosofsky A, Janulewicz P, Thayer KA, McClean M, Wise LA, Calafat AM, Mikkelsen EM, Taylor KW, Hatch EE.
Environ Res. 2017 Apr;154:73-85. doi: 10.1016/j.envres.2016.12.011.
68. Prenatal phthalate exposure and 8-isoprostane among Mexican-American children with high prevalence of obesity.
Tran V, Tindula G, Huen K, Bradman A, Harley K, Kogut K, Calafat AM, Nguyen B, Parra K, Ye X, Eskenazi B, Holland N.
J Dev Orig Health Dis. 2017 Apr;8(2):196-205. doi: 10.1017/S2040174416000763.
69. Cumulative risk assessment of phthalates associated with birth outcomes in pregnant Chinese women: A prospective cohort study.
Gao H, Xu YY, Huang K, Ge X, Zhang YW, Yao HY, Xu YQ, Yan SQ, Jin ZX, Sheng J, Zhu P, Hao JH, Tao FB.
Environ Pollut. 2017 Mar;222:549-556. doi: 10.1016/j.envpol.2016.11.026.

70. Increased Urinary Phthalate Levels in Women with Uterine Leiomyoma: A Case-Control Study.
Kim YA, Kho Y, Chun KC, Koh JW, Park JW, Bunderson-Schelvan M, Cho YH.
Int J Environ Res Public Health. 2016 Dec 15;13(12). pii: E1247.
71. Evaluating spatial distribution and seasonal variation of phthalates using passive air sampling in southern India.
Sampath S, Selvaraj KK, Shanmugam G, Krishnamoorthy V, Chakraborty P, Ramaswamy BR.
Environ Pollut. 2017 Feb;221:407-417. doi: 10.1016/j.envpol.2016.12.003.
72. Maternal di-(2-ethylhexyl) phthalate exposure during pregnancy causes fetal growth restriction in a stage-specific but gender-independent manner.
Shen R, Zhao LL, Yu Z, Zhang C, Chen YH, Wang H, Zhang ZH, Xu DX.
Reprod Toxicol. 2017 Jan;67:117-124. doi: 10.1016/j.reprotox.2016.12.003.
73. Does exposure to phthalates influence thyroid function and growth hormone homeostasis? The Taiwan Environmental Survey for Toxicants (TEST) 2013.
Huang HB, Pan WH, Chang JW, Chiang HC, Guo YL, Jaakkola JJ, Huang PC.
Environ Res. 2017 Feb;153:63-72. doi: 10.1016/j.envres.2016.11.014.
74. Exposure to phthalates in children aged 5-7years: Associations with thyroid function and insulin-like growth factors.
Wu W, Zhou F, Wang Y, Ning Y, Yang JY, Zhou YK.
Sci Total Environ. 2017 Feb 1;579:950-956. doi: 10.1016/j.scitotenv.2016.06.146.
75. Phthalate levels and related factors in children aged 6-12 years.
Wu W, Zhou F, Wang Y, Ning Y, Yang JY, Zhou YK.
Environ Pollut. 2017 Jan;220(Pt B):990-996. doi: 10.1016/j.envpol.2016.11.049.
76. Prenatal di-2-ethylhexyl phthalate exposure and cord blood adipokine levels and birth size: The Hokkaido study on environment and children's health.
Minatoya M, Araki A, Miyashita C, Sasaki S, Goto Y, Nakajima T, Kishi R.
Sci Total Environ. 2017 Feb 1;579:606-611. doi: 10.1016/j.scitotenv.2016.11.051.
77. Female exposure to phthalates and time to pregnancy: a first pregnancy planner study.
Thomsen AM, Riis AH, Olsen J, Jönsson BA, Lindh CH, Hjollund NH, Jensen TK, Bonde JP, Toft G.
Hum Reprod. 2017 Jan;32(1):232-238.
78. Associations of urinary phthalate and phenol biomarkers with menarche in a multiethnic cohort of young girls.
Wolff MS, Pajak A, Pinney SM, Windham GC, Galvez M, Rybak M, Silva MJ, Ye X, Calafat AM, Kushi LH, Biro FM, Teitelbaum SL; Breast Cancer and Environment Research Program.
Reprod Toxicol. 2017 Jan;67:56-64. doi: 10.1016/j.reprotox.2016.11.009.
79. Occurrence of phthalate esters in over-the-counter medicines from China and its implications for human exposure.
Jia LL, Lou XY, Guo Y, Leung KS, Zeng EY.
Environ Int. 2017 Jan;98:137-142. doi: 10.1016/j.envint.2016.10.025.
80. Population attributable risks and costs of diabetogenic chemical exposures in the elderly.
Trasande L, Lampa E, Lind L, Lind PM.

J Epidemiol Community Health. 2017 Feb;71(2):111-114. doi: 10.1136/jech-2016-208006.

81. Long-term exposure assessment to phthalates: How do nail analyses compare to commonly used measurements in urine.

Alves A, Koppen G, Vanermen G, Covaci A, Voorspoels S.

J Chromatogr B Analyt Technol Biomed Life Sci. 2016 Nov 15;1036-1037:124-135. doi: 10.1016/j.jchromb.2016.09.039.

82. Urinary polyaromatic hydrocarbons are associated with adult emphysema, chronic bronchitis, asthma, and infections: US NHANES, 2011-2012.

Shiue I.

Environ Sci Pollut Res Int. 2016 Dec;23(24):25494-25500.

83. Environmental exposure to human carcinogens in teenagers and the association with DNA damage.

Franken C, Koppen G, Lambrechts N, Govarts E, Bruckers L, Den Hond E, Loots I, Nelen V, Sioen I, Nawrot TS, Baeyens W, Van Larebeke N, Boonen F, Ooms D, Wevers M, Jacobs G, Covaci A, Schettgen T, Schoeters G.

Environ Res. 2017 Jan;152:165-174. doi: 10.1016/j.envres.2016.10.012.

84. Phthalates exposure indicators determined by urinary phthalate metabolites in healthy non-obese Czech adults: FANTOM study.

Müllerová D, Bouchalová V, Matějková D, Kovářová K, Svačina Š, Vrbík K, Pavloušková J, Dvořáková J, Müller L.

Food Addit Contam Part A Chem Anal Control Expo Risk Assess. 2016 Dec;33(12):1817-1825.

85. Health risk assessment of exposures to a high molecular weight plasticizer present in automobile interiors.

Perez AL, Liong M, Plotkin K, Rickabaugh KP, Paustenbach DJ.

Chemosphere. 2017 Jan;167:541-550. doi: 10.1016/j.chemosphere.2016.10.007.

86. Prenatal phthalate biomarker concentrations and performance on the Bayley Scales of Infant Development-II in a population of young urban children.

Doherty BT, Engel SM, Buckley JP, Silva MJ, Calafat AM, Wolff MS.

Environ Res. 2017 Jan;152:51-58. doi: 10.1016/j.envres.2016.09.021.

87. Phthalates in plastic bottled non-alcoholic beverages from China and estimated dietary exposure in adults.

Yang JF, Yang LM, Zheng LY, Ying GG, Liu CB, Luo SL.

Food Addit Contam Part B Surveill. 2017 Mar;10(1):44-50. doi: 10.1080/19393210.2016.1245679.

88. Lifetime cancer risk assessment for inhalation exposure to di(2-ethylhexyl) phthalate (DEHP).

Miao Y, Wang R, Lu C, Zhao J, Deng Q.

Environ Sci Pollut Res Int. 2017 Jan;24(1):312-320. doi: 10.1007/s11356-016-7797-4.

89. A systematic review on the adverse health effects of di-2-ethylhexyl phthalate.

Zarean M, Keikha M, Poursafa P, Khalighinejad P, Amin M, Kelishadi R.

Environ Sci Pollut Res Int. 2016 Dec;23(24):24642-24693.

90. Non-target analysis of household dust and laundry dryer lint using comprehensive two-dimensional liquid chromatography coupled with time-of-flight mass spectrometry.

Ouyang X, Weiss JM, de Boer J, Lamoree MH, Leonards PE.

Chemosphere. 2017 Jan;166:431-437. doi: 10.1016/j.chemosphere.2016.09.107.

91. Human exposure to environmental contaminants and congenital anomalies: a critical review.
Foster WG, Evans JA, Little J, Arbour L, Moore A, Sauve R, Andrés León J, Luo W.
Crit Rev Toxicol. 2017 Jan;47(1):59-84. doi: 10.1080/10408444.2016.1211090.
92. A global assessment of phthalates burden and related links to health effects.
Katsikantami I, Sifakis S, Tzatzarakis MN, Vakonaki E, Kalantzi OI, Tsatsakis AM, Rizos AK.
Environ Int. 2016 Dec;97:212-236. doi: 10.1016/j.envint.2016.09.013. Review.
93. Occupational exposure to phthalates in relation to gender, consumer practices and body composition.
Petrovičová I, Kolena B, Šidlovská M, Pilka T, Wimmerová S, Trnovec T.
Environ Sci Pollut Res Int. 2016 Dec;23(23):24125-24134.
94. Phthalates in neonatal health: friend or foe?
Bowman JD, Choudhury M.
J Dev Orig Health Dis. 2016 Dec;7(6):652-664.
95. Mediation of the Relationship between Maternal Phthalate Exposure and Preterm Birth by Oxidative Stress with Repeated Measurements across Pregnancy.
Ferguson KK, Chen YH, VanderWeele TJ, McElrath TF, Meeker JD, Mukherjee B.
Environ Health Perspect. 2017 Mar;125(3):488-494. doi: 10.1289/EHP282.
96. Additional oxidized and alkyl chain breakdown metabolites of the plasticizer DINCH in urine after oral dosage to human volunteers.
Schütze A, Otter R, Modick H, Langsch A, Brüning T, Koch HM.
Arch Toxicol. 2017 Jan;91(1):179-188. doi: 10.1007/s00204-016-1688-9.
97. Semi-volatile organic compounds in the air and dust of 30 French schools: a pilot study.
Raffy G, Mercier F, Blanchard O, Derbez M, Dassonville C, Bonvallot N, Glorennec P, Le Bot B.
Indoor Air. 2017 Jan;27(1):114-127. doi: 10.1111/ina.12288.
98. Dermal uptake directly from air under transient conditions: advances in modeling and comparisons with experimental results for human subjects.
Morrison GC, Weschler CJ, Bekö G.
Indoor Air. 2016 Dec;26(6):913-924. doi: 10.1111/ina.12277.
99. Safe excipient exposure in neonates and small children - protocol for the SEEN project.
Valeur KS, Hertel SA, Lundstrøm KE, Holst H.
Dan Med J. 2017 Feb;64(2). pii: A5324.
100. Maternal urinary paraben levels and offspring size at birth from a Chinese birth cohort.
Wu C, Huo W, Li Y, Zhang B, Wan Y, Zheng T, Zhou A, Chen Z, Qian M, Zhu Y, Jiang Y, Liu H, Hu J, Chen X, Xu B, Xia W, Xu S.
Chemosphere. 2017 Apr;172:29-36. doi: 10.1016/j.chemosphere.2016.12.131.
101. Urinary paraben concentrations and their associations with anthropometric measures of children aged 3 years.
Guo J, Wu C, Lu D, Jiang S, Liang W, Chang X, Xu H, Wang G, Zhou Z.

Environ Pollut. 2017 Mar;222:307-314. doi: 10.1016/j.envpol.2016.12.040.

102. Time trends of contact allergy to the European baseline series in Lithuania.

Linauskienė K, Malinauskienė L, Blažienė A.

Contact Dermatitis. 2016 Dec 4. doi: 10.1111/cod.12726. [Epub ahead of print]

103. Daily intake and hazard index of parabens based upon 24 h urine samples of the German Environmental Specimen Bank from 1995 to 2012.

Moos RK, Apel P, Schröter-Kermani C, Kolossa-Gehring M, Brüning T, Koch HM.

J Expo Sci Environ Epidemiol. 2016 Nov 30. doi: 10.1038/jes.2016.65. [Epub ahead of print]

104. Two decades of p-phenylenediamine and toluene-2,5-diamine patch testing - focus on co-sensitizations in the European baseline series and cross-reactions with chemically related substances.

Vogel TA, Heijnen RW, Coenraads PJ, Schuttelaar MA.

Contact Dermatitis. 2017 Feb;76(2):81-88. doi: 10.1111/cod.12619.

105. Association of birth outcomes with fetal exposure to parabens, triclosan and triclocarban in an immigrant population in Brooklyn, New York.

Geer LA, Pycke BF, Waxenbaum J, Sherer DM, Abulafia O, Halden RU.

J Hazard Mater. 2017 Feb 5;323(Pt A):177-183. doi: 10.1016/j.jhazmat.2016.03.028.

106. Perfluoroalkyl substances and endometriosis-related infertility in Chinese women.

Wang B, Zhang R, Jin F, Lou H, Mao Y, Zhu W, Zhou W, Zhang P, Zhang J.

Environ Int. 2017 Mar 7. pii: S0160-4120(16)31028-5. doi: 10.1016/j.envint.2017.03.003. [Epub ahead of print]

107. Human exposure to perfluoroalkyl substances near a fluorochemical industrial park in China.

Bao J, Liu L, Wang X, Jin YH, Dong GH.

Environ Sci Pollut Res Int. 2017 Feb 20. doi: 10.1007/s11356-017-8620-6. [Epub ahead of print]

108. Health risk/benefit information for consumers of fish and shellfish: FishChoice, a new online tool.

Vilavert L, Borrell F, Nadal M, Jacobs S, Minnens F, Verbeke W, Marques A, Domingo JL.

Food Chem Toxicol. 2017 Feb 5. pii: S0278-6915(17)30050-9. doi: 10.1016/j.fct.2017.02.004. [Epub ahead of print]

109. Association of perfluoroalkyl substances exposure with impaired lung function in children.

Qin XD, Qian ZM, Dharmage SC, Perret J, Geiger SD, Rigdon SE, Howard S, Zeng XW, Hu LW, Yang BY, Zhou Y, Li M, Xu SL, Bao WW, Zhang YZ, Yuan P, Wang J, Zhang C, Tian YP, Nian M, Xiao X, Chen W, Lee YL, Dong GH.

Environ Res. 2017 Feb 4;155:15-21. doi: 10.1016/j.envres.2017.01.025. [Epub ahead of print]

110. Polymorphism in xenobiotic and estrogen metabolizing genes, exposure to perfluorinated compounds and subsequent breast cancer risk: A nested case-control study in the Danish National Birth Cohort.

Ghisari M, Long M, Røge DM, Olsen J, Bonfeld-Jørgensen EC.

Environ Res. 2017 Apr;154:325-333. doi: 10.1016/j.envres.2017.01.020.

111. Home produced eggs: An important pathway of human exposure to perfluorobutanoic acid (PFBA) and perfluorooctanoic acid (PFOA) around a fluorochemical industrial park in China.

Su H, Shi Y, Lu Y, Wang P, Zhang M, Sweetman A, Jones K, Johnson A.

Environ Int. 2017 Apr;101:1-6. doi: 10.1016/j.envint.2017.01.016.

112. Prenatal Exposure to Perfluoroalkyl Substances and Body Fatness in Girls.
Hartman TJ, Calafat AM, Holmes AK, Marcus M, Northstone K, Flanders WD, Kato K, Taylor EV.
Child Obes. 2017 Jan 27. doi: 10.1089/chi.2016.0126. [Epub ahead of print]
113. Concentrations and patterns of perfluoroalkyl and polyfluoroalkyl substances in a river and three drinking water treatment plants near and far from a major production source.
Boiteux V, Dauchy X, Bach C, Colin A, Hemard J, Sagres V, Rosin C, Munoz JF.
Sci Total Environ. 2017 Apr 1;583:393-400. doi: 10.1016/j.scitotenv.2017.01.079.
114. Effects of perfluorinated chemicals on thyroid function, markers of ovarian reserve, and natural fertility.
Crawford NM, Fenton SE, Strynar M, Hines EP, Pritchard DA, Steiner AZ.
Reprod Toxicol. 2017 Jan 19;69:53-59. doi: 10.1016/j.reprotox.2017.01.006. [Epub ahead of print]
115. Serum perfluoroalkyl substances in children exposed to the world trade center disaster.
Trasande L, Koshy TT, Gilbert J, Burdine LK, Attina TM, Ghassabian A, Honda M, Marmor M, Chu DB, Han X, Shao Y, Kannan K.
Environ Res. 2017 Apr;154:212-221. doi: 10.1016/j.envres.2017.01.008.
116. Association between perfluoroalkyl substance exposure and asthma and allergic disease in children as modified by MMR vaccination.
Timmermann CA, Budtz-Jørgensen E, Jensen TK, Osuna CE, Petersen MS, Steuerwald U, Nielsen F, Poulsen LK, Weihe P, Grandjean P.
J Immunotoxicol. 2017 Dec;14(1):39-49. doi: 10.1080/1547691X.2016.1254306.
117. Maternal Concentrations of Perfluoroalkyl Substances and Fetal Markers of Metabolic Function and Birth Weight: The Maternal-Infant Research on Environmental Chemicals (MIREC) Study.
Ashley-Martin J, Dodds L, Arbuckle TE, Bouchard MF, Fisher M, Morriset AS, Monnier P, Shapiro GD, Ettinger AS, Dallaire R, Taback S, Fraser W, Platt RW.
Am J Epidemiol. 2017 Jan 9. doi: 10.1093/aje/kww213. [Epub ahead of print]
118. ADONA and perfluoroalkylated substances in plasma samples of German blood donors living in South Germany.
Fromme H, Wöckner M, Roscher E, Völkel W.
Int J Hyg Environ Health. 2017 Jan 4. pii: S1438-4639(16)30568-5. doi: 10.1016/j.ijheh.2016.12.014. [Epub ahead of print]
119. Maternal serum concentrations of perfluoroalkyl acids in five international birth cohorts.
Bjerregaard-Olesen C, Bossi R, Liew Z, Long M, Bech BH, Olsen J, Henriksen TB, Berg V, Nøst TH, Zhang JJ, Bonefeld-Jørgensen EC.
Int J Hyg Environ Health. 2016 Dec 23. pii: S1438-4639(16)30323-6. doi: 10.1016/j.ijheh.2016.12.005. [Epub ahead of print]
120. Dietary predictors and plasma concentrations of perfluorinated alkyl acids in a Singapore population.
Liu Y, Su J, van Dam RM, Prem K, Hoong JY, Zou L, Lu Y, Ong CN.
Chemosphere. 2017 Mar;171:617-624. doi: 10.1016/j.chemosphere.2016.12.107.

121. Per- and Polyfluoroalkyl Substances (PFASs) in Food and Human Dietary Intake: A Review of the Recent Scientific Literature.
Domingo JL, Nadal M.
J Agric Food Chem. 2017 Jan 25;65(3):533-543. doi: 10.1021/acs.jafc.6b04683.
122. Multianalyte profiling of per- and polyfluoroalkyl substances (PFASs) in liquid commercial products.
Favreau P, Poncioni-Rothlisberger C, Place BJ, Bouchex-Bellomie H, Weber A, Tremp J, Field JA, Kohler M.
Chemosphere. 2017 Mar;171:491-501. doi: 10.1016/j.chemosphere.2016.11.127.
123. Perfluoroalkyl substances and thyroid hormones in cord blood.
Tsai MS, Lin CC, Chen MH, Hsieh WS, Chen PC.
Environ Pollut. 2017 Mar;222:543-548. doi: 10.1016/j.envpol.2016.11.027.
124. Nationwide reconnaissance of contaminants of emerging concern in source and treated drinking waters of the United States.
Glassmeyer ST, Furlong ET, Kolpin DW, Batt AL, Benson R, Boone JS, Conerly O, Donohue MJ, King DN, Kostich MS, Mash HE, Pfaller SL, Schenck KM, Simmons JE, Varughese EA, Vesper SJ, Villegas EN, Wilson VS.
Sci Total Environ. 2017 Mar 1;581-582:909-922. doi: 10.1016/j.scitotenv.2016.12.004.
125. The impact of two fluoropolymer manufacturing facilities on downstream contamination of a river and drinking water resources with per- and polyfluoroalkyl substances.
Bach C, Dauchy X, Boiteux V, Colin A, Hemard J, Sagres V, Rosin C, Munoz JF.
Environ Sci Pollut Res Int. 2016 Dec 17. [Epub ahead of print]
126. Levels and trends of contaminants in humans of the Arctic.
Gibson J, Adlard B, Olafsdottir K, Sandanger TM, Odland JØ.
Int J Circumpolar Health. 2016 Dec 13;75:33804. doi: 10.3402/ijch.v75.33804.
127. Novel Chlorinated Polyfluorinated Ether Sulfonates and Legacy Per-/Polyfluoroalkyl Substances: Placental Transfer and Relationship with Serum Albumin and Glomerular Filtration Rate.
Pan Y, Zhu Y, Zheng T, Cui Q, Buka SL, Zhang B, Guo Y, Xia W, Yeung LW, Li Y, Zhou A, Qiu L, Liu H, Jiang M, Wu C, Xu S, Dai J.
Environ Sci Technol. 2017 Jan 3;51(1):634-644. doi: 10.1021/acs.est.6b04590.
128. Occurrence, temporal trends, and half-lives of perfluoroalkyl acids (PFAAs) in occupational workers in China.
Fu J, Gao Y, Cui L, Wang T, Liang Y, Qu G, Yuan B, Wang Y, Zhang A, Jiang G.
Sci Rep. 2016 Dec 1;6:38039. doi: 10.1038/srep38039.
129. Perfluoroalkyl acids (PFAAs) in the Pra and Kakum River basins and associated tap water in Ghana.
Essumang DK, Eshun A, Hogarh JN, Bentum JK, Adjei JK, Negishi J, Nakamichi S, Habibullah-Al-Mamun M, Masunaga S.
Sci Total Environ. 2017 Feb 1;579:729-735. doi: 10.1016/j.scitotenv.2016.11.035.
130. Occurrence of perfluoroalkyl substances in cord serum and association with growth indicators in newborns from Beijing.
Shi Y, Yang L, Li J, Lai J, Wang Y, Zhao Y, Wu Y.
Chemosphere. 2017 Feb;169:396-402. doi: 10.1016/j.chemosphere.2016.11.050.

131. Exposure to perfluoroalkyl substances and thyroid function in pregnant women and children: A systematic review of epidemiologic studies.
Ballesteros V, Costa O, Iñiguez C, Fletcher T, Ballester F, Lopez-Espinosa MJ.
Environ Int. 2017 Feb;99:15-28. doi: 10.1016/j.envint.2016.10.015. Review.
132. Is there a human health risk associated with indirect exposure to perfluoroalkyl carboxylates (PFCAs)?
Rand AA, Mabury SA.
Toxicology. 2017 Jan 15;375:28-36. doi: 10.1016/j.tox.2016.11.011.
133. Carcinogenic risk of emerging persistent organic pollutant perfluorooctane sulfonate (PFOS): A proposal of classification.
Arrieta-Cortes R, Farias P, Hoyo-Vadillo C, Kleiche-Dray M.
Regul Toxicol Pharmacol. 2017 Feb;83:66-80. doi: 10.1016/j.yrtph.2016.11.021.
134. Maternal serum levels of perfluoroalkyl substances and organochlorines and indices of fetal growth: a Scandinavian case-cohort study.
Lauritzen HB, Larose TL, Øien T, Sandanger TM, Odland JØ, van de Bor M, Jacobsen GW.
Pediatr Res. 2017 Jan;81(1-1):33-42. doi: 10.1038/pr.2016.187.
135. Analysis of perfluorinated compounds in human serum from the general population in Shanghai by liquid chromatography-tandem mass spectrometry (LC-MS/MS).
Wu M, Sun R, Wang M, Liang H, Ma S, Han T, Xia X, Ma J, Tang L, Sun Y, Xu G.
Chemosphere. 2017 Feb;168:100-105. doi: 10.1016/j.chemosphere.2016.09.161.
136. Perfluoroalkyl and polyfluoroalkyl substances in cord blood of newborns in Shanghai, China: Implications for risk assessment.
Wang B, Chen Q, Shen L, Zhao S, Pang W, Zhang J.
Environ Int. 2016 Dec;97:7-14. doi: 10.1016/j.envint.2016.10.008.
137. Environmental Chemicals in an Urban Population of Pregnant Women and Their Newborns from San Francisco.
Morello-Frosch R, Cushing LJ, Jesdale BM, Schwartz JM, Guo W, Guo T, Wang M, Harwani S, Petropoulou SE, Duong W, Park JS, Petreas M, Gajek R, Alvaran J, She J, Dobraca D, Das R, Woodruff TJ.
Environ Sci Technol. 2016 Nov 15;50(22):12464-12472.
138. Behavioral difficulties in 7-year old children in relation to developmental exposure to perfluorinated alkyl substances.
Oulhote Y, Steuerwald U, Debes F, Weihe P, Grandjean P.
Environ Int. 2016 Dec;97:237-245. doi: 10.1016/j.envint.2016.09.015.
139. Spatial and temporal trends in perfluorooctanoic and perfluorohexanoic acid in well, surface, and tap water around a fluoropolymer plant in Osaka, Japan.
Shiwaku Y, Lee P, Thepaksorn P, Zheng B, Koizumi A, Harada KH.
Chemosphere. 2016 Dec;164:603-610. doi: 10.1016/j.chemosphere.2016.09.006.
140. Screening for perfluoroalkyl acids in consumer products, building materials and wastes.
Bečanová J, Melymuk L, Vojta Š, Komprdová K, Klánová J.
Chemosphere. 2016 Dec;164:322-329. doi: 10.1016/j.chemosphere.2016.08.112.

141. Early-Life Exposure to Perfluoroalkyl Substances and Childhood Metabolic Function.
Fleisch AF, Rifas-Shiman SL, Mora AM, Calafat AM, Ye X, Luttmann-Gibson H, Gillman MW, Oken E, Sagiv SK.
Environ Health Perspect. 2017 Mar;125(3):481-487. doi: 10.1289/EHP303.
142. Perfluoroalkyl Chemicals, Menstrual Cycle Length, and Fecundity: Findings from a Prospective Pregnancy Study.
Lum KJ, Sundaram R, Barr DB, Louis TA, Buck Louis GM.
Epidemiology. 2017 Jan;28(1):90-98.
143. Prenatal Exposure to Perfluoroalkyl Substances and Adiposity in Early and Mid-Childhood.
Mora AM, Oken E, Rifas-Shiman SL, Webster TF, Gillman MW, Calafat AM, Ye X, Sagiv SK.
Environ Health Perspect. 2017 Mar;125(3):467-473. doi: 10.1289/EHP246.
- 144. The Association of Prenatal Exposure to Perfluorinated Chemicals with Glucocorticoid and Androgenic Hormones in Cord Blood Samples: The Hokkaido Study.**
Goudarzi H, Araki A, Itoh S, Sasaki S, Miyashita C, Mitsui T, Nakazawa H, Nonomura K, Kishi R.
Environ Health Perspect. 2017 Jan;125(1):111-118. doi: 10.1289/EHP142.
145. Triclosan/triclocarban levels in maternal and umbilical blood samples and their association with fetal malformation.
Wei L, Qiao P, Shi Y, Ruan Y, Yin J, Wu Q, Shao B.
Clin Chim Acta. 2017 Mar;466:133-137. doi: 10.1016/j.cca.2016.12.024.
146. Urinary Concentrations of the Antibacterial Agent Triclocarban in United States Residents: 2013-2014 National Health and Nutrition Examination Survey.
Ye X, Wong LY, Dwivedi P, Zhou X, Jia T, Calafat AM.
Environ Sci Technol. 2016 Dec 20;50(24):13548-13554.
147. Hypothesis-driven weight-of-evidence analysis of endocrine disruption potential: a case study with triclosan.
Mihaich E, Capdevielle M, Urbach-Ross D, Slezak B.
Crit Rev Toxicol. 2017 Jan 27;1-26. doi: 10.1080/10408444.2016.1269722. [Epub ahead of print]
148. Cross-sectional study of social behaviors in preschool children and exposure to flame retardants.
Lipscomb ST, McClelland MM, MacDonald M, Cardenas A, Anderson KA, Kile ML.
Environ Health. 2017 Mar 9;16(1):23. doi: 10.1186/s12940-017-0224-6.
149. Current halogenated flame retardant concentrations in serum from residents of Shandong Province, China, and temporal changes in the concentrations.
Ma Y, Li P, Jin J, Wang Y, Wang Q.
Environ Res. 2017 Feb 16;155:116-122. doi: 10.1016/j.envres.2017.02.010. [Epub ahead of print]
150. Associations between urinary diphenyl phosphate and thyroid function.
Preston EV, McClean MD, Claus Henn B, Stapleton HM, Braverman LE, Pearce EN, Makey CM, Webster TF.
Environ Int. 2017 Apr;101:158-164. doi: 10.1016/j.envint.2017.01.020.
151. Chemical alternatives assessment of different flame retardants - A case study including multi-walled carbon nanotubes as synergist.

- Aschberger K, Campia I, Pesudo LQ, Radovnikovic A, Reina V.
Environ Int. 2017 Apr;101:27-45. doi: 10.1016/j.envint.2016.12.017. Review.
152. Levels of Urinary Metabolites of Organophosphate Flame Retardants, TDCIPP, and TPHP, in Pregnant Women in Shanghai.
Feng L, Ouyang F, Liu L, Wang X, Wang X, Li YJ, Murtha A, Shen H, Zhang J, Zhang JJ.
J Environ Public Health. 2016;2016:9416054. doi: 10.1155/2016/9416054.
153. Effect of E-waste Recycling on Urinary Metabolites of Organophosphate Flame Retardants and Plasticizers and Their Association with Oxidative Stress.
Lu SY, Li YX, Zhang T, Cai D, Ruan JJ, Huang MZ, Wang L, Zhang JQ, Qiu RL.
Environ Sci Technol. 2017 Feb 21;51(4):2427-2437. doi: 10.1021/acs.est.6b05462.
154. Association of prenatal and childhood PBDE exposure with timing of puberty in boys and girls.
Harley KG, Rauch SA, Chevrier J, Kogut K, Parra KL, Trujillo C, Lustig RH, Greenspan LC, Sjödin A, Bradman A, Eskenazi B.
Environ Int. 2017 Mar;100:132-138. doi: 10.1016/j.envint.2017.01.003.
155. Organophosphate flame retardants in the indoor air and dust in cars in Japan.
Tokumura M, Hatayama R, Tatsu K, Naito T, Takeda T, Raknuzzaman M, -Al-Mamun MH, Masunaga S.
Environ Monit Assess. 2017 Jan;189(2):48. doi: 10.1007/s10661-016-5725-1.
156. Dietary intake of phosphorus flame retardants (PFRs) using Swedish food market basket estimations.
Poma G, Glynn A, Malarvannan G, Covaci A, Darnerud PO.
Food Chem Toxicol. 2017 Feb;100:1-7. doi: 10.1016/j.fct.2016.12.011.
157. Pregnant Women's perceptions of exposure to brominated flame retardants.
Lane A, Goodyer CG, Rab F, Ashley JM, Sharma S, Hodgson A, Nisker J.
Reprod Health. 2016 Dec 1;13(1):142.
158. Potential human exposure to halogenated flame-retardants in elevated surface dust and floor dust in an academic environment.
Allgood JM, Jimah T, McClaskey CM, La Guardia MJ, Hammel SC, Zeineddine MM, Tang IW, Runnerstrom MG, Ogunseitán OA.
Environ Res. 2017 Feb;153:55-62. doi: 10.1016/j.envres.2016.11.010.
159. Human exposure to brominated flame retardants through the consumption of fish and shellfish in Tarragona County (Catalonia, Spain).
Trabalón L, Vilavert L, Domingo JL, Pocurull E, Borrull F, Nadal M.
Food Chem Toxicol. 2016 Nov 23. pii: S0278-6915(16)30438-0. doi: 10.1016/j.fct.2016.11.022. [Epub ahead of print]
160. Brominated flame retardants in placental tissues: associations with infant sex and thyroid hormone endpoints.
Leonetti C, Butt CM, Hoffman K, Hammel SC, Miranda ML, Stapleton HM.
Environ Health. 2016 Nov 25;15(1):113.
161. In utero and childhood DDT, DDE, PBDE and PCBs exposure and sex hormones in adolescent boys: The CHAMACOS study.

Eskenazi B, Rauch SA, Tenerelli R, Huen K, Holland NT, Lustig RH, Kogut K, Bradman A, Sjödin A, Harley KG. *Int J Hyg Environ Health*. 2016 Nov 14. pii: S1438-4639(16)30264-4. doi: 10.1016/j.ijheh.2016.11.001. [Epub ahead of print]

162. Screening for halogenated flame retardants in European consumer products, building materials and wastes. Vojta Š, Bečanová J, Melymuk L, Komprdová K, Kohoutek J, Kukučka P, Klánová J. *Chemosphere*. 2017 Feb;168:457-466. doi: 10.1016/j.chemosphere.2016.11.032.

163. Quantification of three chlorinated dialkyl phosphates, diphenyl phosphate, 2,3,4,5-tetrabromobenzoic acid, and four other organophosphates in human urine by solid phase extraction-high performance liquid chromatography-tandem mass spectrometry. Jayatilaka NK, Restrepo P, Williams L, Ospina M, Valentin-Blasini L, Calafat AM. *Anal Bioanal Chem*. 2017 Feb;409(5):1323-1332. doi: 10.1007/s00216-016-0061-4.

164. Demographic and temporal trends of hexabromocyclododecanes (HBCDD) in an Australian population. Drage DS, Mueller JF, Hobson P, Harden FA, Toms LL. *Environ Res*. 2017 Jan;152:192-198. doi: 10.1016/j.envres.2016.10.015.

165. Estimation of human exposure to halogenated flame retardants through dermal adsorption by skin wipe. Liu X, Yu G, Cao Z, Wang B, Huang J, Deng S, Wang Y, Shen H, Peng X. *Chemosphere*. 2017 Feb;168:272-278. doi: 10.1016/j.chemosphere.2016.10.015.

166. Emerging and Legacy Flame Retardants in UK Indoor Air and Dust: Evidence for Replacement of PBDEs by Emerging Flame Retardants? Tao F, Abdallah MA, Harrad S. *Environ Sci Technol*. 2016 Dec 6;50(23):13052-13061.

167. Do flame retardant chemicals increase the risk for thyroid dysregulation and cancer? Hoffman K, Sosa JA, Stapleton HM. *Curr Opin Oncol*. 2017 Jan;29(1):7-13.

168. Serum polybrominated diphenyl ether (PBDE) concentrations in relation to biomarkers of oxidative stress and inflammation: The National Health and Nutrition Examination Survey 2003-2004. Yuan Y, Meeker JD, Ferguson KK. *Sci Total Environ*. 2017 Jan 1;575:400-405. doi: 10.1016/j.scitotenv.2016.10.028.

169. Predictors of urinary flame retardant concentration among pregnant women. Hoffman K, Lorenzo A, Butt CM, Adair L, Herring AH, Stapleton HM, Daniels JL. *Environ Int*. 2017 Jan;98:96-101. doi: 10.1016/j.envint.2016.10.007.

170. Distribution of persistent organic pollutants in serum, omental, and parietal adipose tissue of French women with deep infiltrating endometriosis and circulating versus stored ratio as new marker of exposure. Ploteau S, Antignac JP, Volteau C, Marchand P, Vénisseau A, Vacher V, Le Bizec B. *Environ Int*. 2016 Dec;97:125-136. doi: 10.1016/j.envint.2016.08.011.

171. Rice ingestion is a major pathway for human exposure to organophosphate flame retardants (OPFRs) in China. Zhang X, Zou W, Mu L, Chen Y, Ren C, Hu X, Zhou Q.

J Hazard Mater. 2016 Nov 15;318:686-93. doi: 10.1016/j.jhazmat.2016.07.055.

172. Organophosphate ester flame retardant concentrations and distributions in serum from inhabitants of Shandong, China, and changes between 2011 and 2015.

Ma Y, Jin J, Li P, Xu M, Sun Y, Wang Y, Yuan H.

Environ Toxicol Chem. 2017 Feb;36(2):414-421. doi: 10.1002/etc.3554.

173. Levels of polybrominated diphenyl ethers in house dust in Central Poland.

Korcz W, Struciński P, Góralczyk K, Hernik A, Łyczewska M, Matuszak M, Czaja K, Minorczyk M, Ludwicki JK.

Indoor Air. 2017 Jan;27(1):128-135. doi: 10.1111/ina.12293.

174. Dermal bioaccessibility of flame retardants from indoor dust and the influence of topically applied cosmetics.

Pawar G, Abdallah MA, de Sáa EV, Harrad S.

J Expo Sci Environ Epidemiol. 2017 Jan;27(1):100-105. doi: 10.1038/jes.2015.84.

175. Levels of TBT and other selected organotin compounds in duplicate diet samples.

Sousa AC, Coelho SD, Pastorinho MR, Taborda-Barata L, Nogueira AJ, Isobe T, Kunisue T, Takahashi S, Tanabe S.

Sci Total Environ. 2017 Jan 1;574:19-23. doi: 10.1016/j.scitotenv.2016.09.037.

In vitro studier ved DTU Fødevareinstituttet

Søgt i Pubmed med følgende kriterier:

"Endocrine disrupt* AND in vitro*" samt "Endocrine disrupt* AND expose* AND in vitro",

"Paraben* AND in vitro*,"perfluor* OR polyfluor* AND in vitro*" og "Phthalat* AND in vitro*".

Publiceret fra i perioden 2016/12/31 to 2017/03/31.

Efter at have fjernet genganger fra forrige litteraturopdateringslister, samt artikler der ikke hørte til under kategorien "*in vitro*" gav litteratursøgningen, med de angivne søgekriterier, tilsammen en liste med i alt 45 artikler.

2 artikler er blevet udvalgt til abstract, da de beskriver resultater, der bidrager til ny eller yderligere viden om grupper af hormonforstyrrende stoffer. Den første artikel omhandler et *in vitro* studie af BPA og ni strukturelle BPA analoger med det formål, at undersøge stoffernes evne til at påvirke thyroid-hormon systemet. Den anden artikel omhandler *in vitro* studier med det formål, at undersøge de cytotoxiske egenskaber af nogle af de plastblødgørere, som anvendes som alternativer til diethylhexyl phthalat (DEHP) i medicinsk udstyr.

Udvalgte publikationer

Thyroid hormone disrupting potentials of bisphenol A and its analogues - in vitro comparison study employing rat pituitary (GH3) and thyroid follicular (FRTL-5) cells.

Lee S, Kim C, Youn H, Choi K.

Toxicol In Vitro. 2017 Apr;40:297-304. doi: 10.1016/j.tiv.2017.02.004

Abstract

As adverse health effects of bisphenol A (BPA) become a growing public health concern, the chemicals substituting BPA have been increasingly used in everyday lives. BPA substitutes have been frequently detected in both environment and biota in increasing levels. However, very limited toxicological information is available for these chemicals. In the present study, thyroid disrupting effects of nine structural analogues of BPA were evaluated along with BPA, using rat pituitary (GH3) and thyroid follicular (FRTL-5) cells. Similar to BPA, its analogues caused significant down-regulation of *tsh β* , *tr α* , *tr β* , *dio1* or *dio2* genes in GH3 cells, and some analogues, such as BPF, BPM or BPZ, showed even greater potency compared to BPA. In FRTL-5 cells, the genes responsible for hormone synthesis, e.g., *pax8*, *nis*, *tg* or *tpo* genes, exhibited over 1.5-fold up-regulation following exposure to BPA analogues, such as BPS. The effects on gene regulation was different by the cell line. Our results clearly show that the BPA substituting chemicals may influence thyroid hormone homeostasis by affecting thyroid regulation and hormone synthesis, often at lower doses compared to BPA. Thyroid effects of the BPA analogues deserve further investigations in experimental organisms and in human populations

In vitro cytotoxic effects of DEHP-alternative plasticizers and their primary metabolites on a L929 cell line.

Eljezi T, Pinta P, Richard D, Pinguet J, Chezal JM, Chagnon MC, Sautou V, Grimandi G, Moreau E.

Chemosphere. 2017 Apr;173:452-459. doi: 10.1016/j.chemosphere.2017.01.026.

Abstract

Phthalic acid esters have been widely used to improve the plasticity of PVC medical devices. They carry a high exposure risk for both humans and the environment in clinical situations. Our study focuses on the cytotoxicity of alternative plasticizers. Postulated primary metabolites were synthesized, not being commercially available. Cytotoxicity assays were performed on L929 murine cells according to the ISO-EN 10993-5 standard design for the biocompatibility of medical devices. The tested concentrations of plasticizers (0.01, 0.05 and 0.1 mg/ml) covered the range likely to be found in biological fluids coming into direct contact with the medical devices. DEHP, DINP and DINCH were cytotoxic at the highest concentration (0.1 mg/ml) for 7 days of exposure. Their corresponding metabolites were found to be more cytotoxic, for the same concentration. By contrast, TOTM and its corresponding metabolite MOTM were not found to be cytotoxic. DEHA showed no cytotoxicity, but its corresponding monoester (MEHA)

produced a cytotoxic effect at 0.05 mg/ml. In clinical situations, medical devices can release plasticizers, which can come into contact with patients. In vivo, the plasticizers are quickly transformed into primary metabolites. It is therefore important to measure the effects of both the plasticizers and their corresponding metabolites. Standard first-line cytotoxicity assays should be performed to ensure biocompatibility.

Bruttoliste

1. Different DNA damage response of cis and trans isomers of commonly used UV filter after the exposure on adult human liver stem cells and human lymphoblastoid cells.

Sharma A, Bányiová K, Babica P, El Yamani N, Collins AR, Čupr P.

Sci Total Environ. 2017 Mar 21;593-594:18-26. doi: 10.1016/j.scitotenv.2017.03.043. [Epub ahead of print]

2. Is it time to reassess current safety standards for glyphosate-based herbicides?

Vandenberg LN, Blumberg B, Antoniou MN, Benbrook CM, Carroll L, Colborn T, Everett LG, Hansen M, Landrigan PJ, Lanphear BP, Mesnage R, Vom Saal FS, Welshons WV, Myers JP.

J Epidemiol Community Health. 2017 Mar 20. pii: jech-2016-208463. doi: 10.1136/jech-2016-208463. [Epub ahead of print] Review.

3. Weight-of-the-evidence evaluation of 2,4-D potential for interactions with the estrogen, androgen and thyroid pathways and steroidogenesis.

Neal BH, Bus J, Marty MS, Coady K, Williams A, Staveley J, Lamb JC.

Crit Rev Toxicol. 2017 Mar 2:1-57. doi: 10.1080/10408444.2016.1272094. [Epub ahead of print]

4. Curcumin attenuates BPA-induced insulin resistance in HepG2 cells through suppression of JNK/p38 pathways.

Geng S, Wang S, Zhu W, Xie C, Li X, Wu J, Zhu J, Jiang Y, Yang X, Li Y, Chen Y, Wang X, Meng Y, Zhu M, Wu R, Huang C, Zhong C.

Toxicol Lett. 2017 Mar 11. pii: S0378-4274(17)30103-0. doi: 10.1016/j.toxlet.2017.03.011. [Epub ahead of print]

5. Diisononyl phthalate induces asthma via modulation of Th1/Th2 equilibrium.

Hwang YH, Paik MJ, Yee ST.

Toxicol Lett. 2017 Mar 11. pii: S0378-4274(17)30108-X. doi: 10.1016/j.toxlet.2017.03.014. [Epub ahead of print]

6. In vitro effects of phthalate esters in human myometrial and leiomyoma cells and increased urinary level of phthalate metabolite in women with uterine leiomyoma.

Kim JH, Kim SH, Oh YS, Ihm HJ, Chae HD, Kim CH, Kang BM.

Fertil Steril. 2017 Mar 11. pii: S0015-0282(17)30058-4. doi: 10.1016/j.fertnstert.2017.01.015. [Epub ahead of print]

7. Virtual screening applications in short-chain dehydrogenase/reductase research.

Beck KR, Kaserer T, Schuster D, Odermatt A.

J Steroid Biochem Mol Biol. 2017 Mar 9. pii: S0960-0760(17)30072-9. doi: 10.1016/j.jsbmb.2017.03.008. [Epub ahead of print] Review.

8. Polychlorinated biphenyls-153 induces metabolic dysfunction through activation of ROS/NF- κ B signaling via downregulation of HNF1b.

Wu H, Yu W, Meng F, Mi J, Peng J, Liu J, Zhang X, Hai C, Wang X.

Redox Biol. 2017 Mar 7;12:300-310. doi: 10.1016/j.redox.2017.02.026. [Epub ahead of print]

9. Low-Dose Bisphenol A Exposure: A Seemingly Instigating Carcinogenic Effect on Breast Cancer.

Wang Z, Liu H, Liu S.

Adv Sci (Weinh). 2016 Nov 21;4(2):1600248. doi: 10.1002/advs.201600248. Review.

10. Bisphenol A Induces Sox2 in ER₊ Breast Cancer Stem-Like Cells.

Lillo MA, Nichols C, Seagroves TN, Miranda-Carboni GA, Krum SA.

Horm Cancer. 2017 Apr;8(2):90-99. doi: 10.1007/s12672-017-0286-5.

11. Cell-Free Protein Synthesis Approach to Biosensing hTR β -Specific Endocrine Disruptors.

Salehi AS, Shakalli Tang MJ, Smith MT, Hunt JM, Law RA, Wood DW, Bundy BC.

Anal Chem. 2017 Mar 21;89(6):3395-3401. doi: 10.1021/acs.analchem.6b04034.

12. Endocrine Disruptors: Data-based survey of in vivo tests, predictive models and the Adverse Outcome Pathway.

Benigni R, Battistelli CL, Bossa C, Giuliani A, Tcheremenskaia O.

Regul Toxicol Pharmacol. 2017 Feb 20;86:18-24. doi: 10.1016/j.yrtph.2017.02.013. [Epub ahead of print]

13. Pentabromophenol suppresses TGF- β signaling by accelerating degradation of type II TGF- β receptors via caveolae-mediated endocytosis.

Chen CL, Yang PH, Kao YC, Chen PY, Chung CL, Wang SW.

Sci Rep. 2017 Feb 23;7:43206. doi: 10.1038/srep43206.

14. Tributyltin exposure at noncytotoxic doses dysregulates pancreatic β -cell function in vitro and in vivo.

Chen YW, Lan KC, Tsai JR, Weng TI, Yang CY, Liu SH.

Arch Toxicol. 2017 Feb 8. doi: 10.1007/s00204-017-1940-y. [Epub ahead of print]

15. The six most widely used selective serotonin reuptake inhibitors decrease androgens and increase estrogens in the H295R cell line.

Hansen CH, Larsen LW, Sørensen AM, Halling-Sørensen B, Styrihave B.

Toxicol In Vitro. 2017 Feb 5;41:1-11. doi: 10.1016/j.tiv.2017.02.001. [Epub ahead of print]

16. Clastogenic effects of bisphenol A on human cultured lymphocytes.

Santovito A, Cannarsa E, Schleicherova D, Cervella P.

Hum Exp Toxicol. 2017 Jan 1:960327117693069. doi: 10.1177/0960327117693069. [Epub ahead of print]

17. Thyroid hormone disrupting potentials of bisphenol A and its analogues -_in vitro_comparison study employing rat pituitary (GH3) and thyroid follicular (FRTL-5) cells.

Lee S, Kim C, Youn H, Choi K.

Toxicol In Vitro. 2017 Apr;40:297-304. doi: 10.1016/j.tiv.2017.02.004.

18. Hypothesis-driven weight-of-evidence analysis of_endocrine disruption_potential: a case study with triclosan.

Mihaich E, Capdevielle M, Urbach-Ross D, Slezak B.

Crit Rev Toxicol. 2017 Jan 27;1-26. doi: 10.1080/10408444.2016.1269722. [Epub ahead of print]

19. The Effects of_Endocrine Disruptors_on Adipogenesis and Osteogenesis in Mesenchymal Stem Cells: A Review.

Bateman ME, Strong AL, McLachlan JA, Burow ME, Bunnell BA.

Front Endocrinol (Lausanne). 2017 Jan 9;7:171. doi: 10.3389/fendo.2016.00171. Review.

20. Remediation efficiency of three treatments on water polluted with_endocrine disruptors: Assessment by means of in vitro techniques.

Polloni-Silva J, Valdehita A, Fracácio R, Navas JM.

Chemosphere. 2017 Apr;173:267-274. doi: 10.1016/j.chemosphere.2017.01.029.

21. Dibutyl phthalate impairs steroidogenesis and a subset of LH-dependent genes in cultured human mural granulosa cell_in vitro.

Adir M, Combelles CM, Mansur A, Ophir L, Hourvitz A, Orvieto R, Dor J, Machtinger R.

Reprod Toxicol. 2017 Jan 16;69:13-18. doi: 10.1016/j.reprotox.2016.12.007. [Epub ahead of print]

22. In vitro effect of 4-nonylphenol on human chorionic gonadotropin (hCG) stimulated hormone secretion, cell viability and reactive oxygen species generation in mice Leydig cells.

Jambor T, Tvrdá E, Tušimová E, Kováčik A, Bistáková J, Forgács Z, Lukáč N.

Environ Pollut. 2017 Mar;222:219-225. doi: 10.1016/j.envpol.2016.12.053.

23. In vitro_and in silico assessment of the structure-dependent binding of bisphenol analogues to glucocorticoid receptor.

Zhang J, Zhang T, Guan T, Yu H, Li T.

Anal Bioanal Chem. 2017 Mar;409(8):2239-2246. doi: 10.1007/s00216-016-0168-7.

24. Di-2-ethylhexyl phthalate disrupts thyroid hormone homeostasis through activating the Ras/Akt/TRHr pathway and inducing hepatic enzymes.

Ye H, Ha M, Yang M, Yue P, Xie Z, Liu C.

Sci Rep. 2017 Jan 9;7:40153. doi: 10.1038/srep40153.

25. Di-(2-ethylhexyl) phthalate could disrupt the insulin signaling pathway in liver of SD rats and L02 cells via PPAR γ .

Zhang W, Shen XY, Zhang WW, Chen H, Xu WP, Wei W.

Toxicol Appl Pharmacol. 2017 Feb 1;316:17-26. doi: 10.1016/j.taap.2016.12.010.

26. Analysis of the sensitivity of *in vitro* bioassays for androgenic, progestagenic, glucocorticoid, thyroid and estrogenic activity: Suitability for drinking and environmental waters.
Leusch FD, Neale PA, Hebert A, Scheurer M, Schriks MC.
Environ Int. 2017 Feb;99:120-130. doi: 10.1016/j.envint.2016.12.014. Review.
27. Simultaneous profiling of 17 steroid hormones for the evaluation of *endocrine-disrupting chemicals* in H295R cells.
Jumhawan U, Yamashita T, Ishida K, Fukusaki E, Bamba T.
Bioanalysis. 2017 Jan;9(1):67-69.
28. Effects of 4-nonylphenol on the steroidogenesis of human adrenocarcinoma cell line (NCI-H295R).
Bistakova J, Forgacs Z, Bartos Z, Szivosne MR, Jambor T, Knazicka Z, Tvrdá E, Libova L, Goc Z, Massanyi P, Lukac N.
J Environ Sci Health A Tox Hazard Subst Environ Eng. 2017 Feb 23;52(3):221-227. doi: 10.1080/10934529.2016.1246936. Epub 2016 Nov 11.
29. Editor's Highlight: Screening ToxCast Prioritized Chemicals for PPAR γ Function in a Human Adipose-Derived Stem Cell Model of Adipogenesis.
Foley B, Doheny DL, Black MB, Pendse SN, Wetmore BA, Clewell RA, Andersen ME, Deisenroth C.
Toxicol Sci. 2017 Jan;155(1):85-100. doi: 10.1093/toxsci/kfw186.
30. Information-dependent enrichment analysis reveals time-dependent transcriptional regulation of the estrogen pathway of toxicity.
Pendse SN, Maertens A, Rosenberg M, Roy D, Fasani RA, Vantangoli MM, Madnick SJ, Boekelheide K, Fornace AJ, Odwin SA, Yager JD, Hartung T, Andersen ME, McMullen PD.
Arch Toxicol. 2017 Apr;91(4):1749-1762. doi: 10.1007/s00204-016-1824-6. Epub 2016 Sep 3.
31. Bisphenol a induces steatosis in HepaRG cells using a model of perinatal exposure.
Bucher S, Jalili P, Le Guillou D, Begriche K, Rondel K, Martinais S, Zalko D, Corlu A, Robin MA, Fromenty B.
Environ Toxicol. 2017 Mar;32(3):1024-1036. doi: 10.1002/tox.22301.
32. *In vitro* profiling of toxicity and *endocrine disrupting effects* of bisphenol analogues by employing MCF-7 cells and two-hybrid yeast bioassay.
Lei B, Xu J, Peng W, Wen Y, Zeng X, Yu Z, Wang Y, Chen T.
Environ Toxicol. 2017 Jan;32(1):278-289. doi: 10.1002/tox.22234.
33. A study on the *in vitro* percutaneous absorption of silver nanoparticles in combination with aluminum chloride, methyl paraben or di-n-butyl phthalate.
Domeradzka-Gajda K, Nocuń M, Roszak J, Janasik B, Quarles CD Jr, Wąsowicz W, Grobelny J, Tomaszewska E, Celichowski G, Ranożek-Soliwoda K, Cieślak M, Puchowicz D, Gonzalez JJ, Russo RE, Stępnik M.
Toxicol Lett. 2017 Mar 14;272:38-48. doi: 10.1016/j.toxlet.2017.03.006. [Epub ahead of print]
34. A novel method to generate monocyte-derived dendritic cells during coculture with HaCaT facilitates detection of weak contact allergens in cosmetics.

Frombach J, Sonnenburg A, Krapohl BD, Zuberbier T, Stahlmann R, Schreiner M.

Arch Toxicol. 2017 Jan;91(1):339-350. doi: 10.1007/s00204-016-1722-y. Erratum in: Arch Toxicol. 2017 Jan;91(1):351.

35. Selective intracellular vaporisation of antibody-conjugated phase-change nano-droplets in vitro.

Ishijima A, Minamihata K, Yamaguchi S, Yamahira S, Ichikawa R, Kobayashi E, Iijima M, Shibasaki Y, Azuma T, Nagamune T, Sakuma I.

Sci Rep. 2017 Mar 23;7:44077. doi: 10.1038/srep44077.

36. Perfluorocarbon reduces cell damage from blast injury by inhibiting signal paths of NF- κ B, MAPK and Bcl-2/Bax signaling pathway in A549 cells.

Zhang Z, Liang Z, Li H, Li C, Yang Z, Li Y, She D, Cao L, Wang W, Liu C, Chen L.

PLoS One. 2017 Mar 21;12(3):e0173884. doi: 10.1371/journal.pone.0173884. eCollection 2017 Mar 21.

37. Toxic effects of perfluorinated compounds at human cellular level and on a model vertebrate.

Rainieri S, Conlledo N, Langerholc T, Madorran E, Sala M, Barranco A.

Food Chem Toxicol. 2017 Mar 9. pii: S0278-6915(17)30093-5. doi: 10.1016/j.fct.2017.02.041. [Epub ahead of print]

38. Formation of Gold Nanostar-Coated Hollow Mesoporous Silica for Tumor Multimodality Imaging and Photothermal Therapy.

Li X, Xing L, Zheng K, Wei P, Du L, Shen M, Shi X.

ACS Appl Mater Interfaces. 2017 Feb 22;9(7):5817-5827. doi: 10.1021/acsami.6b15185.

39. Diisononyl phthalate induces asthma via modulation of Th1/Th2 equilibrium.

Hwang YH, Paik MJ, Yee ST.

Toxicol Lett. 2017 Mar 11. pii: S0378-4274(17)30108-X. doi: 10.1016/j.toxlet.2017.03.014. [Epub ahead of print]

40. In vitro effects of phthalate esters in human myometrial and leiomyoma cells and increased urinary level of phthalate metabolite in women with uterine leiomyoma.

Kim JH, Kim SH, Oh YS, Ihm HJ, Chae HD, Kim CH, Kang BM.

Fertil Steril. 2017 Mar 11. pii: S0015-0282(17)30058-4. doi: 10.1016/j.fertnstert.2017.01.015. [Epub ahead of print]

41. In vitro cytotoxic effects of DEHP-alternative plasticizers and their primary metabolites on a L929 cell line.

Eljezi T, Pinta P, Richard D, Pinguet J, Chezal JM, Chagnon MC, Sautou V, Grimandi G, Moreau E.

Chemosphere. 2017 Apr;173:452-459. doi: 10.1016/j.chemosphere.2017.01.026.

42. The effects of di 2-ethyl hexyl phthalate (DEHP) on cellular lipid accumulation in HepG2 cells and its potential mechanisms in the molecular level.

Zhang W, Shen XY, Zhang WW, Chen H, Xu WP, Wei W.

Toxicol Mech Methods. 2017 Feb 1:1-8. doi: 10.1080/15376516.2016.1273427. [Epub ahead of print]

43. In vitro_and in silico investigations of the binary-mixture toxicity of_phthalate_esters and cadmium (II) to *Vibrio qinghaiensis* sp.-Q67.

Ding K, Lu L, Wang J, Wang J, Zhou M, Zheng C, Liu J, Zhang C, Zhuang S.

Sci Total Environ. 2017 Feb 15;580:1078-1084. doi: 10.1016/j.scitotenv.2016.12.062.

44. Low level of mono(2-ethylhexyl)_phthalate_reduces oocyte developmental competence in association with impaired gene expression.

Kalo D, Roth Z.

Toxicology. 2017 Feb 15;377:38-48. doi: 10.1016/j.tox.2016.12.005.

45. Effects of Di-isononyl_Phthalate_on Neuropeptide Y Expression in Differentiating Human Neuronal Cells.

Rendel F, Alfredsson CF, Bornehag CG, Sundström BE, Nånberg E.

Basic Clin Pharmacol Toxicol. 2017 Mar;120(3):318-323. doi: 10.1111/bcpt.12670.

***In Vivo* studier ved DTU Fødevareinstituttet**

Søgning er udført på PubMed og dækker perioden Juli - ultimo September 2016

Følgende søgeprofil er benyttet i PubMed: ((endocrine disrupt*) AND (rat OR mice OR mammal*)) OR ((endocrine disrupt*) AND (in vivo*)) OR ((endocrine disrupt*) AND (Paraben*)) OR ((endocrine disrupt*) AND (Phthalat*)) OR ((Endocrine disrupt* AND (antiandrogen)) OR ((endocrine disrupt*) AND (behaviour OR behavior*)) OR ((Endocrine disrupt*) AND (Bisphenol A or BPA) OR ((PFAS* OR Perfluor*) AND (endocrine disrupt*) AND risk assessment

Efter at have fjernet gengangere fra dem vi havde med på den forrige litteraturopdateringsliste samt *in vitro*, human eller SDU relevante artikler, gav litteratursøgningen en liste med i alt 68 artikler (Bruttolisten).

Fire artikler er blevet udvalgt til. Disse artikler er valgt fordi vi mener, de bidrager til ny viden om hormonforstyrrende stoffer og her er der særligt fokus på Linuron (Ding et al. 2017) samt hormonforstyrrende potentiale af Deltamethrin (Slima et al. 2017). De 2 sidste artikler er dels fra en review artikel, der gennemgår testmetoder for hormonforstyrrende sundhedsskadelige virkninger (Manibusan & Touart 2017) og en artikel der gennemgår hvordan AOP kan hjælpe i brugen af forudsigelsesmodeller i regulatorisk toksikologi. (Wittwehr et al. 2017).

Udvalgte publikationer

Rigtig God læselyst.

Ud fra bruttolisten (se længere nede i dokumentet) er udvalgt følgende 2 artikler til engelsk abstrakt og dansk resume og 2 artikler blot med deres abstract.

Reproductive toxicity of linuron following gestational exposure in rats and underlying mechanisms.

Ding H, Zheng W, Han H, Hu X, Hu B, Wang F, Su L, Li H, Li Y.

Toxicol Lett. 2017 Jan 15;266:49-55. doi: 10.1016/j.toxlet.2016.12.013.

Abstract

Linuron is a widely used herbicide in agriculture; its endocrine disruptive toxicity has recently received public attention. This study was designed to examine the developmental toxicity of linuron on the reproductive system of male offspring following maternal exposure. Mother rats received oral gavages of linuron, once daily, at the dose of 0, 50, 100, 150 or 200mg/kg, from gestational day (GD)13 to GD18; gonadal organs from GD20 fetuses were examined. Data indicated that exposed male offspring had a significantly shortened anogenital distance. Pathological examination further revealed a lack of fusion in the urogenital fold in treated fetuses, the damaged seminiferous tubules, and the injured Leydig cell ultrastructure. Analysis of serum testosterone concentrations at postnatal day (PND)2 showed a significant dose-related reduction (about 33.7-58.75%, $r=-0.838$, $p<0.05$) as compared to controls. Immunohistochemical results demonstrated a significantly reduced expression of enzymes pertinent to the testosterone production including P450scc, 3 β -HSD, and PCNA in Leydig cells ($p<0.05$). qPCR studies confirmed decreased levels of mRNAs encoding P450scc, 3 β -HSD and PCNA ($p<0.05$). Taken together, these data suggest that maternal exposure to linuron hampers the male gonadal organ development; this appears to be due to linuron's direct action on the production of testosterone in fetal and postnatal offspring.

Endocrine disrupting potential and reproductive dysfunction in male mice exposed to deltamethrin.

Ben Slima A, Chtourou Y, Barkallah M, Fetoui H, Boudawara T, Gdoura R.

Hum Exp Toxicol. 2017 Mar;36(3):218-226. doi: 10.1177/0960327116646617.

Abstract

Pesticide exposure may affect semen quality and male fertility in humans. The aim of the present work was to elucidate the adverse effects of deltamethrin (Delta), a synthetic pyrethroid, on exposed male mice and their offspring. Adult male Albino/Swiss mice received deltamethrin (5 mg/kg) daily for 35 days and mated with untreated females to produce offspring. Classical measurements of ejaculate and sperm quality and testicular histopathological changes were assessed. Deltamethrin treatment affects sperm quality and quantity in the ejaculated semen of mice that had also markedly impaired libido as measured by indices of mating and fertility and number of pregnant females housed with male mice exposed to this pesticide.

Exposure mice to deltamethrin significantly decreased their testosterone and inhibin B levels and affected reproductive performance. Testes of exposed mice showed marked histopathological alterations as compared to the control group. The mice exposed to 5 mg/kg body weight/day of deltamethrin showed severe alterations of the seminiferous tubules, sloughing of the germ cells, the vacuolization of germ cell cytoplasm, and the disruption of spermatogenic cells compared to the control group. Altered pregnancy outcomes were directly attributed to damage of sperm of male mice exposed to deltamethrin compared to the control group. We concluded that exposure to deltamethrin affected the reproductive system of male mice explored by altered total sperm density, motility, and morphology in mice spermatozoa.

A comprehensive review of regulatory test methods for endocrine adverse health effects M. K.

Manibusan & L. W. Touart (2017): *Critical Reviews in Toxicology*, DOI: 10.1080/10408444.2016.1272095
<http://dx.doi.org/10.1080/10408444.2016.1272095>

Abstract

Development of new endocrine disruption-relevant test methods has been the subject of intensive research efforts for the past several decades, prompted in part by mandates in the 1996 Food Quality Protection Act (FQPA). While scientific understanding and test methods have advanced, questions remain on whether current scientific methods are capable of adequately addressing the complexities of the endocrine system for regulatory health and ecological risk assessments. The specific objective of this article is to perform a comprehensive, detailed evaluation of the adequacy of current test methods to inform regulatory risk assessments of whether a substance has the potential to perturb endocrine-related pathways resulting in human adverse effects. To that end, approximately 42 existing test guidelines (TGs) were considered in the evaluation of coverage for endocrine-related adverse effects. In addition to evaluations of whether test methods are adequate to capture endocrine-related effects, considerations of further enhancements to current test methods, along with the need to develop novel test methods to address existing test method gaps are described. From this specific evaluation, up to 35 test methods are capable of informing whether a chemical substance perturbs known endocrine related biological pathways. Based on these findings, it can be concluded that current validated test methods are adequate to discern substances that may perturb the endocrine system, resulting in an adverse health effect. Together, these test methods predominantly form the core data requirements of a typical food-use pesticide registration submission. It is recognized, however, that the current state of science is rapidly advancing and there is a need to update current test methods to include added enhancements to ensure continued coverage and public health and environmental protection.

How Adverse Outcome Pathways Can Aid the Development and Use of Computational Prediction Models for Regulatory Toxicology.

Wittwehr C, Aladjov H, Ankley G, Byrne HJ, de Knecht J, Heinzle E, Klambauer G, Landesmann B, Luijten M, MacKay C, Maxwell G, Meek ME, Paini A, Perkins E, Sobanski T, Villeneuve D, Waters KM, Whelan M. *Toxicol Sci.* 2017 Feb;155(2):326-336. doi: 10.1093/toxsci/kfw207. Review.

Abstract

Efforts are underway to transform regulatory toxicology and chemical safety assessment from a largely empirical science based on direct observation of apical toxicity outcomes in whole organism toxicity tests to a predictive one in which outcomes and risk are inferred from accumulated mechanistic understanding. The adverse outcome pathway (AOP) framework provides a systematic approach for organizing knowledge that may support such inference. Likewise, computational models of biological systems at various scales provide another means and platform to integrate current biological understanding to facilitate inference and extrapolation. We argue that the systematic organization of knowledge into AOP frameworks can inform and help direct the design and development of computational prediction models that can further enhance the utility of mechanistic and in silico data for chemical safety assessment. This concept was explored as part of a workshop on AOP-Informed Predictive Modeling Approaches for Regulatory Toxicology held September 24-25, 2015. Examples of AOP-informed model development and its application to the assessment of chemicals for skin sensitization and multiple modes of endocrine disruption are provided. The role of problem formulation, not only as a critical phase of risk assessment, but also as guide for both AOP and complementary model development is described. Finally, a proposal for actively engaging the modeling community in AOP-informed computational model development is made. The contents serve as a vision for how AOPs can be leveraged to facilitate development of computational prediction models needed to support the next generation of chemical safety assessment.

Bruttoliste

1. Perinatal Exposure to Low-Dose Bisphenol-A (BPA) Disrupts the Structural and Functional Development of the Hypothalamic Feeding Circuitry.
MacKay H, Patterson ZR, Abizaid A.
Endocrinology. 2017 Feb 7. doi: 10.1210/en.2016-1718. [Epub ahead of print]
2. Is it time to reassess current safety standards for glyphosate-based herbicides?
Vandenberg LN, Blumberg B, Antoniou MN, Benbrook CM, Carroll L, Colborn T, Everett LG, Hansen M, Landrigan PJ, Lanphear BP, Mesnage R, Vom Saal FS, Welshons WV, Myers JP.
J Epidemiol Community Health. 2017 Mar 20. pii: jech-2016-208463. doi: 10.1136/jech-2016-208463. [Epub ahead of print] Review.
3. Weight-of-the-evidence evaluation of 2,4-D potential for interactions with the estrogen, androgen and thyroid pathways and steroidogenesis.
Neal BH, Bus J, Marty MS, Coady K, Williams A, Staveley J, Lamb JC.
Crit Rev Toxicol. 2017 Mar 2:1-57. doi: 10.1080/10408444.2016.1272094. [Epub ahead of print]
4. Altered expression of the Olr59, Ethe1, and Slc10a2 genes in the liver of F344 rats by neonatal thyroid hormone disruption.
Matsubara K, Nakamura N, Sanoh S, Ohta S, Kitamura S, Uramaru N, Miyagawa S, Iguchi T, Fujimoto N.
J Appl Toxicol. 2017 Mar 16. doi: 10.1002/jat.3452. [Epub ahead of print]
5. Maternal exposure to di(2-ethylhexyl)phthalate (DEHP) promotes the transgenerational inheritance of adult-onset reproductive dysfunctions through the female germline in mice.
Pocar P, Fiandanese N, Berrini A, Secchi C, Borromeo V.
Toxicol Appl Pharmacol. 2017 Mar 9;322:113-121. doi: 10.1016/j.taap.2017.03.008. [Epub ahead of print]
6. The mouse mammary gland as a sentinel organ: distinguishing 'control' populations with diverse environmental histories.
Kolla S, Pokharel A, Vandenberg LN.
Environ Health. 2017 Mar 9;16(1):25. doi: 10.1186/s12940-017-0229-1.
7. Female Prostate: historical, developmental, and morphological perspectives.
Biancardi MF, Dos Santos FC, de Carvalho HF, Sanches BD, Taboga SR.
Cell Biol Int. 2017 Mar 4. doi: 10.1002/cbin.10759. [Epub ahead of print] Review.
8. Endocrine Disruptors: Data-based survey of in vivo tests, predictive models and the Adverse Outcome Pathway.
Benigni R, Battistelli CL, Bossa C, Giuliani A, Tcheremenskaia O.
Regul Toxicol Pharmacol. 2017 Feb 20;86:18-24. doi: 10.1016/j.yrtph.2017.02.013.
9. Neonatal Exposure to Endocrine Disrupting Chemicals Impairs Learning Behaviour by Disrupting Hippocampal Organization in Male Swiss Albino Mice.
Bhaskar R, Mishra AK, Mohanty B.
Basic Clin Pharmacol Toxicol. 2017 Feb 16. doi: 10.1111/bcpt.12767. [Epub ahead of print]

10. Direct and transgenerational effects of low doses of perinatal di-(2-ethylhexyl) phthalate (DEHP) on social behaviors in mice.
Quinnies KM, Harris EP, Snyder RW, Sumner SS, Rissman EF.
PLoS One. 2017 Feb 15;12(2):e0171977. doi: 10.1371/journal.pone.0171977.
11. Hypothalamic transcriptomic alterations in male and female California mice (*Peromyscus californicus*) developmentally exposed to bisphenol A or ethinyl estradiol.
Johnson SA, Spollen WG, Manshock LK, Bivens NJ, Givan SA, Rosenfeld CS.
Physiol Rep. 2017 Feb;5(3). pii: e13133. doi: 10.14814/phy2.13133.
12. Animal models of hyperandrogenism and ovarian morphology changes as features of polycystic ovary syndrome: a systematic review.
Paixão L, Ramos RB, Lavarda A, Morsh DM, Spritzer PM.
Reprod Biol Endocrinol. 2017 Feb 10;15(1):12. doi: 10.1186/s12958-017-0231-z. Review.
13. Thyroid hormone disrupting potentials of bisphenol A and its analogues - in vitro comparison study employing rat pituitary (GH3) and thyroid follicular (FRTL-5) cells.
Lee S, Kim C, Youn H, Choi K.
Toxicol In Vitro. 2017 Apr;40:297-304. doi: 10.1016/j.tiv.2017.02.004.
14. Environmental obesogen tributyltin chloride leads to abnormal hypothalamic-pituitary-gonadal axis function by disruption in kisspeptin/leptin signaling in female rats.
Sena GC, Freitas-Lima LC, Merlo E, Podratz PL, de Araújo JF, Brandão PA, Carneiro MT, Zicker MC, Ferreira AV, Takiya CM, de Lemos Barbosa CM, Morales MM, Santos-Silva AP, Miranda-Alves L, Silva IV, Graceli JB.
Toxicol Appl Pharmacol. 2017 Mar 15;319:22-38. doi: 10.1016/j.taap.2017.01.021.
15. Extranuclear-initiated estrogenic actions of endocrine disrupting chemicals: Is there toxicology beyond paracelsus?
Nadal A, Fuentes E, Ripoll C, Villar-Pazos S, Castellano-Muñoz M, Soriano S, Martinez-Pinna J, Quesada I, Alonso-Magdalena P.
J Steroid Biochem Mol Biol. 2017 Jan 31. pii: S0960-0760(17)30014-6. doi: 10.1016/j.jsbmb.2017.01.014. [Epub ahead of print]
16. Dose-dependent effect of Bisphenol-A on insulin signaling molecules in cardiac muscle of adult male rat.
Sivashanmugam P, Mullainadhan V, Karundevi B.
Chem Biol Interact. 2017 Mar 25;266:10-16. doi: 10.1016/j.cbi.2017.01.022.
17. Early postnatal genistein administration permanently affects nitrergic and vasopressinergic systems in a sex-specific way.
Ponti G, Rodriguez-Gomez A, Farinetti A, Marraudino M, Filice F, Foglio B, Sciacca G, Panzica GC, Gotti S.
Neuroscience. 2017 Mar 27;346:203-215. doi: 10.1016/j.neuroscience.2017.01.024.
18. Teratogenic effects of in utero exposure to di-(2-ethylhexyl)-phthalate (DEHP) in B6:129S4 mice.
Ungewitter E, Rotgers E, Bantukul T, Kawakami Y, Kissling GE, Hung-Chang Yao H.
Toxicol Sci. 2017 Jan 25. pii: kfx019. doi: 10.1093/toxsci/kfx019. [Epub ahead of print]
19. In vitro effect of 4-nonylphenol on human chorionic gonadotropin (hCG) stimulated hormone secretion, cell viability and reactive oxygen species generation in mice Leydig cells.

- Jambor T, Tvrdá E, Tušimová E, Kováčik A, Bistáková J, Forgács Z, Lukáč N.
Environ Pollut. 2017 Mar;222:219-225. doi: 10.1016/j.envpol.2016.12.053.
20. Anxiety like behavior due to perinatal exposure to Bisphenol-A is associated with decrease in excitatory to inhibitory synaptic density of male mouse brain.
Kumar D, Thakur MK.
Toxicology. 2017 Mar 1;378:107-113. doi: 10.1016/j.tox.2017.01.010.
21. Testicular Dysgenesis Syndrome and Long-Lasting Epigenetic Silencing of Mouse Sperm Genes Involved in the Reproductive System after Prenatal Exposure to DEHP.
Stenz L, Escoffier J, Rahban R, Nef S, Paoloni-Giacobino A.
PLoS One. 2017 Jan 13;12(1):e0170441. doi: 10.1371/journal.pone.0170441.
22. Prenatal exposure to DEHP induces premature reproductive senescence in male mice.
Barakat R, Lin PP, Rattan S, Brehm E, Canisso IF, Abosalum ME, Flaws JA, Hess R, Ko C.
Toxicol Sci. 2017 Jan 12. pii: kfw248. doi: 10.1093/toxsci/kfw248. [Epub ahead of print]
23. Gestational and lactational exposure to di-isobutyl phthalate via diet in maternal mice decreases testosterone levels in male offspring.
Wang X, Sheng N, Cui R, Zhang H, Wang J, Dai J.
Chemosphere. 2017 Apr;172:260-267. doi: 10.1016/j.chemosphere.2017.01.011.
24. Perinatal Exposure to Bisphenol A or Diethylstilbestrol Increases the Susceptibility to Develop Mammary Gland Lesions After Estrogen Replacement Therapy in Middle-Aged Rats.
Gomez AL, Delconte MB, Altamirano GA, Vigezzi L, Bosquiazzo VL, Barbisan LF, Ramos JG, Luque EH, Muñoz-de-Toro M, Kass L.
Horm Cancer. 2017 Apr;8(2):78-89. doi: 10.1007/s12672-016-0282-1.
25. The interaction of dietary isoflavones and estradiol replacement on behavior and brain-derived neurotrophic factor in the ovariectomized rat.
Russell AL, Grimes JM, Larco DO, Cruthirds DF, Westerfield J, Wooten L, Keil M, Weiser MJ, Landauer MR, Handa RJ, Wu TJ.
Neurosci Lett. 2017 Feb 15;640:53-59. doi: 10.1016/j.neulet.2017.01.011.
26. Long-term exposure to a 'safe' dose of bisphenol A reduced protein acetylation in adult rat testes.
Chen Z, Zuo X, He D, Ding S, Xu F, Yang H, Jin X, Fan Y, Ying L, Tian C, Ying C.
Sci Rep. 2017 Jan 9;7:40337. doi: 10.1038/srep40337.
27. Syringaresinol: A Renewable and Safer Alternative to Bisphenol A for Epoxy-Amine Resins.
Janvier M, Hollande L, Jaufurally AS, Pernes M, Ménard R, Grimaldi M, Beaugrand J, Balaguer P, Ducrot PH, Allais F.
ChemSusChem. 2017 Feb 22;10(4):738-746. doi: 10.1002/cssc.201601595.
28. Exposure to benzo[a]pyrene impairs decidualization and decidual angiogenesis in mice during early pregnancy.
Li X, Shen C, Liu X, He J, Ding Y, Gao R, Mu X, Geng Y, Wang Y, Chen X.
Environ Pollut. 2017 Mar;222:523-531. doi: 10.1016/j.envpol.2016.11.029.
29. Adverse effects of maternal exposure to bisphenol F on the anxiety- and depression-like behavior of offspring.

Ohtani N, Iwano H, Suda K, Tsuji E, Tanemura K, Inoue H, Yokota H.
J Vet Med Sci. 2017 Feb 28;79(2):432-439. doi: 10.1292/jvms.16-0502.

30. Di-(2-ethylhexyl) phthalate could disrupt the insulin signaling pathway in liver of SD rats and L02 cells via PPAR γ .
Zhang W, Shen XY, Zhang WW, Chen H, Xu WP, Wei W.
Toxicol Appl Pharmacol. 2017 Feb 1;316:17-26. doi: 10.1016/j.taap.2016.12.010.

31. Role of melatonin in mitigating nonylphenol-induced toxicity in frontal cortex and hippocampus of rat brain.
Tabassum H, Ashafaq M, Parvez S, Raisuddin S.
Neurochem Int. 2017 Mar;104:11-26. doi: 10.1016/j.neuint.2016.12.010.

32. Reproductive toxicity of linuron following gestational exposure in rats and underlying mechanisms.

Ding H, Zheng W, Han H, Hu X, Hu B, Wang F, Su L, Li H, Li Y.

Toxicol Lett. 2017 Jan 15;266:49-55. doi: 10.1016/j.toxlet.2016.12.013. valgt

33. Maternal di-(2-ethylhexyl) phthalate exposure during pregnancy causes fetal growth restriction in a stage-specific but gender-independent manner.
Shen R, Zhao LL, Yu Z, Zhang C, Chen YH, Wang H, Zhang ZH, Xu DX.
Reprod Toxicol. 2017 Jan;67:117-124. doi: 10.1016/j.reprotox.2016.12.003.

34. Gestational di-n-butyl phthalate exposure induced developmental and teratogenic anomalies in rats: a multigenerational assessment.
Mahaboob Basha P, Radha MJ.
Environ Sci Pollut Res Int. 2017 Feb;24(5):4537-4551. doi: 10.1007/s11356-016-8196-6.

35. Perinatal exposure to glyphosate-based herbicide alters the thyrotrophic axis and causes thyroid hormone homeostasis imbalance in male rats.
de Souza JS, Kizys MM, da Conceição RR, Glebocki G, Romano RM, Ortiga-Carvalho TM, Giannocco G, da Silva ID, Dias da Silva MR, Romano MA, Chiamolera MI.
Toxicology. 2017 Feb 15;377:25-37. doi: 10.1016/j.tox.2016.11.005.

36. Suppression of the brain-pituitary-testicular axis function following acute arsenic and manganese co-exposure and withdrawal in rats.
Adedara IA, Abolaji AO, Awogbindin IO, Farombi EO.
J Trace Elem Med Biol. 2017 Jan;39:21-29. doi: 10.1016/j.jtemb.2016.07.001.

37. Bisphenol A (BPA) in the serum of pet dogs following short-term consumption of canned dog food and potential health consequences of exposure to BPA.
Koestel ZL, Backus RC, Tsuruta K, Spollen WG, Johnson SA, Javurek AB, Ellersieck MR, Wiedmeyer CE, Kannan K, Xue J, Bivens NJ, Givan SA, Rosenfeld CS.
Sci Total Environ. 2017 Feb 1;579:1804-1814. doi: 10.1016/j.scitotenv.2016.11.162.

38. Improved assessment of sensorimotor gating in animal models relevant to ASD: A data modelling approach to quantify PrePulse Inhibition of the acoustic startle reflex.
Degroote S, Hunting D, Takser L.
J Neurosci Methods. 2017 Jan 30;276:13-22. doi: 10.1016/j.jneumeth.2016.11.007.

39. Effect of the herbicide atrazine and its metabolite DACT on bovine sperm quality.
Komsky-Elbaz A, Roth Z.
Reprod Toxicol. 2017 Jan;67:15-25. doi: 10.1016/j.reprotox.2016.11.001.
40. The influence of phthalates and bisphenol A on the obesity development and glucose metabolism disorders.
Stojanoska MM, Milosevic N, Milic N, Abenavoli L.
Endocrine. 2017 Mar;55(3):666-681. doi: 10.1007/s12020-016-1158-4. Review.
41. Anxiety-like behaviors in adulthood are altered in male but not female rats exposed to low dosages of polychlorinated biphenyls in utero.
Gillette R, Reilly MP, Topper VY, Thompson LM, Crews D, Gore AC.
Horm Behav. 2017 Jan;87:8-15. doi: 10.1016/j.yhbeh.2016.10.011.
42. Low-dose exposure to bisphenol A in combination with fructose increases expression of genes regulating angiogenesis and vascular tone in juvenile Fischer 344 rat cardiac tissue.
Klint H, Lejonklou MH, Karimullina E, Rönn M, Lind L, Lind PM, Brittebo E.
Ups J Med Sci. 2017 Mar;122(1):20-27. doi: 10.1080/03009734.2016.1225870.
43. High-Content Analysis Provides Mechanistic Insights into the Testicular Toxicity of Bisphenol A and Selected Analogues in Mouse Spermatogonial Cells.
Liang S, Yin L, Shengyang Yu K, Hofmann MC, Yu X.
Toxicol Sci. 2017 Jan;155(1):43-60. doi: 10.1093/toxsci/kfw178.
44. Lactational exposure effect of polychlorinated biphenyl on rat Sertoli cell markers and functional regulators in prepuberal and puberal F₁ offspring.
Sugantha Priya E, Sathish Kumar T, Balaji S, Bavithra S, Raja Singh P, Sakthivel D, Ravi Sankar B, Arunakaran J.
J Endocrinol Invest. 2017 Jan;40(1):91-100. doi: 10.1007/s40618-016-0539-0.
45. Histologic study of testis injury after bisphenol A exposure in mice.
Tian J, Ding Y, She R, Ma L, Du F, Xia K, Chen L.
Toxicol Ind Health. 2017 Jan;33(1):36-45. doi: 10.1177/0748233716658579.
46. Effects of a glyphosate-based herbicide on the uterus of adult ovariectomized rats.
Varayoud J, Durando M, Ramos JG, Milesi MM, Ingaramo PI, Muñoz-de-Toro M, Luque EH.
Environ Toxicol. 2017 Apr;32(4):1191-1201. doi: 10.1002/tox.22316.
47. Metabolite profiling study on the toxicological effects of polybrominated diphenyl ether in a rat model.
Jung YS, Lee J, Seo J, Hwang GS.
Environ Toxicol. 2017 Apr;32(4):1262-1272. doi: 10.1002/tox.22322.
48. Di (2-ethylhexyl) phthalate impairs steroidogenesis in ovarian follicular cells of prepuberal mice.
Lai FN, Liu JC, Li L, Ma JY, Liu XL, Liu YP, Zhang XF, Chen H, De Felici M, Dyce PW, Shen W.
Arch Toxicol. 2017 Mar;91(3):1279-1292. doi: 10.1007/s00204-016-1790-z.
49. Gestational Exposure to Bisphenol A Affects the Function and Proteome Profile of F1 Spermatozoa in Adult Mice.
Rahman MS, Kwon WS, Karmakar PC, Yoon SJ, Ryu BY, Pang MG.
Environ Health Perspect. 2017 Feb;125(2):238-245. doi: 10.1289/EHP378.

50. Effects on the reproductive parameters of two generations of *Rattus norvegicus* offspring from dams exposed to heptachlor during gestation and lactation.

Martínez-Ibarra A, Morimoto S, Cerbón M, Prado-Flores G.

Environ Toxicol. 2017 Mar;32(3):856-868. doi: 10.1002/tox.22285.

51. Endocrine disrupting potential and reproductive dysfunction in male mice exposed to deltamethrin.

Ben Slima A, Chtourou Y, Barkallah M, Fetoui H, Boudawara T, Gdoura R.

***Hum Exp Toxicol.* 2017 Mar;36(3):218-226. doi: 10.1177/0960327116646617. valgt**

52. Bisphenol a induces steatosis in HepaRG cells using a model of perinatal exposure.

Bucher S, Jalili P, Le Guillou D, Begriche K, Rondel K, Martinais S, Zalko D, Corlu A, Robin MA, Fromenty B.

Environ Toxicol. 2017 Mar;32(3):1024-1036. doi: 10.1002/tox.22301.

53. Long-term effects of in utero and lactational exposure to butyl paraben in female rats.

Guerra MT, Sanabria M, Cagliarani SV, Leite GA, Borges CD, De Grava Kempinas W.

Environ Toxicol. 2017 Mar;32(3):776-788. doi: 10.1002/tox.22277.

54. 4-Nonylphenol induces disruption of spermatogenesis associated with oxidative stress-related apoptosis by targeting p53-Bcl-2/Bax-Fas/FasL signaling.

Duan P, Hu C, Butler HJ, Quan C, Chen W, Huang W, Tang S, Zhou W, Yuan M, Shi Y, Martin FL, Yang K.

Environ Toxicol. 2017 Mar;32(3):739-753. doi: 10.1002/tox.22274.

55. Exposure to the mixture of organophosphorus pesticides is embryotoxic and teratogenic on gestational rats during the sensitive period.

Yu Y, Yang Y, Zhao X, Liu X, Xue J, Zhang J, Yang A. *Environ Toxicol.* 2017 Jan;32(1):139-146. doi: 10.1002/tox.22219.

56. Challenges in assigning endocrine-specific modes of action: Recommendations for researchers and regulators.

Mihaich EM, Schäfers C, Dreier DA, Hecker M, Ortego L, Kawashima Y, Dang ZC, Solomon K.

Integr Environ Assess Manag. 2017 Mar;13(2):280-292. doi: 10.1002/ieam.1883

57. Endocrine Disrupting Chemicals and Endometrial Cancer: An Overview of Recent Laboratory Evidence and Epidemiological Studies.

Mallozzi M, Leone C, Manurita F, Bellati F, Caserta D.

Int J Environ Res Public Health. 2017 Mar 22;14(3). pii: E334. doi: 10.3390/ijerph14030334. Review.

58. Perinatal Exposure to Low-Dose Bisphenol-A (BPA) Disrupts the Structural and Functional Development of the Hypothalamic Feeding Circuitry.

MacKay H, Patterson ZR, Abizaid A.

Endocrinology. 2017 Feb 7. doi: 10.1210/en.2016-1718. [Epub ahead of print]

59. Endocrine disruptors: Does BPA disrupt autophagy in the liver?

Morris A.

Nat Rev Endocrinol. 2017 Mar 10. doi: 10.1038/nrendo.2017.27. [Epub ahead of print] No abstract available.

60. The Rapid Effect of Bisphenol-A on Long-Term Potentiation in Hippocampus Involves Estrogen Receptors and ERK Activation.

Chen X, Wang Y, Xu F, Wei X, Zhang J, Wang C, Wei H, Xu S, Yan P, Zhou W, Mody I, Xu X, Wang Q.

Neural Plast. 2017;2017:5196958. doi: 10.1155/2017/5196958.

61. Low-Dose Bisphenol A Exposure: A Seemingly Instigating Carcinogenic Effect on Breast Cancer.

Wang Z, Liu H, Liu S.

Adv Sci (Weinh). 2016 Nov 21;4(2):1600248. doi: 10.1002/adv.201600248. Review.

62. Genes, Gender, Environment, and Novel Functions of Estrogen Receptor Beta in the Susceptibility to Neurodevelopmental Disorders.

Varshney M, Nalvarte I.

Brain Sci. 2017 Feb 23;7(3). pii: E24. doi: 10.3390/brainsci7030024. Review.

63. Endocrine Disruptors and Obesity.

Darbre PD.

Curr Obes Rep. 2017 Mar;6(1):18-27. doi: 10.1007/s13679-017-0240-4. Review.

64. Effects of triazole fungicides on androgenic disruption and CYP3A4 enzyme activity.

Lv X, Pan L, Wang J, Lu L, Yan W, Zhu Y, Xu Y, Guo M, Zhuang S.

Environ Pollut. 2017 Mar;222:504-512. doi: 10.1016/j.envpol.2016.11.051.

65. Quantitative weight of evidence to assess confidence in potential modes of action.

Becker RA, Dellarco V, Seed J, Kronenberg JM, Meek B, Foreman J, Palermo C, Kirman C, Linkov I, Schoeny R, Dourson M, Pottenger LH, Manibusan MK.

Regul Toxicol Pharmacol. 2017 Feb 20;86:205-220. doi: 10.1016/j.yrtph.2017.02.017. [Epub ahead of print]

66. A comprehensive review of regulatory test methods for endocrine adverse health effects M. K. Manibusan & L. W. Touart (2017): Critical Reviews in Toxicology, DOI: 10.1080/10408444.2016.1272095

<http://dx.doi.org/10.1080/10408444.2016.1272095> valgt til Abstract

67. How Adverse Outcome Pathways Can Aid the Development and Use of Computational Prediction Models for Regulatory Toxicology.

Wittwehr C, Aladjov H, Ankley G, Byrne HJ, de Knecht J, Heinzle E, Klambauer G, Landesmann B, Luijten M, MacKay C, Maxwell G, Meek ME, Paini A, Perkins E, Sobanski T, Villeneuve D, Waters KM, Whelan M. Toxicol Sci. 2017 Feb;155(2):326-336. doi: 10.1093/toxsci/kfw207. Review. Valgt til abstract

68. The challenge of predicting problematic chemicals using a decision analysis tool: Triclosan as a case study.

Perez AL, Gauthier AM, Ferracini T, Cowan DM, Kingsbury T, Panko J.

Integr Environ Assess Manag. 2017 Jan;13(1):198-207. doi: 10.1002/ieam.1778.

Wildlife studier ved Biologisk Institut, Syddansk Universitet (SDU)

Søgningen er udført på Web of Science (all databases) og dækker perioden 12/12 2016 - 30/3 2017.

Søgeprofilen kombinerer: "endocrine disrupt*" and

- fish*
- amphibia*
- bird* OR avia*
- invertebrat*
- mollus*
- gastropod*
- insect*
- crustacea*
- echinoderm*
- ursus
- reptil* OR alligator
- whal* OR seal* OR dolphin*

Fra bruttolisten (længere nede i dokumentet) er udvalgt fire artikler til medtagelse af abstract. Kriterierne for udvælgelsen er, at de bidrager til ny viden omkring effekter af og virkningsmekanismer for hormonforstyrrende stoffer i 'wildlife' og/eller, at de repræsenterer vigtig viden, som vurderes at have særlig interesse for Miljøstyrelsen bl.a. i forbindelse med styrelsens fokus på udvikling af testmetoder. Desuden udvælges artikler, der omhandler 'nye' stoffer, der har vist sig hormonforstyrrende; specielt hvis disse har relevans for danske forhold.

Udvalgte publikationer

Frogs model man: In vivo thyroid hormone signaling during development.

Sachs LM, Buchholz DR.

Genesis. 55(1-2): 2017.

ABSTRACT:

Thyroid hormone (TH) signaling comprises TH transport across cell membranes, metabolism by deiodinases, and molecular mechanisms of gene regulation. Proper TH signaling is essential for normal perinatal development, most notably for neurogenesis and fetal growth. Knowledge of perinatal TH endocrinology needs improvement to provide better treatments for premature infants and endocrine diseases during gestation and to counteract effects of endocrine disrupting chemicals. Studies in amphibians have provided major insights to understand *in vivo* mechanisms of TH signaling. The frog model boasts dramatic TH-dependent changes directly observable in free-living tadpoles with precise and easy experimental control of the TH response at developmental stages comparable to fetal stages in mammals. The hormones, their receptors, molecular mechanisms, and developmental roles of TH signaling are conserved to a high degree in humans and amphibians, such that with respect to developmental TH signaling “frogs are just little people that hop.” The frog model is exceptionally illustrative of fundamental molecular mechanisms of *in vivo* TH action involving TH receptors, transcriptional cofactors, and chromatin remodeling. This review highlights the current need, recent successes, and future prospects using amphibians as a model to elucidate molecular mechanisms and functional roles of TH signaling during post-embryonic development.

Exposure to a PBDE/OH-BDE mixture alters juvenile zebrafish (*Danio rerio*) development.

Macaulay LJ, Chernick M, Chen A, Hinton DE, Bailey JM, Kullman SW, Levin ED, Stapleton HM.

Environmental Toxicology and Chemistry. 36(1): 36-48. 2017.

ABSTRACT:

Polybrominated diphenyl ethers (PBDEs) and their metabolites (e.g., hydroxylated BDEs [OH-BDEs]) are contaminants frequently detected together in human tissues and are structurally similar to thyroid hormones. Thyroid hormones partially mediate metamorphic transitions between life stages in zebrafish, making this a critical developmental window that may be vulnerable to chemicals disrupting thyroid signaling. In the present study, zebrafish were exposed to 6-OH-BDE-47 (30 nM; 15 µg/L) alone, or to a low-dose (30 µg/L) or high-dose (600 µg/L) mixture of PentaBDEs, 6-OH-BDE-47 (0.5–6 µg/L), and 2,4,6-tribromophenol (5–100 µg/L) during juvenile development (9–23 d postfertilization) and evaluated for developmental endpoints mediated by thyroid hormone signaling. Fish were sampled at 3 time points and examined for developmental and skeletal morphology, apical thyroid and skeletal gene markers, and modifications in swimming behavior (as adults). Exposure to the high-dose mixture resulted in >85% mortality within 1 wk of exposure, despite being below reported acute toxicity thresholds for individual congeners. The low-dose mixture and 6-OH-BDE-47 groups exhibited reductions in body length and delayed maturation, specifically relating to swim bladder, fin, and pigmentation development. Reduced skeletal ossification was also observed in 6-OH-BDE-47-treated fish. Assessment of thyroid and osteochondral gene regulatory networks demonstrated significantly increased expression of genes that regulate skeletal

development and thyroid hormones. Overall, these results indicate that exposures to PBDE/OH-BDE mixtures adversely impact zebrafish maturation during metamorphosis.

Kinetic Determination of Vitellogenin Induction in the Epidermis of Cyprinid and Perciform Fishes: Evaluation of Sensitive Enzyme-Linked Immunosorbent Assays.

Allner B, Hennies M, Lerche CF, Schmidt T, Schneider K, Willner M, Stahlschmidt-Allner P. *Environmental Toxicology and Chemistry*. 35(12): 2916-2930. 2016.

ABSTRACT:

Induction of vitellogenin (VTG) in male and immature fish is a standardized endpoint in endocrine-disruption testing. To establish a nondestructive swab sampling method, VTG induction in the epidermis of Cypriniformes and Perciformes species was investigated. Both VTG and estrogen receptor genes are expressed in epidermal cells. Immunoaffinity and mass fingerprint analyses show induction of identical VTG peptides in liver and epidermis. Induction of VTG by estradiol (E2) and bisphenol A (BPA) in the epidermis was quantified with homolog enzyme-linked immunosorbent assays. Initial values in juveniles and males were below 1 ng VTG/mL extraction buffer. Exposure to E2 led to values between 200 ng/mL and 4600 ng/mL in cyprinids and between 10 ng/mL and 81 ng/mL in perciforms. Exposure to BPA increased VTG amounts to 250 ng/mL in fathead minnows, 1360 ng/mL in goldfish, 100 ng/mL in zebrafish, and 12 ng/mL in bluegills. Serum VTG contents demonstrated a similar dose–response pattern in the epidermis and the blood. These results show that VTG induction may be reliably assessed in the skin mucus of fishes, demonstrating the suitability of this biological sample for investigating estrogenic activity in compliance with Organisation for Economic Co-operation and Development standard protocols. This broadens the perspectives in toxicological screening and environmental monitoring, reducing the number of tested animals and minimizing harmful effects for animals, allowing for follow-up of individual induction profiles.

Validation of the OECD reproduction test guideline with the New Zealand mudsnail *Potamopyrgus antipodarum* using trenbolone and prochloraz.

GeiSS C, Ruppert K, Askem C, Barroso C, Faber D, Ducrot V, Holbech H, Hutchinson TH, Kajankari P, Kinnberg KL, Lagadic L, Matthiessen P, Morris S, Neiman M, Penttinen OP, Sanchez-Marin P, Teigeler M, Weltje L, Oehlmann J. *Ecotoxicology*. E-pub ahead of print. 2017.

ABSTRACT:

The Organisation for Economic Cooperation and Development (OECD) provides several standard test methods for the environmental hazard assessment of chemicals, mainly based on primary producers, arthropods, and fish. In April 2016, two new test guidelines with two mollusc species representing different reproductive strategies were approved by OECD member countries. One test guideline describes a 28-day reproduction test with the parthenogenetic New Zealand mudsnail *Potamopyrgus antipodarum*. The main endpoint of the test is reproduction, reflected by the embryo number in the brood pouch per

female. The development of a new OECD test guideline involves several phases including inter-laboratory validation studies to demonstrate the robustness of the proposed test design and the reproducibility of the test results. Therefore, a ring test of the reproduction test with *P. antipodarum* was conducted including eight laboratories with the test substances trenbolone and prochloraz and results are presented here. Most laboratories could meet test validity criteria, thus demonstrating the robustness of the proposed test protocol. Trenbolone did not have an effect on the reproduction of the snails at the tested concentration range (nominal: 10–1000 ng/L). For prochloraz, laboratories produced similar EC₁₀ and NOEC values, showing the inter-laboratory reproducibility of results. The average EC₁₀ and NOEC values for reproduction (with coefficient of variation) were 26.2 µg/L (61.7%) and 29.7 µg/L (32.9%), respectively. This ring test shows that the mudsnail reproduction test is a well-suited tool for use in the chronic aquatic hazard and risk assessment of chemicals.

Bruttoliste

1. Environmental impact of estrogens on human, animal and plant life: A critical review.
Adeel M, Song X, Wang Y, Francis D, Yang Y.
Environment International. 99: 107-119. 2017.
2. Assessment of Thyroid Endocrine System Impairment and Oxidative Stress Mediated by Cobalt Ferrite (CoFe₂O₄) Nanoparticles in Zebrafish Larvae.
Ahmad F, Liu X, Zhou Y, Yao H, Zhao F, Ling Z, Xu C.
Environmental Toxicology. 31(12): 2068-2080. 2016.
- 3. Kinetic Determination of Vitellogenin Induction in the Epidermis of Cyprinid and Perciform Fishes: Evaluation of Sensitive Enzyme-Linked Immunosorbent Assays.**
Allner B, Hennies M, Lerche CF, Schmidt T, Schneider K, Willner M, Stahlschmidt-Allner P.
Environmental Toxicology and Chemistry. 35(12): 2916-2930. 2016.
4. Alteration of thyroid hormone concentrations in juvenile Chinook salmon (*Oncorhynchus tshawytscha*) exposed to polybrominated diphenyl ethers, BDE-47 and BDE-99.
Arkoosh MR, Van Gaest AL, Strickland SA, Hutchinson GP, Krupkin AB, Dietrich JP.
Chemosphere. 171: 1-8. 2017.
5. Utilization of *Mytilus* digestive gland cells for the in vitro screening of potential metabolic disruptors in aquatic invertebrates.
Balbi T, Ciacci C, Grasselli E, Smerilli A, Voci A, Canesi L.
Comparative Biochemistry and Physiology C-Toxicology & Pharmacology. 191: 26-35. 2017.
6. Endocrine Disruptors: Data-based survey of in vivo tests, predictive models and the Adverse Outcome Pathway.
Benigni R, Battistelli CL, Bossa C, Giuliani A, Tcheremenskaia O.
Regulatory toxicology and pharmacology. 86: 18-24. 2017.
7. Implication of thyroid hormone signaling in neural crest cells migration: Evidence from thyroid hormone receptor beta knockdown and NH₃ antagonist studies.
Bronchain OJ, Chesneau A, Monsoro-Burq AH, Jolivet P, Paillard E, Scanlan TS, Demeneix BA, Sachs LM, Pollet N.
Molecular and Cellular Endocrinology. 439(C): 233-246. 2017.
8. Screening of 17 alpha-ethynylestradiol and non-steroidal anti-inflammatory pharmaceuticals accumulation in *Mytilus edulis trossulus* (Gould, 1890) collected from the Gulf of Gdansk.
Caban M, Szaniawska A, Stepnowski P.
Oceanological and Hydrobiological Studies. 45(4): 605-614. 2016.
9. Reproductive toxicity of azoxystrobin to adult zebrafish (*Danio rerio*).
Cao F, Zhu L, Li H, Yu S, Wang C, Qiu L.
Environmental Pollution. 219: 1109-1121. 2016.
10. Dietary administration of EDC mixtures: A focus on fish lipid metabolism.
Carnevali O, Notarstefano V, Olivotto I, Graziano M, Gallo P, Di Marco Pisciotano I, Vaccari L, Mandich A, Giorgini E, Maradonna F.

Aquatic toxicology. 185: 95-104. 2017.

11. Developmental bisphenol A exposure impairs sperm function and reproduction in zebrafish.

Chen J, Saili KS, Liu Y, Li L, Zhao Y, Jia Y, Bai C, Tanguay RL, Dong Q, Huang C.

Chemosphere. 169: 262-270. 2017.

12. Expression analysis of vasa in Asian paddle crab (*Charybdis japonica*) exposed to Bisphenol A.

Chen J, Wang C, Gao H, Yan B.

Electronic Journal of Biotechnology. 24: 49-55. 2016.

13. Effects of Microcystis on Hypothalamic-Pituitary-Gonadal-Liver Axis in Nile Tilapia (*Oreochromis niloticus*).

Chen J, Meng S, Xu H, Zhang Z, Wu X.

Bulletin of environmental contamination and toxicology. 98(4): 562-566. 2017.

14. Linking genomic responses of gonads with reproductive impairment in marine medaka (*Oryzias melastigma*) exposed chronically to the chemopreventive and antifouling agent, 3,3'-diindolylmethane (DIM).

Chen L, Au DWT, Hu C, Zhang W, Zhou B, Cai L, Giesy JP, Qian PY.

Aquatic toxicology. 183: 135-143. 2017.

15. Developmental toxicity and thyroid hormone-disrupting effects of 2,4-dichloro-6-nitrophenol in Chinese rare minnow (*Gobiocypris rarus*).

Chen R, Yuan L, Zha J, Wang Z.

Aquatic toxicology. 185: 40-47. 2017.

16. Fighting Nemo: Effect of 17 α -ethinylestradiol (EE2) on aggressive behavior and social hierarchy of the false clown anemonefish *Amphiprion ocellaris*.

Chen TH, Hsieh CY.

Marine pollution bulletin. E-pub ahead of print. 2016.

17. Development and assays estradiol equivalent concentration from prawn (p-EEQ) in river prawn, *Macrobrachium nipponense*, in Taiwan.

Chiu YW, Yeh FL, Shieh BS, Chen CM, Lai HT, Wang SY, Huang DJ.

Ecotoxicology and Environmental Safety. 137: 12-17. 2017.

18. The challenging role of life cycle monitoring: evidence from bisphenol A on the copepod *Tigriopus japonicus*.

Dahms HU, Lee SH, Huang DJ, Chen WY, Hwang JS.

Hydrobiologia. 784(1): 81-91. 2017.

19. Distribution and bioaccumulation of endocrine disrupting chemicals in water, sediment and fishes in a shallow Chinese freshwater lake: Implications for ecological and human health risks.

Dan L, Wu S, Xu H, Zhang Q, Zhang S, Shi L, Yao C, Liu Y, Cheng J.

Ecotoxicology and Environmental Safety. 140: 222-229. 2017.

20. Phenolic endocrine-disrupting compounds in the Pearl River Estuary: Occurrence, bioaccumulation and risk assessment.

Diao P, Chen Q, Wang R, Sun D, Cai Z, Wu H, Duan S.

The Science of the total environment. 584-585: 1100-1107. 2017.

21. The SSRI fluoxetine exhibits mild effects on the reproductive axis in the cichlid fish *Cichlasoma dimerus* (Teleostei, Cichliformes).
Dorelle LS, Da Cuna RH, Rey Vazquez G, Hocht C, Shimizu A, Genovese G, Lo Nostro FL.
Chemosphere. 171: 370-378. 2017.
22. Analysis of sexually dimorphic growth in captive reared coxia (*Rachycentron canadum*) and the occurrence of intersex individuals.
Dutney L, Elizur A, Lee P.
Aquaculture. 468: 348-355. 2017.
23. Court Like You Mean It: Male Siamese Fighting Fish are Less Attentive to Courting Males that Have Been Exposed to an Estrogen Mimic.
Dzieweczynski TL, LaMonica HJ.
Ethology. 122(12): 991-998. 2016.
24. Diclofenac can exhibit estrogenic modes of action in male *Xenopus laevis*, and affects the hypothalamus-pituitary-gonad axis and mating vocalizations.
Efosa NJ, Kleiner W, Kloas W, Hoffmann F.
Chemosphere. 173: 69-77. 2017.
25. Inhalation - Route of EDC exposure in seabirds (*Larus argentatus*) from the Southern Baltic.
Falkowska L, Grajewska A, Staniszewska M, Nehring I, Szumilo-Pilarska E, Saniewska D.
Marine pollution bulletin. 117: 111-117. 2017.
26. Molecular initiating events of the intersex phenotype: Low-dose exposure to 17 alpha-ethinylestradiol rapidly regulates molecular networks associated with gonad differentiation in the adult fathead minnow testis.
Feswick A, Loughery JR, Isaacs MA, Munkittrick KR, Martyniuk CJ.
Aquatic Toxicology. 181: 46-56. 2016.
27. The influence of control group reproduction on the statistical power of the Environmental Protection Agency's Medaka Extended One Generation Reproduction Test (MEOGRT).
Flynn K, Swintek J, Johnson R.
Ecotoxicology and Environmental Safety. 136: 8-13. 2017.
28. Exposure to SSRI-type antidepressants increases righting time in the marine snail *Ilyanassa obsoleta*.
Fong PP, Bury TB, Donovan EE, Lambert OJ, Palmucci JR, Adamczak SK.
Environmental Science and Pollution Research. 24(1): 725-731. 2017.
29. Boric Acid Is Reproductively Toxic to Adult *Xenopus laevis*, but Not Endocrine Active.
Fort DJ, Fort TD, Mathis MB, Ball R.
Toxicological Sciences. 154(1): 16-26. 2016.
30. Warmer temperature modifies effects of polybrominated diphenyl ethers on hormone profiles in leopard frog tadpoles (*Lithobates pipiens*).
Freitas MB, Brown CT, Karasov WH.
Environmental Toxicology and Chemistry. 36(1): 120-127. 2017.

31. The toxic effects of chlorophenols and associated mechanisms in fish.
Ge T, Han J, Qi Y, Gu X, Ma L, Zhang C, Naeem S, Huang D.
Aquatic toxicology. 184: 78-93. 2017.
- 32. Validation of the OECD reproduction test guideline with the New Zealand mudsnail *Potamopyrgus antipodarum* using trenbolone and prochloraz.**
GeiSS C, Ruppert K, Askem C, Barroso C, Faber D, Ducrot V, Holbech H, Hutchinson TH, Kajankari P, Kinnberg KL, Lagadic L, Matthiessen P, Morris S, Neiman M, Penttinen OP, Sanchez-Marin P, Teigeler M, Weltje L, Oehlmann J.
***Ecotoxicology*. E-pub ahead of print. 2017.**
33. Effects of food-borne exposure of juvenile rainbow trout (*Oncorhynchus mykiss*) to emerging brominated flame retardants 1,2-bis(2,4,6-tribromophenoxy)ethane and 2-ethylhexyl-2,3,4,5-tetrabromobenzoate.
Giraud M, Douville M, Letcher RJ, Houde M.
Aquatic toxicology. 186: 40-49. 2017.
34. The effects of fipronil and the photodegradation product fipronil desulfinyl on growth and gene expression in juvenile blue crabs, *Callinectes sapidus*, at different salinities.
Goff AD, Saranjampour P, Ryan LM, Hladik ML, Covi JA, Armbrust KL, Brander SM.
Aquatic toxicology. 186: 96-104. 2017.
35. An in vivo assay performed using multiple biomarkers related to testosterone synthesis and conversion for assessing the androgenic potency of refuse leachate.
Gong Y, Tian H, Dong Y, Zhang X, Wang W, Ru S.
Ecotoxicology and Environmental Safety. 135: 82-89. 2017.
36. Refuse leachate exposure causes changes of thyroid hormone level and related gene expression in female goldfish (*Carassius auratus*).
Gong Y, Tian H, Zhang X, Dong Y, Wang W, Ru S.
Environmental Toxicology and Pharmacology. 48: 46-52. 2016.
37. Intersexuality in aquatic invertebrates: Prevalence and causes.
Grilo TF, Rosa R.
The Science of the total environment. E-pub ahead of print. 2017.
38. Chronic diclofenac exposure affects gill integrity and pituitary gene expression and displays estrogenic activity in Nile tilapia (*Oreochromis niloticus*).
Groener F, Hoehne C, Kleiner W, Kloas W.
Chemosphere. 166: 473-481. 2017.
39. Joint acute and endocrine disruptive toxicities of malathion, cypermethrin and prochloraz to embryo-larval zebrafish, *Danio rerio*.
Guo D, Wang Y, Qian Y, Chen C, Jiao B, Cai L, Wang Q.
Chemosphere. 166: 63-71. 2017.
40. Effects on Biotransformation, Oxidative Stress, and Endocrine Disruption in Rainbow Trout (*Oncorhynchus mykiss*) Exposed to Hydraulic Fracturing Flowback and Produced Water.

- He Y, Folkerts EJ, Zhang Y, Martin JW, Alessi DS, Goss GG.
Environmental Science & Technology. 51(2): 940-947. 2017.
41. Transcriptional deregulation of genetic biomarkers in *Chironomus riparius* larvae exposed to ecologically relevant concentrations of di(2-ethylhexyl) phthalate (DEHP).
Herrero O, Morcillo G, Planello R.
Plos One. 12(2): 2017.
42. Reduction of Intersex in a Wild Fish Population in Response to Major Municipal Wastewater Treatment Plant Upgrades.
Hicks KA, Fuzzen ML, McCann EK, Arlos MJ, Bragg LM, Kleywegt S, Tetreault GR, McMaster ME, Servos MR.
Environmental Science & Technology. 51(3): 1811-1819. 2017.
43. Clobetasol propionate causes immunosuppression in zebrafish (*Danio rerio*) at environmentally relevant concentrations.
Hidasi AO, Groh KJ, Suter MJF, Schirmer K.
Ecotoxicology and Environmental Safety. 138: 16-24. 2017.
44. Development of an in vivo anti-androgenic activity detection assay using fenitrothion in Japanese medaka (*Oryzias latipes*).
Horie Y, Watanabe H, Takanobu H, Yagi A, Yamagishi T, Iguchi T, Tatarazako N.
Journal of applied toxicology : JAT. 37(3): 339-346. 2017.
45. Bioindicators of wastewater ecotoxicity.
Jirova G, Wittlingerova Z, Zimova M, Vlkova A, Wittlerova M, Dvorakova M, Jirova D.
Neuro endocrinology letters. 37(Suppl1): 2016.
46. Adverse effects of BDE-47 on in vivo developmental parameters, thyroid hormones, and expression of hypothalamus-pituitary-thyroid (HPT) axis genes in larvae of the self-fertilizing fish *Kryptolebias marmoratus*.
Kang HM, Lee YH, Kim BM, Kim IC, Jeong CB, Lee JS.
Chemosphere. 176: 39-46. 2017.
47. Effects on circulating steroid hormones and gene expression along the hypothalamus-pituitary-gonadal axis in adult Japanese quail exposed to 17beta-trenbolone across multiple generations.
Karouna-Renier NK, Chen Y, Henry PFP, Maddox CM, Sprague DT.
Toxicological sciences : an official journal of the Society of Toxicology. 2017.
48. Transcriptomic change as evidence for cadmium-induced endocrine disruption in marine fish model of medaka, *Oryzias javanicus*.
Kim YJ, Lee N, Woo S, Ryu JC, Yum S.
Molecular & Cellular Toxicology. 12(4): 409-420. 2016.
49. Thyroid endocrine disruption in male zebrafish following exposure to binary mixture of bisphenol AF and sulfamethoxazole.
Kwon B, Kho Y, Kim PG, Ji K.
Environmental Toxicology and Pharmacology. 48: 168-174. 2016.

50. Multi-generational xenoestrogenic effects of Perfluoroalkyl acids (PFAAs) mixture on *Oryzias latipes* using a flow-through exposure system.
Lee JW, Lee JW, Shin YJ, Kim JE, Ryu TK, Ryu J, Lee J, Kim P, Choi K, Park K.
Chemosphere. 169: 212-223. 2017.
51. Extending the toxicity-testing paradigm for freshwater mussels: Assessing chronic reproductive effects of the synthetic estrogen 17 alpha-ethinylestradiol on the unionid mussel *Elliptio complanata*.
Leonard JA, Cope W, Hammer EJ, Barnhart M, Bringolf RB.
Comparative Biochemistry and Physiology C-Toxicology & Pharmacology. 191: 14-25. 2017.
52. Disruption of sex-hormone levels and steroidogenic-related gene expression on Mongolia Racerunner (*Eremias argus*) after exposure to triadimefon and its enantiomers.
Li J, Chang J, Li W, Guo B, Li J, Wang H.
Chemosphere. 171: 554-563. 2017.
53. An integrated approach, for identifying priority contaminant in the Great Lakes Basin - Investigations in the Lower Green Bay/Fox River and Milwaukee Estuary areas of concern.
Li S, Villeneuve DL, Berninger JP, Blackwell BR, Cavallin JE, Hughes MN, Jensen KM, Jorgenson Z, Kahl MD, Schroeder AL, Stevens KE, Thomas LM, Weberg MA, Ankley GT.
Science of the Total Environment. 579: 825-837. 2017.
54. Behavioural effect of low-dose BPA on male zebrafish: Tuning of male mating competition and female mating preference during courtship process.
Li X, Guo JY, Li X, Zhou HJ, Zhang SH, Liu XD, Chen DY, Fang YC, Feng XZ.
Chemosphere. 169: 40-52. 2017.
55. Alternative Approaches to Vertebrate Ecotoxicity Tests in the 21st Century: A Review of Developments Over the Last 2 Decades and Current Status.
Lillicrap A, Belanger S, Burden N, Du Pasquier D, Embry MR, Halder M, Lampi MA, Lee L, Norberg-King T, Rattner BA, Schirmer K, Thomas P.
Environmental Toxicology and Chemistry. 35(11): 2637-2646. 2016.
56. Development of predictive models for predicting binding affinity of endocrine disrupting chemicals to fish sex hormone-binding globulin.
Liu H, Yang X, Yin C, Wei M, He X.
Ecotoxicology and Environmental Safety. 136: 46-54. 2017.
57. Determination of a broad spectrum of endocrine-disrupting pesticides in fish samples by UHPLC-MS/MS using the pass-through cleanup approach.
Liu S, Huang X, Jin Q, Zhu G.
Journal of separation science. 40(6): 1266-1272. 2017.
58. Differential effects of bisphenol A toxicity on oyster (*Crassostrea angulata*) gonads as revealed by label-free quantitative proteomics.
Luo L, Zhang Q, Kong X, Huang H, Ke C.
Chemosphere. 176: 305-314. 2017.

59. Exposure to a PBDE/OH-BDE mixture alters juvenile zebrafish (*Danio rerio*) development.
Macaulay LJ, Chernick M, Chen A, Hinton DE, Bailey JM, Kullman SW, Levin ED, Stapleton HM.
Environmental Toxicology and Chemistry. 36(1): 36-48. 2017.

60. Transcriptomic Alterations in the Brain of Painted Turtles (*Chrysemys picta*) Developmentally Exposed to Bisphenol A or Ethinyl Estradiol.
Manshack LK, Conard CM, Bryan SJ, Deem SL, Holliday DK, Bivens NJ, Givan SA, Rosenfeld CS.
Physiological genomics. E-pub ahead of print. 2017.

61. Biological responses to phenylurea herbicides in fish and amphibians: New directions for characterizing mechanisms of toxicity.
Marlatt VL, Martyniuk CJ.
Comparative biochemistry and physiology Toxicology & pharmacolog. 194: 9-21. 2017.

62. Shell shape as a biomarker of marine pollution historic increase.
Marquez F, Primost M, Bigatti G.
Marine pollution bulletin. 114(2): 816-820. 2017.

63. Disruption of thyroxine and sex hormones by 1,2-dibromo-4-(1,2-dibromoethyl)cyclohexane (DBE-DBCH) in American kestrels (*Falco sparverius*) and associations with reproductive and behavioral changes.
Marteinson SC, Palace V, Letcher RJ, Fernie KJ.
Environmental research. 154: 389-397. 2017.

64. Endocrine-related genes are altered by antibacterial agent triclosan in *Chironomus riparius* aquatic larvae.
Martinez-Paz P, Morales M, Urien J, Morcillo G, Martinez-Guitarte JL.
Ecotoxicology and Environmental Safety. 140: 185-190. 2017.

65. Cadmium in vivo exposure alters stress response and endocrine-related genes in the freshwater snail *Physa acuta*.
New biomarker genes in a new model organism.
Martinez-Paz P, Morales M, Sanchez-Arguello P, Morcillo G, Luis Martinez-Guitarte J.
Environmental Pollution. 220: 1488-1497. 2017.

66. Population-relevant endpoints in the evaluation of endocrine-active substances (EAS) for ecotoxicological hazard and risk assessment.
Marty MS, Blankinship A, Chambers J, Constantine L, Kloas W, Kumar A, Lagadic L, Meador J, Pickford D, Schwarz T, Verslycke T.
Integrated environmental assessment and management. 13(2): 317-330. 2017.

67. Smartphone-based fluorescence detection of bisphenol A from water samples.
McCracken KE, Tat T, Paz V, Yoon JY.
Rsc Advances. 7(15): 9237-9243. 2017.

68. Effects of Pollution on Marine Organisms.
Mearns AJ, Reish DJ, Oshida PS, Morrison AM, Rempel-Hester MA, Arthur C, Rutherford N, Pryor R.
Water Environment Research. 88(10): 1693-1807. 2016.

69. Responses and recovery pattern of sex steroid hormones in testis of Nile tilapia (*Oreochromis niloticus*) exposed to sublethal concentration of methomyl.
Meng SL, Qiu LP, Hu GD, Fan LM, Song C, Zheng Y, Wu W, Qu JH, Li DD, Chen JZ, Xu P.
Ecotoxicology. 25(10): 1805-1811. 2016.
70. A study of temporal effects of the model anti-androgen flutamide on components of the hypothalamic-pituitary-gonadal axis in adult fathead minnows.
Milsk R, Cavallin JE, Durhan EJ, Jensen KM, Kahl MD, Makynen EA, Martinovic-Weigelt D, Mueller N, Schroeder A, Villeneuve DL, Ankley GT.
Aquatic Toxicology. 180: 164-172. 2016.
71. A field study of hemolymph yolk protein levels in a bivalve (*Unio tumidus*) and future considerations for bivalve yolk protein as endocrine biomarker.
Morthorst JE.
Comparative Biochemistry and Physiology C-Toxicology & Pharmacology. 192: 16-22. 2017.
72. Characterization, specificity and sensibility of produced anti-Rhamdia quelen vitellogenin in Brazilian fish species.
Moura Costa DD, Bozza DA, Rizzo LE, Garcia J, Moura Costa MD, de Oliveira Ribeiro CA.
Fish physiology and biochemistry. 42(6): 1721-1732. 2016.
73. Effects of environmental chemicals on fish thyroid function: Implications for fisheries and aquaculture in Australia.
Nugegoda D, Kibria G.
General and comparative endocrinology. 244: 40-53. 2017.
74. Endocrine disrupting pesticides impair the neuroendocrine regulation of reproductive behaviors and secondary sexual characters of red munia (*Amandava amandava*).
Pandey SP, Tsutsui K, Mohanty B.
Physiology & behavior. 173: 15-22. 2017.
75. Disruption of the hypothalamic-pituitary-thyroid axis on co-exposures to dithiocarbamate and neonicotinoid pesticides: Study in a wildlife bird, *Amandava amandava*.
Pandey SP, Mohanty B.
Neurotoxicology. 60: 16-22. 2017.
76. Histopathology of brown bullhead (*Ameiurus nebulosus*), smallmouth bass (*Micropterus dolomieu*), and yellow perch (*Perca flavescens*) in relation to polychlorinated biphenyl (PCB) contamination in the Hudson River.
Pinkney AE, Myers MS, Rutter MA.
Science of the Total Environment. 575: 1325-1338. 2017.
77. Toxic and endocrine disrupting effects of wastewater treatment plant influents and effluents on a freshwater isopod *Asellus aquaticus* (Isopoda, Crustacea).
Plahuta M, Tisler T, Toman MJ, Pintar A.
Chemosphere. 174: 342-353. 2017.
78. Modulation of the stress response in wild fish is associated with variation in dissolved nitrate and nitrite.
Pottinger TG.
Environmental pollution. E-pub ahead of print. 2017.

79. Is Nitrate An Endocrine Disruptor?

Poulsen R, Cedergreen N, Hansen M.

Integrated environmental assessment and management. 13(1): 210-212. 2017.

80. Endocrine and physiological effects of linuron and S-metolachlor in zebrafish developing embryos.

Quintaneiro C, Patricio D, Novais SC, Soares AMVM, Monteiro MS.

The Science of the total environment. 586: 390-400. 2017.

81. Reproductive effects on freshwater fish exposed to 17alpha-trenbolone and 17alpha-estradiol.

Robinson JA, Staveley JP, Constantine L.

Environmental Toxicology and Chemistry. 36(3): 636-644. 2017.

82. Characterisation of the transcriptome of male and female wild-type guppy brains with RNA-Seq and consequences of exposure to the pharmaceutical pollutant, 17alpha-ethinyl estradiol.

Saaristo M, Wong BBM, Mincarelli L, Craig A, Johnstone CP, Allinson M, Lindstrom K, Craft JA.

Aquatic toxicology. 186: 28-39. 2017.

83. Frogs model man: In vivo thyroid hormone signaling during development.

Sachs LM, Buchholz DR.

Genesis. 55(1-2): 2017.

84. I: Biomarker quantification in fish exposed to crude oil as input to species sensitivity distributions and threshold values for environmental monitoring.

Sanni S, Bjorkblom C, Jonsson H, Godal BF, Liewenborg B, Lyng E, Pampanin DM.

Marine environmental research. 125: 10-24. 2017.

85. Endocrine disruption, oxidative stress, and testicular damage induced by 4-nonylphenol in *Clarias gariepinus*: the protective role of *Cydonia oblonga*.

Sayed AE-D, Ismail RFK.

Fish physiology and biochemistry. E-pub ahead of print. 2017.

86. Post-embryonic development of sheepshead minnow *Cyprinodon variegatus*: a staging tool based on externally visible anatomical traits.

Schnitzler JG, Dussenne M, Frederich B, Das K.

Ichthyological Research. 64(1): 29-36. 2017.

87. Triclosan exposure results in alterations of thyroid hormone status and retarded early development and metamorphosis in *Cyprinodon variegatus*.

Schnitzler JG, Frederich B, Dussenne M, Klaren PH, Silvestre F, Das K.

Aquatic Toxicology. 181: 1-10. 2016.

88. Assessing the potential for trace organic contaminants commonly found in Australian rivers to induce vitellogenin in the native rainbowfish (*Melanotaenia fluviatilis*) and the introduced mosquitofish (*Gambusia holbrooki*).

Scott PD, Coleman HM, Colville A, Lim R, Matthews B, McDonald JA, Miranda A, Neale PA, Nugegoda D, Tremblay LA, Leusch FDL.

Aquatic toxicology. 185: 105-120. 2017.

89. Effects of PCB 126 and PCB 153 on secretion of steroid hormones and mRNA expression of steroidogenic genes (STAR, HSD3B, CYP19A1) and estrogen receptors (ER alpha, ER beta) in prehierarchical chicken ovarian follicles.
Sechman A, Batoryna M, Antos PA, Hrabia A.
Toxicology Letters. 264: 29-37. 2016.
90. Reproductive and transcriptional effects of the antiandrogenic progestin chlormadinone acetate in zebrafish (Danio rerio).
Siegenthaler PF, Zhao Y, Zhang K, Fent K.
Environmental pollution. 223: 346-356. 2017.
91. Effects of antiandrogenic progestins, chlormadinone and cyproterone acetate, and the estrogen 17 alpha-ethinylestradiol (EE2), and their mixtures: Transactivation with human and rainbowfish hormone receptors and transcriptional effects in zebrafish (Danio rerio) eleuthero-embryos.
Siegenthaler PF, Bain P, Riva F, Fent K.
Aquatic Toxicology. 182: 142-162. 2017.
92. Alteration of sex hormone levels and steroidogenic pathway by several low molecular weight phthalates and their metabolites in male zebrafish (Danio rerio) and/or human adrenal cell (H295R) line.
Sohn J, Kim S, Koschorreck J, Kho Y, Choi K.
Journal of Hazardous Materials. 320: 45-54. 2016.
93. Occurrence and Biological Effects of Endocrine Disrupting Chemicals in the Yellow River (Zhengzhou Section).
Song WT, Wang ZJ.
Bulletin of environmental contamination and toxicology. 97(6): 763-769. 2016.
94. Factors determining accumulation of bisphenol A and alkylphenols at a low trophic level as exemplified by mussels *Mytilus trossulus*.
Staniszewska M, Graca B, Sokoiewski A, Nehring I, Wasik A, Jendzul A.
Environmental Pollution. 220: 1147-1159. 2017.
95. Thyroid hormone modulates offspring sex ratio in a turtle with temperature-dependent sex determination.
Sun BJ, Li T, Mu Y, McGlashan JK, Georges A, Shine R, Du WG.
Proceedings of the Royal Society B-Biological Sciences. 283(1841): 2016.
96. Estrogen-dependent seasonal adaptations in the immune response of fish.
Szejser E, Verburg-van Kemenade BML, Maciuszek M, Chadzinska M.
Hormones and behavior. 88: 15-24. 2017.
97. Vitellogenin induction and reduced fecundity in zebrafish exposed to effluents from the City of Bulawayo, Zimbabwe.
Teta C, Naik YS.
Chemosphere. 167: 282-290. 2017.
98. Potential mechanisms underlying estrogen-induced expression of the molluscan estrogen receptor (ER) gene.
Thi Kim AT, MacFarlane GR, Kong RYC, O'Connor WA, Yu RMK.
Aquatic Toxicology. 179: 82-94. 2016.

99. Transcriptional response of mysid crustacean, *Americamysis bahia*, is affected by subchronic exposure to nonylphenol.
Uchida M, Hirano M, Ishibashi H, Kobayashi J, Kagami Y, Koyanagi A, Kusano T, Koga M, Arizono K.
Ecotoxicology and Environmental Safety. 133: 360-365. 2016.
100. Health risk/benefit information for consumers of fish and shellfish: FishChoice, a new online tool.
Vilavert L, Borrell F, Nadal M, Jacobs S, Minnens F, Verbeke W, Marques A, Domingo JL.
Food and chemical toxicology. E-pub ahead of print. 2017.
101. Effects of the antimicrobial contaminant triclocarban, and co-exposure with the androgen 17-trenbolone, on reproductive function and ovarian transcriptome of the fathead minnow (*Pimephales promelas*).
Villeneuve DL, Jensen KM, Cavallin JE, Durhan EJ, Garcia-Reyero N, Kahl MD, Leino RL, Makynen EA, Wehmas LC, Perkins EJ, Ankley GT.
Environmental Toxicology and Chemistry. 36(1): 231-242. 2017.
102. Endocrine disruption by Bisphenol A, polychlorinated biphenyls and polybrominated diphenyl ether, in zebra fish (*Danio rerio*) model: an in silico approach.
Vutukuru S, Ganugapati J, Ganesh V, Atheeksha P, Potti RB.
Fish physiology and biochemistry. 42(6): 1541-1555. 2016.
103. A novel enzyme-linked immunosorbent assay based on anti-lipovitellin monoclonal antibodies for quantification of zebrafish (*Danio rerio*) vitellogenin.
Wang J, Wang W, Tian H, Zhang X, Ru S.
Ecotoxicology and Environmental Safety. 136: 78-83. 2017.
104. Effects of Three Insect Growth Regulators on *Encarsia formosa* (Hymenoptera: Aphelinidae), an Endoparasitoid of *Bemisia tabaci* (Hemiptera: Aleyrodidae).
Wang Q, Liu T.
Journal of Economic Entomology. 109(6): 2290-2297. 2016.
105. Scaling Up Endocrine Disruption Effects from Individuals to Populations: Outcomes Depend on How Many Males a Population Needs.
White J, Cole BJ, Cherr GN, Connon RE, Brander SM.
Environmental Science & Technology. 51(3): 1802-1810. 2017.
106. Embryonic atrazine exposure alters zebrafish and human miRNAs associated with angiogenesis, cancer, and neurodevelopment.
Wirbisky SE, Weber GJ, Schlotman KE, Sepulveda MS, Freeman JL.
Food and Chemical Toxicology. 98: 25-33. 2016.
107. Oxidative stress, endocrine disruption, and malformation of *Bufo gargarizans* embryo exposed to sub-lethal cadmium concentrations.
Wu C, Zhang Y, Chai L, Wang H.
Environmental Toxicology and Pharmacology. 49: 97-104. 2017.

108. Bioconcentration pattern and induced apoptosis of bisphenol A in zebrafish embryos at environmentally relevant concentrations.

Wu M, Pan C, Chen Z, Jiang L, Lei P, Yang M.

Environmental science and pollution research international. E-pub ahead of print. 2017.

109. The combination of in silico and in vivo approaches for the investigation of disrupting effects of tris (2-chloroethyl) phosphate (TCEP) toward core receptors of zebrafish.

Wu Y, Su G, Tang S, Liu W, Ma Z, Zheng X, Liu H, Yu H.

Chemosphere. 168: 122-130. 2017.

110. Reproduction impairment and endocrine disruption in adult zebrafish (*Danio rerio*) after waterborne exposure to TBOEP.

Xu Q, Wu D, Dang Y, Yu L, Liu C, Wang J.

Aquatic Toxicology. 182: 163-171. 2017.

111. Quantitative proteomics analysis reveals perturbation of lipid metabolic pathways in the liver of Atlantic cod (*Gadus morhua*) treated with PCB 153.

Yadetie F, Oveland E, Doskeland A, Berven F, Goksoyr A, Karlsen OA.

Aquatic toxicology. 185: 19-28. 2017.

112. Parental transfer of tris(1,3-dichloro-2-propyl) phosphate and transgenerational inhibition of growth of zebrafish exposed to environmentally relevant concentrations.

Yu L, Jia Y, Su G, Sun Y, Letcher RJ, Giesy JP, Yu H, Han Z, Liu C.

Environmental Pollution. 220: 196-203. 2017.

113. The relative risk and its distribution of endocrine disrupting chemicals, pharmaceuticals and personal care products to freshwater organisms in the Bohai Rim, China.

Zhang M, Shi Y, Lu Y, Johnson AC, Sarvajayakesavalu S, Liu Z, Su C, Zhang Y, Juergens MD, Jin X.

The Science of the total environment. 590-591: 633-642. 2017.

114. Quizalofop-P-ethyl exposure increases estrogen axis activity in male and slightly decreases estrogen axis activity in female zebrafish (*Danio rerio*).

Zhu LZ, Qi SZ, Cao FJ, Mu XY, Yang Y, Wang C.

Aquatic toxicology. 183: 76-84. 2017.