CENTER FOR HORMONFORSTYRRENDE STOFFER

Litteraturgennemgang for perioden august 2016 – september 2016

Indhold

Humane studier ved Afd. for Vækst og Reproduktion, Rigshospitalet

Søgning er udført på PubMed og dækker perioden 27. juli 2016 – 25. september 2016

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. De kommenterede artikler er highlightet.

De udvalgte artikler er 1) kontrolleret høj eksponering for DBP og sædkvalitet, 2) perfluorstoffer og feber hos børn, 3) paracetamol og AGD og 4) phthalate eksponering og påvirket epigenetik i moderkagen

God læselyst

Udvalgte artikler

A crossover-crossback prospective study of dibutyl-phthalate exposure from mesalamine medications and semen quality in men with inflammatory bowel disease

Nassan FL, Coull BA, Skakkebæk NE, Williams MA, Dadd R, Mínguez-Alarcón L, Krawetz SA, Hait EJ, Korzenik JR, Moss AC, Ford JB, Hauser R.

Environ Int. 2016 Oct;95:120-30. doi: 10.1016/j.envint.2016.08.006. Epub 2016 Aug 26.

Abstract

BACKGROUND: Phthalates are widely used chemicals with ubiquitous exposure. Dibutyl-phthalate (DBP), a male reproductive toxicant in animals, is understudied in humans. Some mesalamine medications used to treat inflammatory bowel disease (IBD) have DBP in their coating, whereas other mesalamine formulations do not.

OBJECTIVES: Taking advantage of differences in mesalamine formulations, we investigated whether high-DBP exposure from mesalamine medications was associated with decreased semen parameters.

METHODS: 73 men with IBD taking mesalamine participated in a crossover-crossback prospective study. Men taking non-DBP containing mesalamine at baseline i.e., background exposure, crossed-over for four months to high-DBP mesalamine and then crossed-back for four months to their non-DBP mesalamine (B1HB2-arm;Background1-High-Background2) and vice versa for men taking high-DBP mesalamine at baseline (H1BH2-arm;High1-Background-High2). Men provided up to six semen samples (2: baseline, 2: crossover and 2: crossback).

RESULTS: We estimated crossover, crossback and carryover effects using linear mixed models adjusted for abstinence time, age, season and duration on high-DBP mesalamine at baseline. Semen parameters in B1HB2-arm (26 men, 133 samples) decreased after high-DBP mesalamine exposure (crossover versus baseline), especially motility parameters, and continued to decrease further even after crossback to non-DBP mesalamine (crossback versus crossover). The cumulative carryover effect of high-DBP (crossback versus baseline) was a decrease of % total sperm motility by 7.61(CI:-13.1, -2.15), % progressive sperm motility by 4.23(CI:-8.05, -0.4) and motile sperm count by 26.0% (CI:-46.2%, 1.7%). However, H1BH2-arm (47 men, 199 samples) had no significant change during crossover or crossback.

CONCLUSIONS: Men newly exposed to high-DBP mesalamine for four months had a cumulative reduction in several semen parameters, primarily sperm motility, that was more pronounced and statistically significant even after exposure ended for four months.

Association between prenatal exposure to perfluorinated compounds and symptoms of infections at age 1-4years among 359 children in the Odense Child Cohort

Dalsager L, Christensen N, Husby S, Kyhl H, Nielsen F, Høst A, Grandjean P, Jensen TK.

Environ Int. 2016 Sep 5;96:58-64.

Abstract

INTRODUCTION: Perfluorinated alkylated substances (PFAS) are persistent industrial chemicals that have resulted in global environmental exposures. Previous epidemiological studies have reported possible

effects on the immune system after developmental PFAS exposure, but the possible impact on childhood infectious disease is unclear.
OBJECTIVES: To investigate the association between prenatal exposure to PFAS and symptoms of infections at age 1-4years.
METHODS: The Odense Child Cohort is an on-going prospective study on children's health, where serum concentrations of perfluorooctane sulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorohexane sulfonic acid (PFHxS), perfluorodecanoic acid (PFDA) and perfluorononanoic acid (PFNA) were measured in 649 pregnant women before gestational week 16. Of these women, 359 reported on symptoms of infection in their child every two weeks for a one-year period. The association between prenatal exposure to PFAS and the symptoms was estimated using a logistic regression model and a negative binomial regression model. For the latter, the outcome was reported as an incidence rate-ratio (IRR), and all models were adjusted for maternal age, educational level, parity and child age.
RESULTS: On average, the children experienced symptoms of infection 23% of the time during one year. PFOS exposure in the high tertile compared to the low tertile was associated with a statistically significant increased proportion of days with fever (IRR: 1.65 (95% CI: 1.24, 2.18), P-trend<0.001) and an increased odds of experiencing days with fever above the median (OR: 2.35 (95% CI: 1.31, 4.11). The latter tendency was also apparent for PFOA (OR: 1.97 (95% CI: 1.07, 3.62). Further, higher concentrations of PFOS and PFOA tended to increase the number of episodes of co-occurrence of fever and coughing and fever and nasal discharge during the one-year study period.
CONCLUSION: We found a positive association between prenatal exposure to PFOS and PFOA and the prevalence of fever, which may be a sensitive marker of infection. This finding is in agreement with an immunotoxic effect of prenatal exposure to PFAS. The wider implications for childhood infectious disease deserve attention.

Prenatal paracetamol exposure is associated with shorter anogenital distance in male infants

Fisher BG, Thankamony A, Hughes IA, Ong KK, Dunger DB, Acerini CL.
Hum Reprod. 2016 Sep 8. [Epub ahead of print]

Abstract

STUDY QUESTION: What is the relationship between maternal paracetamol intake during the masculinisation programming window (MPW, 8-14 weeks of gestation) and male infant anogenital distance (AGD), a biomarker for androgen action during the MPW?
SUMMARY ANSWER: Intrauterine paracetamol exposure during 8-14 weeks of gestation is associated with shorter AGD from birth to 24 months of age.
WHAT IS ALREADY KNOWN: The increasing prevalence of male reproductive disorders may reflect environmental influences on foetal testicular development during the MPW. Animal and human xenograft studies have demonstrated that paracetamol reduces foetal testicular testosterone production, consistent with reported epidemiological associations between prenatal paracetamol exposure and cryptorchidism.
STUDY DESIGN, SIZE, DURATION: Prospective cohort study (Cambridge Baby Growth Study), with recruitment of pregnant women at ~12 post-menstrual weeks of gestation from a single UK maternity unit

between 2001 and 2009, and 24 months of infant follow-up. Of 2229 recruited women, 1640 continued with the infancy study after delivery, of whom 676 delivered male infants and completed a medicine consumption questionnaire.
PARTICIPANTS/MATERIALS, SETTING, METHOD: Mothers self-reported medicine consumption during pregnancy by a questionnaire administered during the perinatal period. Infant AGD (measured from 2006 onwards), penile length and testicular descent were assessed at 0, 3, 12, 18 and 24 months of age, and age-specific Z scores were calculated. Associations between paracetamol intake during three gestational periods (<8 weeks, 8-14 weeks and >14 weeks) and these outcomes were tested by linear mixed models. Two hundred and twenty-five (33%) of six hundred and eighty-one male infants were exposed to paracetamol during pregnancy, of whom sixty-eight were reported to be exposed during 8-14 weeks. AGD measurements were available for 434 male infants.
MAIN RESULTS AND THE ROLE OF CHANCE: Paracetamol exposure during 8-14 weeks of gestation, but not any other period, was associated with shorter AGD (by 0.27 SD, 95% CI 0.06-0.48, P = 0.014) from birth to 24 months of age. This reduction was independent of body size. Paracetamol exposure was not related to penile length or testicular descent.
LIMITATIONS, REASONS FOR CAUTION: Confounding by other drugs or endocrine-disrupting chemicals cannot be discounted. The cohort was not fully representative of pregnant women in the UK, particularly in terms of maternal ethnicity and smoking prevalence. There is likely to have been misclassification of paracetamol exposure due to recall error.
WIDER IMPLICATIONS OF THE FINDINGS: Our observational findings support experimental evidence that intrauterine paracetamol exposure during the MPW may adversely affect male reproductive development.
STUDY FUNDING/COMPETING INTERESTS: This work was supported by a European Union Framework V programme, the World Cancer Research Fund International, the Medical Research Council (UK), the Newlife Foundation for Disabled Children, the Evelyn Trust, the Mothercare Group Foundation, Mead Johnson Nutrition, and the National Institute for Health Research Cambridge Comprehensive Biomedical Research Centre. The authors declare no conflict of interest.

Third trimester phthalate exposure is associated with DNA methylation of growth-related genes in human placenta

Zhao Y, Chen J, Wang X, Song Q, Xu HH, Zhang YH
Sci Rep. 2016 Sep 22;6:33449. doi: 10.1038/srep33449

Abstract

Strong evidence implicates maternal phthalate exposure during pregnancy in contributing to adverse birth outcomes. Recent research suggests these effects might be mediated through the improper regulation of DNA methylation in offspring tissue. In this study, we examined associations between prenatal phthalate exposure and DNA methylation in human placenta. We recruited 181 mother-newborn pairs (80 fetal growth restriction newborns, 101 normal newborns) in Wenzhou, China and measured third trimester urinary phthalate metabolite concentrations and placental DNA methylation levels of IGF2 and AHRR. We found urinary concentrations of mono (2-ethyl-5- hydroxyhexyl) phthalate (MEHHP), and mono (2-ethyl-5-oxohexyl) phthalate (MEOHP) were significantly inversely associated with placental IGF2 DNA methylation.

The associations were much more evident in fetal growth restriction (FGR) newborns than those in normal newborns. These findings suggest that changes in placental DNA methylation might be part of the underlying biological pathway between prenatal phthalate exposure and adverse fetal growth.

Bruttoliste

1. 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 Sep 10. [Epub ahead of print]

2. Evaluation of the potential health risks of substances migrating from polycarbonate replacement baby bottles.
Mertens B, Van Hoeck E, Blaude MN, Simon C, Onghena M, Vandermarken T, Van Langenhove K, Demaegdt H, Vandermeiren K, Covaci A, Scippo ML, Elskens M, Van Loco J.
Food Chem Toxicol. 2016 Aug 31;97:108-119. doi: 10.1016/j.fct.2016.08.019. [Epub ahead of print]

3. Effects of BPA on female reproductive function: the involvement of epigenetic mechanism.
Santangeli S, Maradonna F, Olivotto I, Piccinetti CC, Gioacchini G, Carnevali O.
Gen Comp Endocrinol. 2016 Aug 30. pii: S0016-6480(16)30248-9. doi: 10.1016/j.ygcen.2016.08.010. [Epub ahead of print]

4. Recent advances in simultaneous analysis of bisphenol A and its conjugates in human matrices: Exposure biomarker perspectives.
Andra SS, Austin C, Yang J, Patel D, Arora M.
Sci Total Environ. 2016 Aug 30. pii: S0048-9697(16)31507-8. doi: 10.1016/j.scitotenv.2016.07.062. [Epub ahead of print] Review.

5. 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 Aug 26;164:25-31. doi: 10.1016/j.chemosphere.2016.08.001. [Epub ahead of print]

6. Variability and exposure classification of urinary phenol and paraben metabolite concentrations in reproductive-aged women.
Pollack AZ, Perkins NJ, Sjaarda L, Mumford SL, Kannan K, Philippat C, Wactawski-Wende J, Schisterman EF.
Environ Res. 2016 Aug 24;151:513-520. doi: 10.1016/j.envres.2016.08.016. [Epub ahead of print]

7. Polycystic ovary syndrome and environmental toxins.
Rutkowska AZ, Diamanti-Kandarakis E.
Fertil Steril. 2016 Aug 22. pii: S0015-0282(16)62728-0. doi: 10.1016/j.fertnstert.2016.08.031. [Epub ahead of print] Review.

8. Lack of information received by a French female cohort regarding prevention against exposure to reprotoxic agents during pregnancy.
Chabert MC, Perrin J, Berbis J, Bretelle F, Adnot S, Courbiere B.
Eur J Obstet Gynecol Reprod Biol. 2016 Aug 3;205:15-20. doi: 10.1016/j.ejogrb.2016.07.504. [Epub ahead of print] Review.

9. Bisphenol A and ovarian steroidogenesis.
Bloom MS, Mok-Lin E, Fujimoto VY.

Fertil Steril. 2016 Aug 17. pii: S0015-0282(16)62718-8. doi: 10.1016/j.fertnstert.2016.08.021. [Epub ahead of print] Review.

10. Exposure to bisphenol A and the development of asthma: A systematic review of cohort studies.
Xie MY, Ni H, Zhao DS, Wen LY, Li KS, Yang HH, Wang SS, Zhang H, Su H.
Reprod Toxicol. 2016 Aug 16;65:224-229. doi: 10.1016/j.reprotox.2016.08.007. [Epub ahead of print] Review.

11. Synthetic phenolic antioxidants, including butylated hydroxytoluene (BHT), in resin-based dental sealants.
Wang W, Kannan P, Xue J, Kannan K.
Environ Res. 2016 Aug 11;151:339-343. doi: 10.1016/j.envres.2016.07.042. [Epub ahead of print]

12. Human exposure to endocrine disrupting compounds: Their role in reproductive systems, metabolic syndrome and breast cancer. A review.
Giulivo M, Lopez de Alda M, Capri E, Barceló D.
Environ Res. 2016 Aug 6;151:251-264. doi: 10.1016/j.envres.2016.07.011. [Epub ahead of print] Review.

13. An old culprit but a new story: bisphenol A and "NextGen" bisphenols.
Sartain CV, Hunt PA.
Fertil Steril. 2016 Aug 6. pii: S0015-0282(16)62552-9. doi: 10.1016/j.fertnstert.2016.07.1114. [Epub ahead of print] Review.

14. Effects of bisphenol A on male and couple reproductive health: a review.
Mínguez-Alarcón L, Hauser R, Gaskins AJ.
Fertil Steril. 2016 Aug 4. pii: S0015-0282(16)62624-9. doi: 10.1016/j.fertnstert.2016.07.1118. [Epub ahead of print] Review.

15. A study of the influence on diabetes of free and conjugated bisphenol A concentrations in urine: Development of a simple microextraction procedure using gas chromatography-mass spectrometry.
Pastor-Belda M, Bastida D, Campillo N, Pérez-Cárceles MD, Motas M, Viñas P.
J Pharm Biomed Anal. 2016 Sep 10;129:458-65. doi: 10.1016/j.jpba.2016.07.042. Epub 2016 Jul 28.

16. Bisphenol A exposure and symptoms of anxiety and depression among inner city children at 10-12 years of age.
Perera F, Nolte EL, Wang Y, Margolis AE, Calafat AM, Wang S, Garcia W, Hoepner LA, Peterson BS, Rauh V, Herbstman J.
Environ Res. 2016 Aug 3;151:195-202. doi: 10.1016/j.envres.2016.07.028. [Epub ahead of print]

17. Endocrine Disruptors: A Potential Risk Factor for Gestational Diabetes Mellitus.
Ehrlich S, Lambers D, Baccarelli A, Khoury J, Macaluso M, Ho SM.
Am J Perinatol. 2016 Aug 4. [Epub ahead of print]

18. Characterization and Adaptation of Anaerobic Sludge Microbial Communities Exposed to Tetrabromobisphenol A.
Lefevre E, Cooper E, Stapleton HM, Gunsch CK.
PLoS One. 2016 Jul 27;11(7):e0157622. doi: 10.1371/journal.pone.0157622. eCollection 2016.

19. Identification and Molecular Interaction Studies of Thyroid Hormone Receptor Disruptors among Household Dust Contaminants.

Zhang J, Li Y, Gupta AA, Nam K, Andersson PL.
Chem Res Toxicol. 2016 Aug 15;29(8):1345-54. doi: 10.1021/acs.chemrestox.6b00171. Epub 2016 Aug 2.

20. Association of Bisphenol A exposure and Attention-Deficit/Hyperactivity Disorder in a national sample of U.S. children.
Tewar S, Auinger P, Braun JM, Lanphear B, Yolton K, Epstein JN, Ehrlich S, Froehlich TE.
Environ Res. 2016 Oct;150:112-8. doi: 10.1016/j.envres.2016.05.040. Epub 2016 Jun 6.

21. From BPA to its analogues: Is it a safe journey?
Usman A, Ahmad M.
Chemosphere. 2016 Sep;158:131-42. doi: 10.1016/j.chemosphere.2016.05.070. Epub 2016 Jun 1. Review.

22. Life without plastic: A family experiment and biomonitoring study.
Hutter HP, Kundi M, Hohenblum P, Scharf S, Shelton JF, Piegler K, Wallner P.
Environ Res. 2016 Oct;150:639-44. doi: 10.1016/j.envres.2016.05.028. Epub 2016 May 24.

23. Association of bisphenol A exposure with dietary quality indices in Spanish schoolchildren.
Rivas A, Monteagudo C, Heras-Gonzalez L, Mariscal-Arcas M, Lorenzo-Tovar ML, Olea-Serrano F.
Food Chem Toxicol. 2016 Aug;94:25-30. doi: 10.1016/j.fct.2016.05.010. Epub 2016 May 18.

24. A study on phthalate metabolites, bisphenol A and nonylphenol in the urine of Chinese women with unexplained recurrent spontaneous abortion.
Peng F, Ji W, Zhu F, Peng D, Yang M, Liu R, Pu Y, Yin L.
Environ Res. 2016 Oct;150:622-8. doi: 10.1016/j.envres.2016.04.003. Epub 2016 May 3.

25. Association of Bisphenol A Exposure with Breastfeeding and Perceived Insufficient Milk Supply in Mexican Women.
Kasper N, Peterson KE, Zhang Z, Ferguson KK, Sánchez BN, Cantoral A, Meeker JD, Téllez-Rojo MM, Pawlowski CM, Ettinger AS.
Matern Child Health J. 2016 Aug;20(8):1713-9. doi: 10.1007/s10995-016-1974-4.

26. Urinary levels of bisphenol A, benzophenones and parabens in Tunisian women: A pilot study.
Jiménez-Díaz I, Artacho-Cordón F, Vela-Soria F, Belhassen H, Arrebola JP, Fernández MF, Ghali R, Hedhili A, Olea N.
Sci Total Environ. 2016 Aug 15;562:81-8. doi: 10.1016/j.scitotenv.2016.03.203. Epub 2016 Apr 17.

27. Changes in urinary bisphenol A concentrations associated with placement of dental composite restorations in children and adolescents.
Maserejian NN, Trachtenberg FL, Wheaton OB, Calafat AM, Ranganathan G, Kim HY, Hauser R.
J Am Dent Assoc. 2016 Aug;147(8):620-30. doi: 10.1016/j.adaj.2016.02.020. Epub 2016 Apr 13.

28. Risk assessment based on urinary bisphenol A levels in the general Korean population.
Park JH, Hwang MS, Ko A, Jeong DH, Lee JM, Moon G, Lee KS, Kho YH, Shin MK, Lee HS, Kang HS, Suh JH, Hwang IG.
Environ Res. 2016 Oct;150:606-15. doi: 10.1016/j.envres.2016.03.024. Epub 2016 Mar 22.

29. Effects of Prenatal Environmental Exposures on the Development of Endometriosis in Female Offspring.
Wei M, Chen X, Zhao Y, Cao B, Zhao W.
Reprod Sci. 2016 Sep;23(9):1129-38. doi: 10.1177/1933719116630418. Epub 2016 Feb 22.

30. An overview of human biomonitoring of environmental chemicals in the Canadian Health Measures Survey: 2007-2019.
Haines DA, Saravanabhavan G, Werry K, Khoury C.
Int J Hyg Environ Health. 2016 Aug 24. pii: S1438-4639(16)30088-8. doi: 10.1016/j.ijheh.2016.08.002. [Epub ahead of print] Review.

31. Effects of early exposure to phthalates and bisphenols on cardiometabolic outcomes in pregnancy and childhood.
Philips EM, Jaddoe VW, Trasande L.
Reprod Toxicol. 2016 Sep 2. pii: S0890-6238(16)30325-2. doi: 10.1016/j.reprotox.2016.08.015. [Epub ahead of print] Review.

32. Phthalate pregnancy exposure and male offspring growth from the intra-uterine period to five years of age.
Botton J, Philippat C, Calafat AM, Carles S, Charles MA, Slama R, The Eden Mother-Child Cohort Study Group.
Environ Res. 2016 Sep 2;151:601-609. doi: 10.1016/j.envres.2016.08.033. [Epub ahead of print]

33. Urinary concentrations of cyclohexane-1,2-dicarboxylic acid monohydroxy isononyl ester, a metabolite of the non-phthalate plasticizer di(isononyl)cyclohexane-1,2-dicarboxylate (DINCH), and markers of ovarian response among women attending a fertility center.
Mínguez-Alarcón L, Souter I, Chiu YH, Williams PL, Ford JB, Ye X, Calafat AM, Hauser R; Earth Study Team.
Environ Res. 2016 Sep 1;151:595-600. doi: 10.1016/j.envres.2016.08.012. [Epub ahead of print]

34. Exposure to phthalates in house dust and associated allergies in children aged 6-12years.
Ait Bamai Y, Araki A, Kawai T, Tsuboi T, Saito I, Yoshioka E, Cong S, Kishi R.
Environ Int. 2016 Aug 30;96:16-23. doi: 10.1016/j.envint.2016.08.025. [Epub ahead of print]

35. Association between phthalate exposure and lower handgrip strength in an elderly population: a repeated-measures study.
Kim KN, Lee MR, Choi YH, Hwang H, Oh SY, Park C, Hong YC.
Environ Health. 2016 Aug 31;15(1):93. doi: 10.1186/s12940-016-0176-2.

36. A novel method for calculating potency-weighted cumulative phthalates exposure with implications for identifying racial/ethnic disparities among U.S. reproductive-aged women in NHANES 2001-2012.
Varshavsky JR, Zota AR, Woodruff TJ.
Environ Sci Technol. 2016 Aug 31. [Epub ahead of print]

37. A crossover-crossback prospective study of dibutyl-phthalate exposure from mesalamine medications and semen quality in men with inflammatory bowel disease.
Nassan FL, Coull BA, Skakkebaek NE, Williams MA, Dadd R, Mínguez-Alarcón L, Krawetz SA, Hait EJ, Korzenik JR, Moss AC, Ford JB, Hauser R.
Environ Int. 2016 Aug 26. pii: S0160-4120(16)30296-3. doi: 10.1016/j.envint.2016.08.006. [Epub ahead of print]

38. Simple Method To Measure the Vapor Pressure of Phthalates and Their Alternatives.
Wu Y, Eichler CM, Chen S, Little JC.
Environ Sci Technol. 2016 Sep 12. [Epub ahead of print]

39. First trimester phthalate exposure and male newborn genital anomalies.

Sathyanarayana S, Grady R, Barrett ES, Redmon B, Nguyen RH, Barthold JS, Bush NR, Swan SH. Environ Res. 2016 Aug 18. pii: S0013-9351(16)30332-2. doi: 10.1016/j.envres.2016.07.043. [Epub ahead of print]

40. The role of phthalate esters in autism development: A systematic review.
Jeddi MZ, Janani L, Memari AH, Akhondzadeh S, Yunesian M.
Environ Res. 2016 Aug 24;151:493-504. doi: 10.1016/j.envres.2016.08.021. [Epub ahead of print] Review.

41. Endocrine disruptor phthalates in bottled water: daily exposure and health risk assessment in pregnant and lactating women.
Jeddi MZ, Rastkari N, Ahmadkhaniha R, Yunesian M.
Environ Monit Assess. 2016 Sep;188(9):534. doi: 10.1007/s10661-016-5502-1. Epub 2016 Aug 24.

42. Di(2-ethylhexyl)phthalate: Adverse effects on folliculogenesis that cannot be neglected.
Zhang T, Shen W, De Felici M, Zhang XF.
Environ Mol Mutagen. 2016 Aug 17. doi: 10.1002/em.22037. [Epub ahead of print] Review.

43. Gestational exposure to phthalates and gender-related play behaviors in 8-year-old children: an observational study.
Percy Z, Xu Y, Sucharew H, Khoury JC, Calafat AM, Braun JM, Lanphear BP, Chen A, Yolton K.
Environ Health. 2016 Aug 16;15(1):87. doi: 10.1186/s12940-016-0171-7.

44. Phthalate residue in goat milk-based infant formulas manufactured in China.
Ge WP, Yang XJ, Wu XY, Wang Z, Geng W, Guo CF.
J Dairy Sci. 2016 Aug 10. pii: S0022-0302(16)30526-4. doi: 10.3168/jds.2016-11061. [Epub ahead of print]

45. Environmental influences on reproductive health: the importance of chemical exposures.
Wang A, Padula A, Sirota M, Woodruff TJ.
Fertil Steril. 2016 Aug 9. pii: S0015-0282(16)62506-2. doi: 10.1016/j.fertnstert.2016.07.1076. [Epub ahead of print] Review.

46. From Clothing to Laundry Water: Investigating the Fate of Phthalates, Brominated Flame Retardants, and Organophosphate Esters.
Saini A, Thaysen C, Jantunen L, McQueen RH, Diamond ML.
Environ Sci Technol. 2016 Sep 6;50(17):9289-97. doi: 10.1021/acs.est.6b02038. Epub 2016 Aug 10.

47. Are nails a valuable non-invasive alternative for estimating human exposure to phthalate esters?
Alves A, Covaci A, Voorspoels S.
Environ Res. 2016 Aug 2;151:184-194. doi: 10.1016/j.envres.2016.07.023. [Epub ahead of print]

48. Intake of Phthalate-tainted Foods and Serum Thyroid Hormones in Taiwanese Children and Adolescents.
Tsai HJ, Wu CF, Tsai YC, Huang PC, Chen ML, Wang SL, Chen BH, Chen CC, Wu WC, Hsu PS, Hsiung CA, Wu MT.
Sci Rep. 2016 Jul 29;6:30589. doi: 10.1038/srep30589.

49. The effects of phthalates in the cardiovascular and reproductive systems: A review.
Mariana M, Feiteiro J, Verde I, Cairrao E.
Environ Int. 2016 Sep;94:758-76. doi: 10.1016/j.envint.2016.07.004. Review.

50. Breastfeeding Duration and Anogenital Distance in 2-Year-Old Infants.
Ortega-García JA, Olano-Soler HA, Martínez-Álvarez A, Campillo-López F, Gomariz-Peñalver V, Mendiola-Olivares J, Iglesias-Gómez C, Escribano-Muñoz A.
Breastfeed Med. 2016 Sep;11:350-5. doi: 10.1089/bfm.2016.0034. Epub 2016 Jul 12.

51. Dietary exposure and human risk assessment of phthalate esters based on total diet study in Cambodia.
Cheng Z, Li HH, Wang HS, Zhu XM, Sthiannopkao S, Kim KW, Yasin MS, Hashim JH, Wong MH.
Environ Res. 2016 Oct;150:423-30. doi: 10.1016/j.envres.2016.06.011. Epub 2016 Jul 1.

52. Associations of urinary 5-methyl-2'-deoxycytidine and 5-hydroxymethyl-2'-deoxycytidine with phthalate exposure and semen quality in 562 Chinese adult men.
Pan Y, Jing J, Yeung LW, Sheng N, Zhang H, Yao B, Dai J.
Environ Int. 2016 Sep;94:583-90. doi: 10.1016/j.envint.2016.06.020. Epub 2016 Jun 24.

53. Effects of prenatal phthalate exposure on thyroid hormone levels, mental and psychomotor development of infants: The Hokkaido Study on Environment and Children's Health.
Minatoya M, Naka Jima S, Sasaki S, Araki A, Miyashita C, Ikeno T, Nakajima T, Goto Y, Kishi R.
Sci Total Environ. 2016 Sep 15;565:1037-43. doi: 10.1016/j.scitotenv.2016.05.098. Epub 2016 May 31.

54. Prenatal phthalate exposure and infant size at birth and gestational duration.
Shoaff JR, Romano ME, Yolton K, Lanphear BP, Calafat AM, Braun JM.
Environ Res. 2016 Oct;150:52-8. doi: 10.1016/j.envres.2016.05.033. Epub 2016 May 26.

55. Recycling of plastic waste: Presence of phthalates in plastics from households and industry.
Pivnenko K, Eriksen MK, Martín-Fernández JA, Eriksson E, Astrup TF.
Waste Manag. 2016 Aug;54:44-52. doi: 10.1016/j.wasman.2016.05.014.

56. Effects of high di(2-ethylhexyl) phthalate (DEHP) exposure due to tainted food intake on pre-pubertal growth characteristics in a Taiwanese population.
Tsai YA, Lin CL, Hou JW, Huang PC, Lee MC, Chen BH, Wu MT, Chen CC, Wang SL, Lee CC, Hsiung CA, Chen ML; RAPIT Group.
Environ Res. 2016 Aug;149:197-205. doi: 10.1016/j.envres.2016.05.005. Epub 2016 May 19.

57. Maternal phthalate exposure during the first trimester and serum thyroid hormones in pregnant women and their newborns.
Yao HY, Han Y, Gao H, Huang K, Ge X, Xu YY, Xu YQ, Jin ZX, Sheng J, Yan SQ, Zhu P, Hao JH, Tao FB.
Chemosphere. 2016 Aug;157:42-8. doi: 10.1016/j.chemosphere.2016.05.023. Epub 2016 May 18.

58. Phthalates in dormitory and house dust of northern Chinese cities: Occurrence, human exposure, and risk assessment.
Li HL, Song WW, Zhang ZF, Ma WL, Gao CJ, Li J, Huo CY, Mohammed MO, Liu LY, Kannan K, Li YF.
Sci Total Environ. 2016 Sep 15;565:496-502. doi: 10.1016/j.scitotenv.2016.04.187. Epub 2016 May 14.

59. Associations of individual characteristics and lifestyle factors with metabolism of di-2-ethylhexyl phthalate in NHANES 2001-2012.
Yaghjyan L, Carlsson NP, Ghita GL, Chang SH.
Environ Res. 2016 Aug;149:23-31. doi: 10.1016/j.envres.2016.05.002. Epub 2016 May 9.

60. Assessing the potential impact on the thyroid axis of environmentally relevant food constituents/contaminants in humans.

Eisenbrand G, Gelbke HP.
Arch Toxicol. 2016 Aug;90(8):1841-57. doi: 10.1007/s00204-016-1735-6. Epub 2016 May 11. Review.
Erratum in: Arch Toxicol. 2016 Aug;90(8):1859.

61. Hidden Toxicity in Neonatal Intensive Care Units: Phthalate Exposure in Very Low Birth Weight Infants.
Demirel A, Çoban A, Yıldırım Ş, Doğan C, Sancı R, İnce Z.
J Clin Res Pediatr Endocrinol. 2016 Sep 1;8(3):298-304. doi: 10.4274/jcrpe.3027. Epub 2016 Apr 21.

62. Phthalate exposure in association with serum hormone levels, sperm DNA damage and spermatozoa apoptosis: A cross-sectional study in China.
Wang YX, Zeng Q, Sun Y, You L, Wang P, Li M, Yang P, Li J, Huang Z, Wang C, Li S, Dan Y, Li YF, Lu WQ.
Environ Res. 2016 Oct;150:557-65. doi: 10.1016/j.envres.2015.11.023. Epub 2015 Dec 3.

63. 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. 2016 Aug 24. doi: 10.1111/cod.12619. [Epub ahead of print]

64. Determination of endocrine-disrupting chemicals in human milk by dispersive liquid-liquid microextraction.
Vela-Soria F, Jiménez-Díaz I, Díaz C, Pérez J, Iribarne-Durán LM, Serrano-López L, Arrebola JP, Fernández MF, Olea N.
Bioanalysis. 2016 Sep;8(17):1777-91. doi: 10.4155/bio-2016-0073. Epub 2016 Aug 15.

65. A survey of parabens in commercial pharmaceuticals from China and its implications for human exposure.
Ma WL, Zhao X, Lin ZY, Mohammed MO, Zhang ZF, Liu LY, Song WW, Li YF.
Environ Int. 2016 Jul 28. pii: S0160-4120(16)30271-9. doi: 10.1016/j.envint.2016.07.013. [Epub ahead of print]

66. Selective molecularly imprinted polymer combined with restricted access material for in-tube SPME/UHPLC-MS/MS of parabens in breast milk samples.
Souza ID, Melo LP, Jardim IC, Monteiro JC, Nakano AM, Queiroz ME.
Anal Chim Acta. 2016 Aug 17;932:49-59. doi: 10.1016/j.aca.2016.05.027. Epub 2016 May 26.

67. Association between paraben exposure and menstrual cycle in female university students in Japan.
Nishihama Y, Yoshinaga J, Iida A, Konishi S, Imai H, Yoneyama M, Nakajima D, Shiraishi H.
Reprod Toxicol. 2016 Aug;63:107-13. doi: 10.1016/j.reprotox.2016.05.010. Epub 2016 May 14.

68. Determination of parabens in serum by liquid chromatography-tandem mass spectrometry: Correlation with lipstick use.
Tahan GP, Santos Nde K, Albuquerque AC, Martins I.
Regul Toxicol Pharmacol. 2016 Aug;79:42-8. doi: 10.1016/j.yrtph.2016.05.001. Epub 2016 May 3.

69. Association between prenatal exposure to perfluorinated compounds and symptoms of infections at age 1-4 years among 359 children in the Odense Child Cohort.
Dalsager L, Christensen N, Husby S, Kyhl H, Nielsen F, Høst A, Grandjean P, Jensen TK.
Environ Int. 2016 Sep 5;96:58-64. doi: 10.1016/j.envint.2016.08.026. [Epub ahead of print]

70. Prenatal exposure to perfluoroalkyl substances and anogenital distance at 3 months of age in a Danish mother-child cohort.
Lind DV, Priskorn L, Lassen TH, Nielsen F, Kyhl HB, Kristensen DM, Christesen HT, Jørgensen JS, Grandjean P, Jensen TK.
Reprod Toxicol. 2016 Aug 31. pii: S0890-6238(16)30329-X. doi: 10.1016/j.reprotox.2016.08.019. [Epub ahead of print]

71. Screening for perfluoroalkyl acids in consumer products, building materials and wastes.
Bečanová J, Melymuk L, Vojta Š, Komprdová K, Klánová J.
Chemosphere. 2016 Sep 1;164:322-329. doi: 10.1016/j.chemosphere.2016.08.112. [Epub ahead of print]

72. 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. 2016 Sep 2. [Epub ahead of print]

73. Biotransformation of 6:2 polyfluoroalkyl phosphates (6:2 PAPs): Effects of degradative bacteria and co-substrates.
Lewis M, Kim MH, Liu EJ, Wang N, Chu KH.
J Hazard Mater. 2016 Aug 12;320:479-486. doi: 10.1016/j.jhazmat.2016.08.036. [Epub ahead of print]

74. Effects of prenatal perfluoroalkyl acid exposure on cord blood IGF2/H19 methylation and ponderal index: The Hokkaido Study.
Kobayashi S, Azumi K, Goudarzi H, Araki A, Miyashita C, Kobayashi S, Itoh S, Sasaki S, Ishizuka M, Nakazawa H, Ikeno T, Kishi R.
J Expo Sci Environ Epidemiol. 2016 Aug 24. doi: 10.1038/jes.2016.50. [Epub ahead of print]

75. Perfluoroalkyl substances and endometriosis in US women in NHANES 2003-2006.
Campbell S, Raza M, Pollack AZ.
Reprod Toxicol. 2016 Aug 17;65:230-235. doi: 10.1016/j.reprotox.2016.08.009. [Epub ahead of print]

76. Changes in serum levels of perfluoroalkyl substances during a 10-year follow-up period in a large population-based cohort.
Stubleski J, Salihovic S, Lind L, Lind PM, van Bavel B, Kärrman A.
Environ Int. 2016 Aug 16. pii: S0160-4120(16)30292-6. doi: 10.1016/j.envint.2016.08.002. [Epub ahead of print]

77. Perfluoroalkyl Chemicals, Menstrual Cycle Length, and Fecundity: Findings from a Prospective Pregnancy Study.
Lum KJ, Sundaram R, Barr DB, Louis TA, Louis GM.
Epidemiology. 2016 Aug 18. [Epub ahead of print]

78. Number of Persistent Organic Pollutants Detected at High Concentrations in Blood Samples of the United States Population.
Pumarega J, Gasull M, Lee DH, López T, Porta M.
PLoS One. 2016 Aug 10;11(8):e0160432. doi: 10.1371/journal.pone.0160432. eCollection 2016.

79. Serum Vaccine Antibody Concentrations in Adolescents Exposed to Perfluorinated Compounds.
Grandjean P, Heilmann C, Weihe P, Nielsen F, Mogensen UB, Budtz-Jørgensen E.
Environ Health Perspect. 2016 Aug 9. [Epub ahead of print]

80. Children's white blood cell counts in relation to developmental exposures to methylmercury and persistent organic pollutants.
Oulhote Y, Shamim Z, Kielsen K, Weihe P, Grandjean P, Ryder LP, Heilmann C.
Reprod Toxicol. 2016 Aug 4. pii: S0890-6238(16)30309-4. doi: 10.1016/j.reprotox.2016.08.001. [Epub ahead of print]

81. Early-life exposures to persistent organic pollutants in relation to overweight in preschool children.
Karlsen M, Grandjean P, Weihe P, Steuerwald U, Oulhote Y, Valvi D.
Reprod Toxicol. 2016 Aug 3. pii: S0890-6238(16)30310-0. doi: 10.1016/j.reprotox.2016.08.002. [Epub ahead of print]

82. Longitudinal Associations of Exposure to Perfluoroalkylated Substances in Childhood and Adolescence and Indicators of Adiposity and Glucose Metabolism 6 and 12 Years Later: The European Youth Heart Study.
Domazet SL, Grøntved A, Timmermann AG, Nielsen F, Jensen TK.
Diabetes Care. 2016 Aug 3. pii: dc160269. [Epub ahead of print]

83. U.S. domestic cats as sentinels for perfluoroalkyl substances: Possible linkages with housing, obesity, and disease.
Bost PC, Strynar MJ, Reiner JL, Zweigenbaum JA, Secoura PL, Lindstrom AB, Dye JA.
Environ Res. 2016 Jul 29;151:145-153. doi: 10.1016/j.envres.2016.07.027. [Epub ahead of print]

84. Identification of Biomarkers of Exposure to FTOHs and PAPs in Humans Using a Targeted and Nontargeted Analysis Approach.
Dagnino S, Strynar MJ, McMahen RL, Lau CS, Ball C, Garantziotis S, Webster TF, McClean MD, Lindstrom AB.
Environ Sci Technol. 2016 Sep 12. [Epub ahead of print]

85. The relationship between mercury and autism: A comprehensive review and discussion.
Kern JK, Geier DA, Sykes LK, Haley BE, Geier MR.
J Trace Elem Med Biol. 2016 Sep;37:8-24. doi: 10.1016/j.jtemb.2016.06.002. Epub 2016 Jun 2. Review.

86. Exposure of Norwegian toddlers to perfluoroalkyl substances (PFAS): The association with breastfeeding and maternal PFAS concentrations.
Papadopoulou E, Sabaredzovic A, Namork E, Nygaard UC, Granum B, Haug LS.
Environ Int. 2016 Sep;94:687-94. doi: 10.1016/j.envint.2016.07.006. Epub 2016 Jul 21.

87. Prenatal exposure to perfluorinated compounds affects thyroid hormone levels in newborn girls.
Shah-Kulkarni S, Kim BM, Hong YC, Kim HS, Kwon EJ, Park H, Kim YJ, Ha EH.
Environ Int. 2016 Sep;94:607-13. doi: 10.1016/j.envint.2016.06.024. Epub 2016 Jul 7.

88. Perfluoroalkyl acids (PFAAs) in indoor and outdoor dusts around a mega fluorochemical industrial park in China: Implications for human exposure.
Su H, Lu Y, Wang P, Shi Y, Li Q, Zhou Y, Johnson AC.
Environ Int. 2016 Sep;94:667-73. doi: 10.1016/j.envint.2016.07.002. Epub 2016 Jul 6.

89. The association of carotid intima-media thickness with serum Level of perfluorinated chemicals and endothelium-platelet microparticles in adolescents and young adults.
Lin CY, Chen PC, Lo SC, Torng PL, Sung FC, Su TC.
Environ Int. 2016 Sep;94:292-9. doi: 10.1016/j.envint.2016.06.004. Epub 2016 Jun 9.

90. Exposure to per- and polyfluoroalkyl substances through the consumption of fish from lakes affected by aqueous film-forming foam emissions - A combined epidemiological and exposure modeling approach. The SAMINOR 2 Clinical Study.
Hansen S, Vestergren R, Herzke D, Melhus M, Evenset A, Hanssen L, Brustad M, Sandanger TM.
Environ Int. 2016 Sep;94:272-82. doi: 10.1016/j.envint.2016.05.030. Epub 2016 Jun 7.

91. Association of perfluoroalkyl substances exposure with reproductive hormone levels in adolescents: By sex status.
Zhou Y, Hu LW, Qian ZM, Chang JJ, King C, Paul G, Lin S, Chen PC, Lee YL, Dong GH.
Environ Int. 2016 Sep;94:189-95. doi: 10.1016/j.envint.2016.05.018. Epub 2016 May 31.

92. Circulating levels of perfluoroalkyl substances are associated with dietary patterns - A cross sectional study in elderly Swedish men and women.
Sjogren P, Montse R, Lampa E, Salihovic S, van Bavel B, Lind L, Lind PM.
Environ Res. 2016 Oct;150:59-65. doi: 10.1016/j.envres.2016.05.016. Epub 2016 May 27.

93. Effects of prenatal exposure to perfluoroalkyl acids on prevalence ofallergic diseases among 4-year-old children.
Goudarzi H, Miyashita C, Okada E, Kashino I, Kobayashi S, Chen CJ, Ito S, Araki A, Matsuura H, Ito YM, Kishi R.
Environ Int. 2016 Sep;94:124-32. doi: 10.1016/j.envint.2016.05.020. Epub 2016 May 26.

94. Association of perfluoroalkyl substances exposure in utero with reproductive hormone levels in cord blood in the Hokkaido Study on Environment and Children's Health.
Itoh S, Araki A, Mitsui T, Miyashita C, Goudarzi H, Sasaki S, Cho K, Nakazawa H, Iwasaki Y, Shinohara N, Nonomura K, Kishi R.
Environ Int. 2016 Sep;94:51-9. doi: 10.1016/j.envint.2016.05.011. Epub 2016 May 19.

95. Perfluoroalkyl substance serum concentrations and immune response to FluMist vaccination among healthy adults.
Stein CR, Ge Y, Wolff MS, Ye X, Calafat AM, Kraus T, Moran TM.
Environ Res. 2016 Aug;149:171-8. doi: 10.1016/j.envres.2016.05.020. Epub 2016 May 18.

96. Maternal serum perfluoroalkyl substances during pregnancy and duration of breastfeeding.
Romano ME, Xu Y, Calafat AM, Yolton K, Chen A, Webster GM, Eliot MN, Howard CR, Lanphear BP, Braun JM.
Environ Res. 2016 Aug;149:239-46. doi: 10.1016/j.envres.2016.04.034. Epub 2016 May 11.

97. Perfluoroalkyl substances in cord blood and attention deficit/hyperactivity disorder symptoms in seven-year-old children.
Lien GW, Huang CC, Shiu JS, Chen MH, Hsieh WS, Guo YL, Chen PC.
Chemosphere. 2016 Aug;156:118-27. doi: 10.1016/j.chemosphere.2016.04.102. Epub 2016 May 9.

98. Perfluoroalkyl Substances, Sex Hormones, and Insulin-like Growth Factor-1 at 6-9 Years of Age: A Cross-Sectional Analysis within the C8 Health Project.
Lopez-Espinosa MJ, Mondal D, Armstrong BG, Eskenazi B, Fletcher T.
Environ Health Perspect. 2016 Aug;124(8):1269-75. doi: 10.1289/ehp.1509869. Epub 2016 Jan 22.

99. Chinese population exposure to triclosan and triclocarban as measured via human urine and nails.
Yin J, Wei L, Shi Y, Zhang J, Wu Q, Shao B.

Environ Geochem Health. 2016 Oct;38(5):1125-35. doi: 10.1007/s10653-015-9777-x. Epub 2015 Oct 23.

100. Triclosan: A review on systematic risk assessment and control from the perspective of substance flow analysis.
Huang CL, Abass OK, Yu CP.
Sci Total Environ. 2016 Oct 1;566-567:771-85. doi: 10.1016/j.scitotenv.2016.05.002. Epub 2016 May 28. Review.

101. Prenatal Triclosan Exposure and Anthropometric Measures Including Anogenital Distance in Danish Infants.
Lassen TH, Frederiksen H, Kyhl HB, Swan SH, Main KM, Andersson AM, Lind DV, Husby S, Wohlfahrt-Veje C, Skakkebæk NE, Jensen TK.
Environ Health Perspect. 2016 Aug;124(8):1261-8. doi: 10.1289/ehp.1409637. Epub 2016 Feb 23.

102. 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 Aug 26. pii: S0160-4120(16)30302-6. doi: 10.1016/j.envint.2016.08.011. [Epub ahead of print]

103. The formal electronic recycling industry: Challenges and opportunities in occupational and environmental health research.
Ceballos DM, Dong Z.
Environ Int. 2016 Aug 25. pii: S0160-4120(16)30268-9. doi: 10.1016/j.envint.2016.07.010. [Epub ahead of print]

104. Country-specific chemical signatures of persistent organic pollutants (POPs) in breast milk of French, Danish and Finnish women.
Antignac JP, Main KM, Virtanen HE, Boquien CY, Marchand P, Venisseau A, Guiffard I, Bichon E, Wohlfahrt-Veje C, Legrand A, Boscher C, Skakkebæk NE, Toppari J, Le Bizec B.
Environ Pollut. 2016 Aug 9. pii: S0269-7491(16)30644-3. doi: 10.1016/j.envpol.2016.07.069. [Epub ahead of print]

105. Dermal uptake and percutaneous penetration of ten flame retardants in a human skin ex vivo model.
Frederiksen M, Vorkamp K, Jensen NM, Sørensen JA, Knudsen LE, Sørensen LS, Webster TF, Nielsen JB.
Chemosphere. 2016 Nov;162:308-14. doi: 10.1016/j.chemosphere.2016.07.100. Epub 2016 Aug 16.

106. Polybrominated Diphenyl Ethers in Maternal Serum, Breast Milk, Umbilical Cord Serum, and House Dust in a South Korean Birth Panel of Mother-Neonate Pairs.
Shin MY, Lee S, Kim HJ, Lee JJ, Choi G, Choi S, Kim S, Kim SY, Park J, Moon HB, Choi K, Kim S.
Int J Environ Res Public Health. 2016 Jul 28;13(8). pii: E767. doi: 10.3390/ijerph13080767.

107. Levels of Blood Organophosphorus Flame Retardants and Association with Changes in Human Sphingolipid Homeostasis.
Zhao F, Wan Y, Zhao H, Hu W, Mu D, Webster TF, Hu J.
Environ Sci Technol. 2016 Aug 16;50(16):8896-903. doi: 10.1021/acs.est.6b02474. Epub 2016 Aug 1.

108. New insight into the levels, distribution and health risk diagnosis of indoor and outdoor dust-bound FRs in colder, rural and industrial zones of Pakistan.
Khan MU, Li J, Zhang G, Malik RN.

Environ Pollut. 2016 Sep;216:662-74. doi: 10.1016/j.envpol.2016.06.030. Epub 2016 Jun 23.

109. Breast cancer among women in Michigan following exposure to brominated flame retardants.
Terrell ML, Rosenblatt KA, Wirth J, Cameron LL, Marcus M.
Occup Environ Med. 2016 Aug;73(8):564-7. doi: 10.1136/oemed-2015-103458. Epub 2016 Jun 16.

110. Environmental occurrence, analysis and human exposure to the flame retardant tetrabromobisphenol-A (TBBP-A)-A review.
Abou-Elwafa Abdallah M.
Environ Int. 2016 Sep;94:235-50. doi: 10.1016/j.envint.2016.05.026. Epub 2016 Jun 3. Review.

111. Habitat- and species-dependent accumulation of organohalogen pollutants in home-produced eggs from an electronic waste recycling site in South China: Levels, profiles, and human dietary exposure.
Zeng YH, Luo XJ, Tang B, Mai BX.
Environ Pollut. 2016 Sep;216:64-70. doi: 10.1016/j.envpol.2016.05.039. Epub 2016 May 26.

112. Serum polybrominated diphenyl ether concentrations and thyroid function in young children.
Jacobson MH, Barr DB, Marcus M, Muir AB, Lyles RH, Howards PP, Pardo L, Darrow LA.
Environ Res. 2016 Aug;149:222-30. doi: 10.1016/j.envres.2016.05.022. Epub 2016 May 23.

113. Occurrence and sources of brominated and organophosphorus flame retardants in dust from different indoor environments in Barcelona, Spain.
Cristale J, Hurtado A, Gómez-Canela C, Lacorte S.
Environ Res. 2016 Aug;149:66-76. doi: 10.1016/j.envres.2016.05.001. Epub 2016 May 11.

114. First insight into the levels and distribution of flame retardants in potable water in Pakistan: An underestimated problem with an associated health risk diagnosis.
Khan MU, Li J, Zhang G, Malik RN.
Sci Total Environ. 2016 Sep 15;565:346-59. doi: 10.1016/j.scitotenv.2016.04.173. Epub 2016 May 11.

115. Brominated flame retardants in the hair and serum samples from an e-waste recycling area in southeastern China: the possibility of using hair for biomonitoring.
Liang S, Xu F, Tang W, Zhang Z, Zhang W, Liu L, Wang J, Lin K.
Environ Sci Pollut Res Int. 2016 Aug;23(15):14889-97. doi: 10.1007/s11356-016-6491-x. Epub 2016 Apr 13.

116. Tributyltin induces mitochondrial fission through Mfn1 degradation in human induced pluripotent stem cells.
Yamada S, Asanagi M, Hirata N, Itagaki H, Sekino Y, Kanda Y.
Toxicol In Vitro. 2016 Aug;34:257-63. doi: 10.1016/j.tiv.2016.04.013. Epub 2016 Apr 29.

117. Prenatal paracetamol exposure is associated with shorter anogenital distance in male infants.
Fisher BG, Thankamony A, Hughes IA, Ong KK, Dunger DB, Acerini CL.
Hum Reprod. 2016 Sep 8. [Epub ahead of print]

118. Metabolic targets of endocrine disrupting chemicals assessed by cord blood transcriptome profiling.
Remy S, Govarts E, Wens B, De Boever P, Den Hond E, Croes K, Sioen I, Baeyens W, van Larebeke N, Koppe J, Covaci A, Schettgen T, Nelen V, Legler J, Schoeters G.
Reprod Toxicol. 2016 Aug 31;65:307-320. doi: 10.1016/j.reprotox.2016.08.018. [Epub ahead of print]

119. Chemical UV filters mimic the effect of progesterone on Ca2+ signaling in human sperm cells.

Rehfeld A, Dissing S, Skakkebæk NE.
Endocrinology. 2016 Sep 1:en20161473. [Epub ahead of print]

120. In utero exposure to polychlorinated biphenyls is associated with decreased fecundability in daughters of Michigan female fisheaters: a cohort study.
Han L, Hsu WW, Todem D, Osuch J, Hungerink A, Karmaus W.
Environ Health. 2016 Aug 31;15(1):92. doi: 10.1186/s12940-016-0175-3.

121. Systematic review of the association between oil and natural gas extraction processes and human reproduction.
Balise VD, Meng CX, Cornelius-Green JN, Kassotis CD, Kennedy R, Nagel SC.
Fertil Steril. 2016 Aug 23. pii: S0015-0282(16)62529-3. doi: 10.1016/j.fertnstert.2016.07.1099. [Epub ahead of print] Review.

122. Prenatal exposure to chlordecone, gestational weight gain, and birth weight in a Guadeloupean birth cohort.
Hervé D, Costet N, Kadhel P, Rouget F, Monfort C, Thomé JP, Multigner L, Cordier S.
Environ Res. 2016 Aug 22;151:436-444. doi: 10.1016/j.envres.2016.08.004. [Epub ahead of print]

123. Endocrine-disrupting chemicals and uterine fibroids.
Katz TA, Yang Q, Treviño LS, Walker CL, Al-Hendy A.
Fertil Steril. 2016 Aug 20. pii: S0015-0282(16)62720-6. doi: 10.1016/j.fertnstert.2016.08.023. [Epub ahead of print] Review.

124. Introduction: Environmental toxicants: hidden players on the reproductive stage.
Giudice LC.
Fertil Steril. 2016 Aug 18. pii: S0015-0282(16)62689-4. doi: 10.1016/j.fertnstert.2016.08.019. [Epub ahead of print]

125. Endocrine disrupting chemicals and ovulation: Is there a relationship?
Gallo MV, Ravenscroft J, Carpenter DO, Frye C, Akwesasne Task Force On The Environment, Cook B, Schell LM.
Environ Res. 2016 Aug 17;151:410-418. doi: 10.1016/j.envres.2016.08.007. [Epub ahead of print]

126. Endocrine disruptors: Childhood exposure predicts later adiposity.
Holmes D.
Nat Rev Endocrinol. 2016 Aug 19. doi: 10.1038/nrendo.2016.141. [Epub ahead of print] No abstract available.

127. Recent Advances on Endocrine Disrupting Effects of UV Filters.
Wang J, Pan L, Wu S, Lu L, Xu Y, Zhu Y, Guo M, Zhuang S.
Int J Environ Res Public Health. 2016 Aug 3;13(8). pii: E782. doi: 10.3390/ijerph13080782. Review.

128. Morphologic and molecular changes in the placenta: what we can learn from environmental exposures.
Vrooman LA, Xin F, Bartolomei MS.
Fertil Steril. 2016 Aug 11. pii: S0015-0282(16)62685-7. doi: 10.1016/j.fertnstert.2016.08.016. [Epub ahead of print] Review.

129. Substantial decline of polychlorinated biphenyls serum levels 10 years after public health interventions in a population living near a contaminated site in Northern Italy.
Magoni M, Donato F, Speziani F, Leonardi L, Orizio G, Scarcella C, Gaia A, Apostoli P.
Environ Int. 2016 Aug 10. pii: S0160-4120(16)30287-2. doi: 10.1016/j.envint.2016.07.021. [Epub ahead of print]

130. Elucidating human male germ cell development by studying germ cell cancer.
Nettersheim D, Jostes S, Schneider S, Schorle H.
Reproduction. 2016 Oct;152(4):R101-13. doi: 10.1530/REP-16-0114. Review.

131. Endocrine disrupting chemicals as potential risk factor for estrogen-dependent cancers.
Rutkowska AZ, Szybiak A, Serkies K, Rachoń D.
Pol Arch Med Wewn. 2016 Aug 9;126(7-8):562-70. doi: 10.20452/pamw.3481. Epub 2016 Aug 9.

132. Mechanisms of arsenic disruption on gonadal, adrenal and thyroid endocrine systems in humans: A review.
Sun HJ, Xiang P, Luo J, Hong H, Lin H, Li HB, Ma LQ.
Environ Int. 2016 Aug 6. pii: S0160-4120(16)30286-0. doi: 10.1016/j.envint.2016.07.020. [Epub ahead of print] Review.

133. The Circadian Timing System and Environmental Circadian Disruption: From Follicles to Fertility.
Sen A, Sellix MT.
Endocrinology. 2016 Sep;157(9):3366-73. doi: 10.1210/en.2016-1450. Epub 2016 Aug 8.

134. Hormonally active agents in the environment: a state-of-the-art review.
Anwer F, Chaurasia S, Khan AA.
Rev Environ Health. 2016 Aug 3. pii: /j/reveh.ahead-of-print/reveh-2016-0014/reveh-2016-0014.xml. doi: 10.1515/reveh-2016-0014. [Epub ahead of print]

135. Endocrine Aspects of Environmental "Obesogen" Pollutants.
Nappi F, Barrea L, Di Somma C, Savanelli MC, Muscogiuri G, Orio F, Savastano S.
Int J Environ Res Public Health. 2016 Jul 28;13(8). pii: E765. doi: 10.3390/ijerph13080765. Review.

136. Exposure to PBB-153 and Digit Ratio.
Wainstock T, Pearce B, Barr DB, Marder ME, Terrell M, Marcus M.
Early Hum Dev. 2016 Jul 27;103:33-35. doi: 10.1016/j.earlhumdev.2016.07.004. [Epub ahead of print]

137. A review of the protective effect of melatonin in pesticide-induced toxicity.
Asghari MH, Moloudizargari M, Bahadar H, Abdollahi M.
Expert Opin Drug Metab Toxicol. 2016 Jul 29:1-10. [Epub ahead of print]

138. Developmental Exposure to Environmental Chemicals and Metabolic Changes in Children.
Russ K, Howard S.
Curr Probl Pediatr Adolesc Health Care. 2016 Aug;46(8):255-85. doi: 10.1016/j.cppeds.2016.06.001. Epub 2016 Jul 9.

139. Carcinogenetic mechanisms of endocrine disruptors in female cancers (Review).
Del Pup L, Mantovani A, Cavaliere C, Facchini G, Luce A, Sperlongano P, Caraglia M, Berretta M.
Oncol Rep. 2016 Aug;36(2):603-12. doi: 10.3892/or.2016.4886. Epub 2016 Jun 21.

140. Perinatal exposure to dioxins and dioxin-like compounds and infant growth and body mass index at seven years: A pooled analysis of three European birth cohorts.
Iszatt N, Stigum H, Govarts E, Murinova LP, Schoeters G, Trnovec T, Legler J, Thomsen C, Koppen G, Eggesbø M.
Environ Int. 2016 Sep;94:399-407. doi: 10.1016/j.envint.2016.04.040. Epub 2016 Jun 14.

141. In utero exposure to organochlorine pesticides and early menarche in the Avon Longitudinal Study of Parents and Children.
Namulanda G, Maisonet M, Taylor E, Flanders WD, Olson D, Sjodin A, Qualters JR, Vena J, Northstone K, Naeher L.
Environ Int. 2016 Sep;94:467-72. doi: 10.1016/j.envint.2016.06.001. Epub 2016 Jun 11.

142. Exposure to non-persistent pesticides and thyroid function: A systematic review of epidemiological evidence.
Campos É, Freire C.
Int J Hyg Environ Health. 2016 Aug;219(6):481-97. doi: 10.1016/j.ijheh.2016.05.006. Epub 2016 May 20.

143. Urine and serum biomonitoring of exposure to environmental estrogens II: Soy isoflavones and zearalenone in pregnant women.
Fleck SC, Churchwell MI, Doerge DR, Teeguarden JG.
Food Chem Toxicol. 2016 Sep;95:19-27. doi: 10.1016/j.fct.2016.05.021. Epub 2016 May 30.

144. Reprogramming of the Epigenome by MLL1 Links Early-Life Environmental Exposures to Prostate Cancer Risk.
Wang Q, Trevino LS, Wong RL, Medvedovic M, Chen J, Ho SM, Shen J, Foulds CE, Coarfa C, O'Malley BW, Shilatifard A, Walker CL.
Mol Endocrinol. 2016 Aug;30(8):856-71. doi: 10.1210/me.2015-1310. Epub 2016 May 24.

145. Effects of maternal diet and environmental exposure to organochlorine pesticides on newborn weight in Southern Spain.
Monteagudo C, Mariscal-Arcas M, Heras-Gonzalez L, Ibañez-Peinado D, Rivas A, Olea-Serrano F.
Chemosphere. 2016 Aug;156:135-42. doi: 10.1016/j.chemosphere.2016.04.103. Epub 2016 May 9.

146. Urinary benzophenone concentrations and their association with demographic factors in a South Korean population.
Kang HS, Ko A, Kwon JE, Kyung MS, Moon GI, Park JH, Lee HS, Suh JH, Lee JM, Hwang MS, Kim K, Hong JH, Hwang IG.
Environ Res. 2016 Aug;149:1-7. doi: 10.1016/j.envres.2016.04.036. Epub 2016 May 5.

147. Novel functions of PXR in cardiometabolic disease.
Zhou C.
Biochim Biophys Acta. 2016 Sep;1859(9):1112-20. doi: 10.1016/j.bbagrm.2016.02.015. Epub 2016 Feb 26.

148. Maternal and infant characteristics influencing the anogenital distance and penile length in newborns.
Singal AK, Jain VG.
Andrologia. 2016 Aug;48(6):708-13. doi: 10.1111/and.12507. Epub 2015 Dec 15.

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 2016/06/30 to 2016/12/31.

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 40 artikler.

Udvalgte publikationer

2 artikler er blevet udvalgt til nærmere beskrivelse baseret på, at de beskriver resultater der bidrager til ny eller yderligere viden om grupper af hormonforstyrrende stoffer eller metoder til testning af stoffer med hormonforstyrrende egenskaber.

Den første artikel omhandler et studie, hvor man har haft til formål at udvikle et *in vitro* assay, der kan erstatte den såkaldte uterotrofiske test i gavner/*in vivo*.
Den anden artikel omhandler *in vitro* studier af mykotoksinet zeralenon (ZEN) (et såkaldt mycoestrogen), dets metabolit α-zeralenol (α-ZEL) og et andet mykotoksin, alternariol (AOH). Formålet med studiet var at undersøge de østrogene kombinations effekterne af de tre mykotoxiner.

Development of an In vitro Assay Measuring Uterine-Specific Estrogenic Responses for Use in Chemical Safety Assessment.
Miller MM, Alyea RA, LeSommer C, Doheny DL, Rowley SM, Childs KM, Balbuena P, Ross SM, Dong J, Sun B, Andersen MA, Clewell RA.
Toxicol Sci. 2016 Aug 7. pii: kfw152.

A toxicity pathway approach was taken to develop an in vitro assay using human uterine epithelial adenocarcinoma (Ishikawa) cells as a replacement for measuring an in vivo uterotrophic response to estrogens. The Ishikawa cell was determined to be fit for the purpose of recapitulating in vivo uterine response by verifying fidelity of the biological pathway components and the dose-response predictions to women of child-bearing age. Expression of the suite of estrogen receptors that control uterine proliferation (ERα66, ERα46, ERα36, ERβ, G-protein coupled estrogen receptor (GPER)) were confirmed across passages and treatment conditions. Phenotypic responses to ethinyl estradiol (EE) from transcriptional activation of ER-mediated genes, to ALP enzyme induction and cellular proliferation occurred at concentrations consistent withestrogenic activity in adult women (low picomolar). To confirm utility of this model to predict concentration-response for uterine proliferation with xenobiotics, we tested the concentration-response for compounds with known uterine estrogenic activity in humans and compared the results to assays from the ToxCast and Tox21 suite of estrogen assays. The Ishikawa proliferation assay was consistent with in vivo responses and was a more sensitive measure of uterine response. Because this assay was constructed by first mapping the key molecular events for cellular response, and then ensuring that the assay incorporated these events, the resulting cellular assay should be a reliable tool for identifying estrogenic compounds and may provide improved quantitation of chemical concentration response for in vitro-based safety assessments.

Synergistic estrogenic effects of Fusarium and Alternaria mycotoxins in vitro.
Vejdovszky K, Hahn K, Braun D, Warth B, Marko D.
Arch Toxicol. 2016 Jul 11.

Mycotoxins are toxic secondary metabolites formed by various fungal species that are found as natural contaminants in food. This very heterogeneous group of compounds triggers multiple toxic mechanisms, including endocrine disruptive potential. Current risk assessment ofmycotoxins, as for most chemical substances, is based on the effects of single compounds. However, concern on a potential enhancement of risks by interactions of single substances in naturally occurring mixtures has greatly increased recently. In this study, the combinatory effects of three mycoestrogens were investigated in detail. This includes the endocrine disruptors zearalenone (ZEN) and α-zearalenol (α-ZEL) produced byFusarium fungi and alternariol (AOH), a cytotoxic and estrogenic mycotoxin formed by Alternaria species. For evaluation of effects, estrogen-dependent activation of alkaline phosphatase (AlP) and cell proliferation were tested in the adenocarcinoma cell line Ishikawa. The estrogenicpotential varied among the single substances. Half maximum effect concentrations (EC50) for AlP activation were evaluated for α-ZEL, ZEN and AOH as 37 pM, 562 pM and 995 nM, respectively. All three mycotoxins were found to act as partial agonists. The majority of binary combinations, even at very low concentrations in the case of α-ZEL, showed strong synergism in the AlP assay. These potentiating phenomena of mycotoxin mixtures highlight the urgent need to incorporate combinatory effects into future risk assessment, especially when endocrine disruptors are involved. To the best of our knowledge, this study presents the first investigation on synergistic effects of mycoestrogens.

Bruttoliste

1.Differential Activation of a Mouse Estrogen Receptor β Isoform (mERβ2) with Endocrine-Disrupting Chemicals (EDCs).
Donoghue LJ, Neufeld TI, Li Y, Arao Y, Coons LA, Korach KS.
Environ Health Perspect. 2016 Sep 16. [Epub ahead of print]

2.Screening of endocrine activity of compounds migrating from plastic baby bottles using a multi-receptor panel of in vitro bioassays.
Simon C, Onghena M, Covaci A, Van Hoeck E, Van Loco J, Vandermarken T, Van Langenhove K, Demaegdt H, Mertens B, Vandermeiren K, Scippo ML, Elskens M.
Toxicol In Vitro. 2016 Sep 12. pii: S0887-2333(16)30184-9. doi: 10.1016/j.tiv.2016.09.008. [Epub ahead of print]

3.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.
Comp Biochem Physiol C Toxicol Pharmacol. 2016 Sep 11;191:26-35. doi: 10.1016/j.cbpc.2016.08.009. [Epub ahead of print]

4.miR-541 Contributes to Microcystin-LR-Induced Reproductive Toxicity through Regulating the Expression of p15 in Mice.
Meng X, Zhang L, Chen X, Xiang Z, Li D, Han X.
Toxins (Basel). 2016 Sep 6;8(9). pii: E260. doi: 10.3390/toxins8090260.

5.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. 2016 Sep 3. [Epub ahead of print]

6.Release of monomers from orthodontic adhesives.
Bationo R, Jordana F, Boileau MJ, Colat-Parros J.
Am J Orthod Dentofacial Orthop. 2016 Sep;150(3):491-8. doi: 10.1016/j.ajodo.2016.02.027.

7.Methylparaben stimulates tumor initiating cells in ER+ breast cancer models.
Lillo MA, Nichols C, Perry C, Runke S, Krutilina R, Seagroves TN, Miranda-Carboni GA, Krum SA.
J Appl Toxicol. 2016 Sep 1. doi: 10.1002/jat.3374. [Epub ahead of print]

8.Predicting anti-androgenic activity of bisphenols using molecular docking and quantitative structure-activity relationships.
Yang X, Liu H, Yang Q, Liu J, Chen J, Shi L.
Chemosphere. 2016 Nov;163:373-81. doi: 10.1016/j.chemosphere.2016.08.062. Epub 2016 Aug 22.

9.Di(2-ethylhexyl)phthalate: Adverse effects on folliculogenesis that cannot be neglected.
Zhang T, Shen W, De Felici M, Zhang XF.
Environ Mol Mutagen. 2016 Aug 17. doi: 10.1002/em.22037. [Epub ahead of print] Review.

10.Prediction of Estrogenic Bioactivity of Environmental Chemical Metabolites.
Pinto CL, Mansouri K, Judson R, Browne P.

Chem Res Toxicol. 2016 Sep 19;29(9):1410-27. doi: 10.1021/acs.chemrestox.6b00079. Epub 2016 Aug 31.

11.Human Peripheral Blood Mononuclear Cell Function and Dendritic Cell Differentiation Are Affected by Bisphenol-A Exposure.
Camarca A, Gianfrani C, Ariemma F, Cimmino I, Bruzzese D, Scerbo R, Picascia S, D'Esposito V, Beguinot F, Formisano P, Valentino R.
PLoS One. 2016 Aug 10;11(8):e0161122. doi: 10.1371/journal.pone.0161122. eCollection 2016.

12.Development of an In vitro Assay Measuring Uterine-Specific Estrogenic Responses for Use in Chemical Safety Assessment.
Miller MM, Alyea RA, LeSommer C, Doheny DL, Rowley SM, Childs KM, Balbuena P, Ross SM, Dong J, Sun B, Andersen MA, Clewell RA.
Toxicol Sci. 2016 Aug 7. pii: kfw152. [Epub ahead of print]

13.TBECH, 1,2-dibromo-4-(1,2 dibromoethyl) cyclohexane, alters androgen receptor regulation in response to mutations associated with prostate cancer.
Kharlyngdoh JB, Asnake S, Pradhan A, Olsson PE.
Toxicol Appl Pharmacol. 2016 Sep 15;307:91-101. doi: 10.1016/j.taap.2016.07.018. Epub 2016 Jul 27.

14.Triazine herbicides inhibit relaxin signaling and disrupt nitric oxide homeostasis.
Park SE, Lim SR, Choi HK, Bae J.
Toxicol Appl Pharmacol. 2016 Sep 15;307:10-8. doi: 10.1016/j.taap.2016.07.010. Epub 2016 Jul 16.

15.In vitro functional screening as a means to identify new plasticizers devoid of reproductive toxicity.
Boisvert A, Jones S, Issop L, Erythropel HC, Papadopoulos V, Culty M.
Environ Res. 2016 Oct;150:496-512. doi: 10.1016/j.envres.2016.06.033. Epub 2016 Jul 15.

16.Glucuronidation of 4-tert-octylphenol in humans, monkeys, rats, and mice: an in vitro analysis using liver and intestine microsomes.
Hanioka N, Isobe T, Ohkawara S, Tanaka-Kagawa T, Jinno H.
Arch Toxicol. 2016 Jul 12. [Epub ahead of print]

17.Synergistic estrogenic effects of Fusarium and Alternaria mycotoxins in vitro.
Vejdovszky K, Hahn K, Braun D, Warth B, Marko D.
Arch Toxicol. 2016 Jul 11. [Epub ahead of print]

18. (Anti-)estrogenic and (anti-)androgenic effects in wastewater during advanced treatment: comparison of three in vitro bioassays.
Gehrmann L, Bielak H, Behr M, Itzel F, Lyko S, Simon A, Kunze G, Dopp E, Wagner M, Tuerk J.
Environ Sci Pollut Res Int. 2016 Jul 11. [Epub ahead of print]

19. Characterization of quality of sediments from Paranaguá Bay (Brazil) by combined in vitro bioassays and chemical analyses.
Rizzi J, Pérez-Albaladejo E, Fernandes D, Contreras J, Froehner S, Porte C.
Environ Toxicol Chem. 2016 Jul 8. doi: 10.1002/etc.3553. [Epub ahead of print]

20. Bisphenol A affects early bovine embryo development and metabolism that is negated by an oestrogen receptor inhibitor.
Choi BI, Harvey AJ, Green MP.
Sci Rep. 2016 Jul 7;6:29318. doi: 10.1038/srep29318.

21. ToxCast Chemical Landscape: Paving the Road to 21st Century Toxicology.
Richard AM, Judson RS, Houck KA, Grulke CM, Volarath P, Thillainadarajah I, Yang C, Rathman J, Martin MT, Wambaugh JF, Knudsen TB, Kancherla J, Mansouri K, Patlewicz G, Williams AJ, Little SB, Crofton KM, Thomas RS.
Chem Res Toxicol. 2016 Aug 15;29(8):1225-51. doi: 10.1021/acs.chemrestox.6b00135. Epub 2016 Jul 20.

22. BDE-99, but not BDE-47, is a transient aryl hydrocarbon receptor agonist in zebrafish liver cells.
Yang J, Zhu J, Chan KM.
Toxicol Appl Pharmacol. 2016 Aug 15;305:203-15. doi: 10.1016/j.taap.2016.06.023. Epub 2016 Jun 23.

23. Profiling of Vitamin D Metabolic Intermediates toward VDR Using Novel Stable Gene Reporter Cell Lines IZ-VDRE and IZ-CYP24.
Bartonkova I, Grycova A, Dvorak Z.
Chem Res Toxicol. 2016 Jul 18;29(7):1211-22. doi: 10.1021/acs.chemrestox.6b00170. Epub 2016 Jul 1.

24. Enantioselective endocrine disrupting effects of omeprazole studied in the H295R cell assay and by molecular modeling.
Sørensen AM, Hansen CH, Bonomo S, Olsen L, Jørgensen FS, Weisser JJ, Kretschmann AC, Styrishave B.
Toxicol In Vitro. 2016 Aug;34:71-80. doi: 10.1016/j.tiv.2016.03.007. Epub 2016 Mar 19.

25. In vitro steroid profiling system for the evaluation of endocrine disruptors.
Nakano Y, Yamashita T, Okuno M, Fukusaki E, Bamba T.
J Biosci Bioeng. 2016 Sep;122(3):370-7. doi: 10.1016/j.jbiosc.2016.02.008. Epub 2016 Mar 12.

26. In Vitro Effects of the Endocrine Disruptor p,p'-DDT on Human Follitropin Receptor.
Munier M, Grouleff J, Gourdin L, Fauchard M, Chantreau V, Henrion D, Coutant R, Schiøtt B, Chabbert M, Rodien P.
Environ Health Perspect. 2016 Jul;124(7):991-9. doi: 10.1289/ehp.1510006. Epub 2016 Feb 19.

27. Bisphenol-A Mediated Inhibition of Hippocampal Neurogenesis Attenuated by Curcumin via Canonical Wnt Pathway.
Tiwari SK, Agarwal S, Tripathi A, Chaturvedi RK.
Mol Neurobiol. 2016 Jul;53(5):3010-29. doi: 10.1007/s12035-015-9197-z. Epub 2015 May 12.

28. In vitro skin absorption tests of three types of parabens using a Franz diffusion cell.
Seo JE, Kim S, Kim BH.
J Expo Sci Environ Epidemiol. 2016 Jul 20. doi: 10.1038/jes.2016.33. [Epub ahead of print]

29. Effects of perfluorinated alkyl acids on cellular responses of MCF-10A mammary epithelial cells in monolayers and on acini formation in vitro.
Halsne R, Tandberg JI, Lobert VH, Østby GC, Thoen E, Ropstad E, Verhaegen S.
Toxicol Lett. 2016 Sep 30;259:95-107. doi: 10.1016/j.toxlet.2016.08.004. Epub 2016 Aug 7.

30. Biomimetic hydrogel with tunable mechanical properties for vitreous substitutes.
Santhanam S, Liang J, Struckhoff J, Hamilton PD, Ravi N.
Acta Biomater. 2016 Oct 1;43:327-37. doi: 10.1016/j.actbio.2016.07.051. Epub 2016 Jul 29.

31. 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. 2016 Sep 13. doi: 10.1111/bcpt.12670. [Epub ahead of print]

32. Environmental Chemicals Modulate Polar Bear (Ursus maritimus) Peroxisome Proliferator-Activated Receptor Gamma (PPARG) and Adipogenesis in Vitro.
Routti H, Lille-Langøy R, Berg MK, Fink T, Harju M, Kristiansen K, Rostkowski P, Rusten M, Sylte I, Øygarden L, Goksøyr A. Environ Sci Technol. 2016 Sep 19. [Epub ahead of print]

33. Disruption of Retinol (Vitamin A) Signaling by Phthalate Esters: SAR and Mechanism Studies.
Chen Y, Reese DH.
PLoS One. 2016 Aug 17;11(8):e0161167. doi: 10.1371/journal.pone.0161167. eCollection 2016.

34. The presence of macrophages and inflammatory responses in an in vitro testicular co-culture model of male reproductive development enhance relevance to in vivo conditions.
Harris S, Shubin SP, Wegner S, Van Ness K, Green F, Hong SW, Faustman EM.
Toxicol In Vitro. 2016 Oct;36:210-5. doi: 10.1016/j.tiv.2016.08.003. Epub 2016 Aug 7.

35. Environmental chemicals impact dog semen quality in vitro and may be associated with a temporal decline in sperm motility and increased cryptorchidism.
Lea RG, Byers AS, Sumner RN, Rhind SM, Zhang Z, Freeman SL, Moxon R, Richardson HM, Green M, Craigon J, England GC.
Sci Rep. 2016 Aug 9;6:31281. doi: 10.1038/srep31281.

36. A Demonstration of the Uncertainty in Predicting the Estrogenic Activity of Individual Chemicals and Mixtures From an In Vitro Estrogen Receptor Transcriptional Activation Assay (T47D-KBluc) to the In Vivo Uterotrophic Assay Using Oral Exposure.
Conley JM, Hannas BR, Furr JR, Wilson VS, Gray LE Jr.
Toxicol Sci. 2016 Jul 29. pii: kfw134. [Epub ahead of print]

37. [Comparison of embryotoxicity of di(2-ethylhexyl) phthalate using mouse and human embryonic stem cell test models in vitro].
Luo S, Fang HQ, Yang H, Zhang LS, Jia XD.
Zhonghua Yu Fang Yi Xue Za Zhi. 2016 Jul 6;50(7):645-51. doi: 10.3760/cma.j.issn.0253-9624.2016.07.016. Chinese.

38. An unusual strategy for the anoxic biodegradation of phthalate.
Ebenau-Jehle C, Mergelsberg M, Fischer S, Brüls T, Jehmlich N, von Bergen M, Boll M.
ISME J. 2016 Jul 8. doi: 10.1038/ismej.2016.91. [Epub ahead of print]

39. Enzymes involved in the anaerobic degradation of ortho-phthalate by the nitrate-reducing bacterium Azoarcus sp. strain PA01.
Junghare M, Spiteller D, Schink B.
Environ Microbiol. 2016 Sep;18(9):3175-88. doi: 10.1111/1462-2920.13447. Epub 2016 Aug 3.

40. Di-(2-ethylhexyl) phthalate inhibits testosterone level through disturbed hypothalamic-pituitary-testis axis and ERK-mediated 5α-Reductase 2.
Ha M, Guan X, Wei L, Li P, Yang M, Liu C.
Sci Total Environ. 2016 Sep 1;563-564:566-75. doi: 10.1016/j.scitotenv.2016.04.145. Epub 2016 May 4.

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 54 artikler (Bruttolisten).

Udvalgte publikationer

To artikler er blevet udvalgt til nærmere beskrivelse (abstrakt og konklusion) og to artikler er udvalgt blot til abstract. Disse artikler er valgt fordi vi mener de bidrager til ny viden om hormonforstyrrende stoffer og her er der særligt fokus på Vinclozolin og NMDR (Flick et al. 2016) samt påvirkninger af anogenital afstand efter pre- og postnatale eksponeringer (Kita et al. 2016). De 2 artikler hvor der er medtaget abstracts fra en artikel der foreslår en systematisk gennemgang og integreret vurdering (SYRINA) af hormonforstyrrende kemikalier (Vandenberg et al. 2016) og et studie med Lavdosis eksponering for bisphenol A i rotter og påvirkning af knogle geometri (Lejonklou et al. 2016).

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.

Investigations of putative reproductive toxicity of low-dose exposures to vinclozolin in Wistar rats.
Flick B, Schneider S, Melching-Kollmuss S, Fussell KC, Gröters S, Buesen R, Strauss V, van Ravenzwaay B.
Arch Toxicol. 2016 Sep 9.

The current investigation examines whether the fungicide vinclozolin, which has an anti-androgenic mode of action, is capable of disrupting endocrine homeostasis at very low doses. The data generated clarify whether a non-monotonic dose-response relationship exists to enhance the current debate about the regulation of endocrine disruptors. Moreover, it is part of a series of investigations assessing the dose-response relationship of single and combined administration of anti-androgenic substances. A pre-postnatal in vivo study design was chosen which was compliant with regulatory testing protocols. The test design was improved by additional endpoints addressing hormone levels, morphology and histopathological examinations. Doses were chosen to represent an effect level (20 mg/kg bw/d), the current NOAEL (4 mg/kg bw/d), and a dose close to the "ADI" (0.005 mg/kg bw/d) for the detection of a possible non-monotonic dose-response curve. Anti-androgenic changes were observable at the effect level but not at lower exposures. Nipple/areola counts appeared to be the most sensitive measure of effect, followed by male sex organ weights at sexual maturation, and finally gross and histopathological findings. The results indicate the absence of evidence for effects at low or very low dose levels. A non-monotonic dose-response relationship was not evident.

Manipulation of pre and postnatal androgen environments and anogenital distance in rats.

Kita DH, Meyer KB, Venturelli AC, Adams R, Machado DL, Morais RN, Swan SH, Gennings C, Martino-Andrade AJ.

Toxicology. 2016 Sep 14. pii: S0300-483X(16)30196-2. doi: 10.1016/j.tox.2016.08.021.

We examined the anogenital distance (AGD) plasticity in rats through the manipulation of the androgen environment in utero and during puberty. Dams were treated from gestation days 13-20 with vehicle, flutamide (20mg/kg/day), di-(2-ethylhexyl) phthalate (DEHP, 750mg/kg/day), or testosterone

(1.0mg/kg/day). After weaning, male pups were randomly assigned to one of four postnatal groups, which received the same treatments given prenatally. Sixteen treatment groups were established based on the combination of pre- and postnatal exposures. The postnatal treatments were conducted from postnatal days 23-53. In utero flutamide and DEHP exposure significantly shortened male AGD, although this effect was more pronounced in flutamide-exposed rats. Postnatal flutamide, DEHP, and testosterone induced slight but significant reductions in male AGD. Our study indicates that AGD is a stable anatomical landmark that reflects the androgen action in utero, although it can also be slightly responsive to changes in the androgen environment following pubertal exposure.

A proposed framework for the systematic review and integrated assessment (SYRINA) of endocrine disrupting chemicals. Vandenberg LN, Ågerstrand M, Beronius A, Beausoleil C, Bergman Å, Bero LA, Bornehag CG, Boyer CS, Cooper GS, Cotgreave I, Gee D, Grandjean P, Guyton KZ, Hass U, Heindel JJ, Jobling S, Kidd KA, Kortenkamp A, Macleod MR, Martin OV, Norinder U, Scheringer M, Thayer KA, Toppari J, Whaley P, Woodruff TJ, Rudén C. Environ Health. 2016 Jul 14;15(1):74. doi: 10.1186/s12940-016-0156-6.

BACKGROUND:
The issue of endocrine disrupting chemicals (EDCs) is receiving wide attention from both the scientific and regulatory communities. Recent analyses of the EDC literature have been criticized for failing to use transparent and objective approaches to draw conclusions about the strength of evidence linking EDC exposures to adverse health or environmental outcomes. Systematic review methodologies are ideal for addressing this issue as they provide transparent and consistent approaches to study selection and evaluation. Objective methods are needed for integrating the multiple streams of evidence (epidemiology, wildlife, laboratory animal, in vitro, and in silico data) that are relevant in assessing EDCs.
METHODS:
We have developed a framework for the systematic review and integrated assessment (SYRINA) of EDC studies. The framework was designed for use with the International Program on Chemical Safety (IPCS) and World Health Organization (WHO) definition of an EDC, which requires appraisal of evidence regarding 1) association between exposure and an adverse effect, 2) association between exposure and endocrine disrupting activity, and 3) a plausible link between the adverse effect and the endocrine disrupting activity.
RESULTS:
Building from existing methodologies for evaluating and synthesizing evidence, the SYRINA framework includes seven steps: 1) Formulate the problem; 2) Develop the review protocol; 3) Identify relevant evidence; 4) Evaluate evidence from individual studies; 5) Summarize and evaluate each stream of evidence; 6) Integrate evidence across all streams; 7) Draw conclusions, make recommendations, and evaluate uncertainties. The proposed method is tailored to the IPCS/WHO definition of an EDC but offers flexibility for use in the context of other definitions of EDCs.
CONCLUSIONS:
When using the SYRINA framework, the overall objective is to provide the evidence base needed to support decision making, including any action to avoid/minimise potential adverse effects of exposures. This framework allows for the evaluation and synthesis of evidence from multiple evidence streams. Finally, a decision regarding regulatory action is not only dependent on the strength of evidence, but also the consequences of action/inaction, e.g. limited or weak evidence may be sufficient to justify action if consequences are serious or irreversible.

Low-dose developmental exposure to bisphenol A alters the femoral bone geometry in wistar rats. Lejonklou MH, Christiansen S, Örberg J, Shen L, Larsson S, Boberg J, Hass U, Lind PM. Chemosphere. 2016 Sep 1;164:339-346. doi: 10.1016/j.chemosphere.2016.08.114.

Bisphenol A (BPA) is a chemical produced in large volumes for use in manufacturing of consumer products and industrial applications, and an endocrine disruptor known to affect several hormonal systems. Bone

produces hormones and is additionally a sensitive hormone target tissue, and is thus potentially sensitive to low doses of endocrine disruptors such as BPA, especially during development.
METHODS:
110 pregnant Wistar rats were gavaged with 0; 25 µg; 250 µg; 5000 µg or 50,000 µg BPA/kg bodyweight (bw)/day from gestational day 7 until weaning at postnatal day 22. The three-month-old offspring were sacrificed and right femurs collected for length measurements, geometrical measurements by peripheral quantitative computed tomography (pQCT), as well as for analyses of biomechanical properties using the three-point-bending method.
RESULTS:
The femur was elongated in female offspring of dams exposed to 25 or 5000 µg BPA/kg bw/day (1.8% and 2.1%, respectively), and increased cortical thickness (4.7%) was observed in male offspring of dams exposed to 25 µg BPA/kg bw/day, compared to controls ($p < 0.005$). The biomechanical properties of the bone were not significantly altered.
CONCLUSIONS:
In utero and lactational exposure to the lowest BPA dose used in this study altered femoral geometry in both male and female offspring. This was observed at 25 µg BPA/kg bw/day, a dose lower than the Human Equivalent Dose (HED) applied by EFSA to set a temporary TDI (609 µg BPA/kg bw/day), and far lower than the No-Observed-Adverse-Effect-Level (NOAEL) (5000 µg BPA/kg bw/day) on which the US FDA TDI is based.

Bruttoliste

1. Evidence of oxidative damage and reproductive dysfunction accompanying 4-vinylcyclohexene diepoxide exposure in female Wistar rats. Abolaji AO, Adedara IA, Abajingin AO, Fatunmibi OJ, Ladipo EO, Farombi EO. Reprod Toxicol. 2016 Sep 16. pii: S0890-6238(16)30340-9. doi: 10.1016/j.reprotox.2016.09.009.

2. Manipulation of pre and postnatal androgen environments and anogenital distance in rats. Kita DH, Meyer KB, Venturelli AC, Adams R, Machado DL, Morais RN, Swan SH, Gennings C, Martino-Andrade AJ. Toxicology. 2016 Sep 14. pii: S0300-483X(16)30196-2. doi: 10.1016/j.tox.2016.08.021. (VALGT)

3. Accelerated reduction of serum thyroxine and hippocampal histone acetylation links to exacerbation of spatial memory impairment in aged CD-1 mice pubertally exposed to bisphenol-a. Jiang W, Cao L, Wang F, Ge H, Wu PC, Li XW, Chen GH. Age (Dordr). 2016 Sep 9.

4. Effects of Exposure to Bisphenol A and Ethinyl Estradiol on the Gut Microbiota of Parents and Their Offspring in a Rodent Model. Javurek AB, Spollen WG, Johnson SA, Bivens NJ, Bromert KH, Givan SA, Rosenfeld CS. Gut Microbes. 2016 Sep 13:0.

5. 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. 2016 Sep 13:1-8.

6. 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. 2016 Sep 10.

7. Mammary Gland Evaluation in Juvenile Toxicity Studies: Temporal Developmental Patterns in the Male and Female Harlan Sprague-Dawley Rat. Filgo AJ, Foley JF, Puvanesarajah S, Borde AR, Midkiff BR, Reed CE, Chappell VA, Alexander LB, Borde PR, Troester MA, Hayes Bouknight SA, Fenton SE. Toxicol Pathol. 2016 Sep 9. pii: 0192623316663864.

8. Investigations of putative reproductive toxicity of low-dose exposures to vinclozolin in Wistar rats. Flick B, Schneider S, Melching-Kollmuss S, Fussell KC, Gröters S, Buesen R, Strauss V, van Ravenzwaay B. Arch Toxicol. 2016 Sep 9. (VALGT)

9. Low-dose developmental exposure to bisphenol A alters the femoral bone geometry in wistar rats. Lejonklou MH, Christiansen S, Örberg J, Shen L, Larsson S, Boberg J, Hass U, Lind PM. Chemosphere. 2016 Sep 1;164:339-346. doi: 10.1016/j.chemosphere.2016.08.114. (Abstract)

10. Identifying Reference Chemicals for Thyroid Bioactivity Screening. Wegner S, Browne P, Dix D. Reprod Toxicol. 2016 Aug 30. pii: S0890-6238(16)30326-4. doi: 10.1016/j.reprotox.2016.08.016.

11. Histologic study of testis injury after bisphenol A exposure in mice: Direct evidence for impairment of the genital system by endocrine disruptors. Tian J, Ding Y, She R, Ma L, Du F, Xia K, Chen L. Toxicol Ind Health. 2016 Aug 29

12. Impact of Low Dose Oral Exposure to Bisphenol A (BPA) on the Neonatal Rat Hypothalamic and Hippocampal Transcriptome: A CLARITY-BPA Consortium Study. Arambula SE, Belcher SM, Planchart A, Turner SD, Patisaul HB. Endocrinology. 2016 Aug 29:en20161339.

13. Gestational and lactational exposure to bisphenol AF in maternal rats increases testosterone levels in 23-day-old male offspring. Li J, Sheng N, Cui R, Feng Y, Shao B, Guo X, Zhang H, Dai J. Chemosphere. 2016 Nov;163:552-61. doi: 10.1016/j.chemosphere.2016.08.059. Epub 2016 Aug 25.

14. The role of retinoic acid receptors and their cognate ligands in reproduction in a context of triorganotin based endocrine disrupting chemicals. Macejova D, Toporova L, Brtko J. Endocr Regul. 2016 Jul;50(3):154-64. doi: 10.1515/enr-2016-0018.

15. Adverse Reproductive and Developmental Health Outcomes Following Prenatal Exposure to a Hydraulic Fracturing Chemical Mixture in Female C57Bl/6 Mice. Kassotis CD, Bromfield JJ, Klemp KC, Meng CX, Wolfe A, Zoeller RT, Balise VD, Isiguzo CJ, Tillitt DE, Nagel SC. Endocrinology. 2016 Sep;157(9):3469-81. doi: 10.1210/en.2016-1242. Epub 2016 Aug 25.

16. Atrazine activates multiple signaling pathways enhancing the rapid hCG-induced androgenesis in rat Leydig cells. Pogrmic-Majkic K, Fa S, Samardzija D, Hrubik J, Kaisarevic S, Andric N. Toxicology. 2016 Aug 20;368-369:37-45. doi: 10.1016/j.tox.2016.08.016.

17. 6-Gingerol-rich fraction from Zingiber officinale ameliorates carbendazim-inducedendocrine disruption and toxicity in testes and epididymis of rats. Salihu M, Ajayi BO, Adedara IA, de Souza D, Rocha JB, Farombi EO. Andrologia. 2016 Aug 22. doi: 10.1111/and.12658.

18. Bisphenol a induces autophagy and apoptosis concurrently involving the Akt/mTOR pathway in testes of pubertal SD rats. Quan C, Wang C, Duan P, Huang W, Chen W, Tang S, Yang K. Environ Toxicol. 2016 Aug 19.doi:10.1002/tox.22339.

19. Differential effects on adiposity and serum marker of bone formation by post-weaning exposure to methylparaben and butylparaben. Hu P, Kennedy RC, Chen X, Zhang J, Shen CL, Chen J, Zhao L. Environ Sci Pollut Res Int. 2016 Aug 18.

20. Di(2-ethylhexyl)phthalate: Adverse effects on folliculogenesis that cannot be neglected. Zhang T, Shen W, De Felici M, Zhang XF. Environ Mol Mutagen. 2016 Aug 17. doi: 10.1002/em.22037. Review.

21. Tributyltin chloride induces renal dysfunction by inflammation and oxidative stress in female rats. Coutinho JV, Freitas-Lima LC, Freitas FF, Freitas FP, Podratz PL, Magnago RP, Porto ML, Meyrelles SS, Vasquez EC, Brandão PA,
22. Carneiro MT, Paiva-Melo FD, Miranda-Alves L, Silva IV, Gava AL, Graceli JB. Toxicol Lett. 2016 Aug 10. pii: S0378-4274(16)33094-6. doi: 10.1016/j.toxlet.2016.08.007.

23. Melatonin abrogates nonylphenol-induced testicular dysfunction in Wistar rats. Tabassum H, Parvez S, Raisuddin S. Andrologia. 2016 Aug 10. doi: 10.1111/and.12648.

24. Development of an In vitro Assay Measuring Uterine-Specific Estrogenic Responses for Use in Chemical Safety Assessment. Miller MM, Alyea RA, LeSommer C, Doheny DL, Rowley SM, Childs KM, Balbuena P, Ross SM, Dong J, Sun B, Andersen MA, Clewell RA. Toxicol Sci. 2016 Aug 7. pii: kfw152.

25. TRIENNIAL REPRODUCTION SYMPOSIUM: Environmental programming of reproduction during fetal life: Effects of intrauterine position and the endocrine disrupting chemical bisphenol A. Vom Saal FS. J Anim Sci. 2016 Jul;94(7):2722-36. doi: 10.2527/jas.2015-0211.

26. Developmental exposure to endocrine disrupting chemicals alters the epigenome: Identification of reprogrammed targets. Prusinski L, Al-Hendy A, Yang Q. Gynecol Obstet Res. 2016 Jul;3(1):1-6. Epub 2016 May 3.

27. Preparation of High-quality Hematoxylin and Eosin-stained Sections from Rodent Mammary Gland Whole Mounts for Histopathologic Review. Tucker DK, Foley JF, Hayes-Bouknight SA, Fenton SE. Toxicol Pathol. 2016 Jul 29.

28. Prenatal exposure to di(2-ethylhexyl) phthalate impairs development of the mouse neocortex. Komada M, Gendai Y, Kagawa N, Nagao T. Toxicol Lett. 2016 Sep 30;259:69-79. doi: 10.1016/j.toxlet.2016.07.019. Epub 2016 Jul 27.

29. Long-term effects of perinatal exposure to low doses of cadmium on the prostate of adult male rats. Santana VP, Salles ÉS, Correa DE, Gonçalves BF, Campos SG, Justulin LA, Godinho AF, Scarano WR. Int J Exp Pathol. 2016 Jul 28. doi: 10.1111/iep.12193.

30. 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. 2016 Jul 27. doi: 10.1002/tox.22316.

31. Di-(2-propylheptyl) phthalate (DPHP) and its metabolites in blood of rats upon single oral administration of DPHP. Klein D, Kessler W, Semder B, Pütz C, Lichtmannegger J, Otter R, Filser JG. Toxicol Lett. 2016 Sep 30;259:80-6. doi: 10.1016/j.toxlet.2016.07.025. Epub 2016 Jul 22.

32. 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. 2016 Jul 21. doi: 10.1002/tox.22322.

33. The effects of phthalates in the cardiovascular and reproductive systems: A review. Mariana M, Feiteiro J, Verde I, Cairrao E. Environ Int. 2016 Sep;94:758-76. doi: 10.1016/j.envint.2016.07.004. Review.

34. Exposure to the environmental endocrine disruptor TCDD and human reproductive dysfunction: Translating lessons from murine models. Bruner-Tran KL, Gnecco J, Ding T, Glore DR, Pensabene V, Osteen KG. Reprod Toxicol. 2016 Jul 14. pii: S0890-6238(16)30264-7. doi: 10.1016/j.reprotox.2016.07.007.

35. In vitro functional screening as a means to identify new plasticizers devoid of reproductive toxicity. Boisvert A, Jones S, Issop L, Erythropel HC, Papadopoulos V, Culty M. Environ Res. 2016 Oct;150:496-512. doi: 10.1016/j.envres.2016.06.033. Epub 2016 Jul 15.

36. Environmental factors, epigenetics, and developmental origin of reproductive disorders. Ho SM, Cheong A, Adgent MA, Veevers J, Suen AA, Tam NN, Leung YK, Jefferson WN, Williams CJ. Reprod Toxicol. 2016 Jul 12. pii: S0890-6238(16)30268-4. doi: 10.1016/j.reprotox.2016.07.011.

37. 2,4,6-Tribromophenol Interferes with the Thyroid Hormone System by Regulating Thyroid Hormones and the Responsible Genes in Mice. Lee D, Ahn C, Hong EJ, An BS, Hyun SH, Choi KC, Jeung EB. Int J Environ Res Public Health. 2016 Jul 12;13(7). pii: E697. doi: 10.3390/ijerph13070697.

38. Maternal exposure to a mixture of di(2-ethylhexyl) phthalate (DEHP) and polychlorinated biphenyls (PCBs) causes reproductive dysfunction in adult male mouse offspring. Fiandanese N, Borromeo V, Berrini A, Fischer B, Schaedlich K, Schmidt JS, Secchi C, Pocar P. Reprod Toxicol. 2016 Jul 11;65:123-132. doi: 10.1016/j.reprotox.2016.07.004.

39. Identification of androgen receptor antagonists: In vitro investigation and classification methodology for flavonoid. Wu Y, Doering JA, Ma Z, Tang S, Liu H, Zhang X, Wang X, Yu H. Chemosphere. 2016 Sep;158:72-9. doi: 10.1016/j.chemosphere.2016.05.059. Epub 2016 May 31.

40. A proposed framework for the systematic review and integrated assessment (SYRINA) of endocrine disrupting chemicals. Vandenberg LN, Ågerstrand M, Beronius A, Beausoleil C, Bergman Å, Bero LA, Bornehag CG, Boyer CS, Cooper GS, Cotgreave I, Gee D, Grandjean P, Guyton KZ, Hass U, Heindel JJ, Jobling S, Kidd KA, Kortenkamp A, Macleod MR, Martin OV, Norinder U, Scheringer M, Thayer KA, Toppari J, Whaley P, Woodruff TJ, Rudén C. Environ Health. 2016 Jul 14;15(1):74. doi: 10.1186/s12940-016-0156-6. (Abstract)

41. 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. 2016 Jul 12.

42. Endocrine-Disrupting Chemicals and Reproductive Health. Zlatnik MG.
J Midwifery Womens Health. 2016 Jul;61(4):442-55. doi: 10.1111/jmwh.12500. Epub 2016 Jul 8. Review.

43. Interaction of bisphenol A (BPA) and soy phytoestrogens on sexually dimorphic sociosexual behaviors in male and female rats. Hicks KD, Sullivan AW, Cao J, Sluzas E, Rebuli M, Patisaul HB. Horm Behav. 2016 Aug;84:121-6. doi: 10.1016/j.yhbeh.2016.06.010. Epub 2016 Jun 30.

44. Preferential epigenetic programming of estrogen response after in utero xenoestrogen (bisphenol-A) exposure.

Jorgensen EM, Alderman MH 3rd, Taylor HS. FASEB J. 2016 Sep;30(9):3194-201. doi: 10.1096/fj.201500089R. Epub 2016 Jun 16.

45. The Environmental Pollutant Tributyltin Chloride Disrupts the Hypothalamic-Pituitary-Adrenal Axis at Different Levels in Female Rats. Merlo E, Podratz PL, Sena GC, de Araújo JF, Lima LC, Alves IS, Gama-de-Souza LN, Pelição R, Rodrigues LC, Brandão PA, Carneiro MT, Pires RG, Martins-Silva C, Alarcon TA, Miranda-Alves L, Silva IV, Graceli JB. Endocrinology. 2016 Aug;157(8):2978-95. doi: 10.1210/en.2015-1896. Epub 2016 Jun 7.

46. Generalized Concentration Addition Modeling Predicts Mixture Effects of Environmental PPARγ Agonists. Watt J, Webster TF, Schlezinger JJ. Toxicol Sci. 2016 Sep;153(1):18-27. doi: 10.1093/toxsci/kfw100. Epub 2016 Jun 2.

47. Environmental signaling: from environmental estrogens to endocrine-disrupting chemicals and beyond. McLachlan JA. Andrology. 2016 Jul;4(4):684-94. doi: 10.1111/andr.12206. Epub 2016 May 27. Review.

48. Effects of benzo[a]pyrene as an environmental pollutant and two natural antioxidants on biomarkers of reproductive dysfunction in male rats. Sheweita SA, Al-Shora S, Hassan M. Environ Sci Pollut Res Int. 2016 Sep;23(17):17226-35. doi: 10.1007/s11356-016-6934-4. Epub 2016 May 24.

49. To Cull or Not To Cull? Considerations for Studies of Endocrine-Disrupting Chemicals. Suvorov A, Vandenberg LN. Endocrinology. 2016 Jul;157(7):2586-94. doi: 10.1210/en.2016-1145. Epub 2016 May 13.

50. An old culprit but a new story: bisphenol A and "NextGen" bisphenols. Sartain CV, Hunt PA. Fertil Steril. 2016 Sep 15;106(4):820-6. doi: 10.1016/j.fertnstert.2016.07.1114. Epub 2016 Aug 6. Review.

51. Bisphenol A affects early bovine embryo development and metabolism that is negated by an oestrogen receptor inhibitor. Choi BI, Harvey AJ, Green MP. Sci Rep. 2016 Jul 7;6:29318. doi: 10.1038/srep29318.

52. From BPA to its analogues: Is it a safe journey? Usman A, Ahmad M. Chemosphere. 2016 Sep;158:131-42. doi: 10.1016/j.chemosphere.2016.05.070. Epub 2016 Jun 1. Review.

53. Whither the impending european regulation of presumed endocrine disruptors? Autrup HN, Berry SC, Cohen SM, Creppy EE, de Camargo JL, Dekant W, Dietrich D, Galli CL, Goodman JI, Gori GB, Greim HA, Klaunig JE, Lotti M, Marquardt HW, Wallace KB, Yamazaki H. Regul Toxicol Pharmacol. 2016 Sep 8. pii: S0273-2300(16)30256-2. doi: 10.1016/j.yrtph.2016.09.006. No abstract available.

54. New challenges in risk assessment of chemicals when simulating real exposure scenarios; simultaneous multi-chemicals' low dose exposure. Tsatsakis AM, Docea AO, Tsitsimpikou C. Food Chem Toxicol. 2016 Oct;96:174-6. doi: 10.1016/j.fct.2016.08.011. Epub 2016 Aug 8.

Wildlife studier ved Biologisk Institut, Syddansk Universitet (SDU)

Søgningen er udført på Web of Science (all databases) og dækker perioden 8/7 - 23/9 2016.

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 tre artikler til medtagelse af abstract og yderligere kommentarer. Kriterierne for udvælgelsen af publikationer til kommentering 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 kommenteres artikler, der omhandler ’nye’ stoffer, der har vist sig hormonforstyrrende; specielt hvis disse har relevans for danske forhold.

Udvalgte publikationer

Impaired anterior swim bladder inflation following exposure to the thyroid peroxidase inhibitor 2-mercaptobenzothiazole part II: Zebrafish
Stinckens E, Vergauwen L, Schroeder AL, Maho W, Blackwell BR, Witters H, Blust R, Ankley GT, Covaci A, Villeneuve DL, Knapen D.
Aquatic Toxicology. 173: 204-217. 2016.

ABSTRACT:
Disruption of the thyroid hormone (TH) system, an important mode of action, can lead to ecologically relevant adverse outcomes, especially during embryonic development. The present study characterizes the effects of disruption of TH synthesis on swim bladder inflation during zebrafish early-life stages using 2-mercaptobenzothiazole (MBT), a thyroid peroxidase (TPO) inhibitor. Zebrafish were exposed to different MBT concentrations until 120/168 h post fertilization (hpf) and 32 days post fertilization (dpf), in two sets of experiments, to investigate the effects of TPO inhibition on posterior and anterior swimbladder inflation respectively, as well as whole body thyroid hormone concentrations (triiodothyronine (T3) and its prohormone, thyroxine (T4)). At 120 hpf, MBT did not directly impair posterior chamber inflation or size, while anterior chamber inflation and size was impaired at 32 dpf. As previously shown in amphibians and mammals, we confirmed that MBT inhibits TPO in fish. Whole-body T4 decreased after MBT exposure at both time points, while T3 levels were unaltered. There was a significant relationship between T4 levels and the anterior chamber surface at 32 dpf. The absence of effects on posterior chamber inflation can possibly be explained by maternal transfer of T4 into the eggs. These maternally derived THs are depleted at 32 dpf and cannot offset TPO inhibition, resulting in impaired anterior chamber inflation. Therefore, we hypothesize that TPO inhibition only inhibits swim bladder inflation during late development, after depletion of maternally derived T4. In a previous study, we showed that iodothyroninedeiodinase (ID) knockdown impaired posterior chamber inflation during early development. Our findings, in parallel with similar effects observed in fathead minnow (see part I, this issue) suggest that thyroid disruption impacts swim bladder inflation, and imply an important distinction among specific subtypes of TH disrupting chemicals. However, the existence of another – yet unknown – mode of action of MBT impacting swim bladder inflation cannot be excluded. These results can be helpful for delineating adverse outcome pathways (AOPs) linking TPO inhibition, ID inhibition and other TH related molecular initiating events, to impaired swim bladder inflation in fish during early life stages. Such AOPs can support the use of in vitro enzyme inhibition assays for predicting reduced survival due to impaired posterior and anterior chamber inflation.

Perchlorate Exposure Reduces Primordial Germ Cell Number in Female Threespine Stickleback.
Petersen AM, Earp NC, Redmond ME, Postlethwait JH, von Hippel FA, Buck C, Cresko WA.
Plos One. 11(7): e0157792. 2016.

ABSTRACT: Perchlorate is a common aquatic contaminant that has long been known to affect thyroid function in vertebrates, including humans. More recently perchlorate has been shown to affect primordial sexual differentiation in the aquatic model fishes zebrafish and threespine stickleback, but the mechanism has been unclear. Stickleback exposed to perchlorate from fertilization have increased androgen levels in the embryo and disrupted reproductive morphologies as adults, suggesting that perchlorate could disrupt the earliest stages of primordial sexual differentiation when primordial germ cells (PGCs) begin to form the gonad. Female stickleback have three to four times the number of PGCs as males during the first weeks of development. We hypothesized that perchlorate exposure affects primordial sexual differentiation by reducing the number of germ cells in the gonad during an important window of stickleback sex

determination at 14–18 days post fertilization (dpf). We tested this hypothesis by quantifying the number of PGCs at 16 dpf in control and 100 mg/L perchlorate-treated male and female stickleback. Perchlorate exposure from the time of fertilization resulted in significantly reduced PGC number only in genotypic females, suggesting that the masculinizing effects of perchlorate observed in adult stickleback may result from early changes to the number of PGCs at a time critical for sex determination. To our knowledge, this is the first evidence of a connection between an endocrine disruptor and reduction in PGC number prior to the first meiosis during sex determination. These findings suggest that a mode of action of perchlorate on adult reproductive phenotypes in vertebrates, including humans, such as altered fecundity and sex reversal or intersex gonads, may stem from early changes to germ cell development.

Comparative sensitivity of juvenile and adult *Potamopyrgus antipodarum* (Mollusca: Hydrobiidae) under chronic exposure to cadmium and tributyltin.

Ruppert K, GeiSS C, Ostermann S, Theis C, Oehlmann J.

Journal of Environmental Science and Health Part A-Toxic/Hazardous Substances & Environmental Engineering. 51(9): 736-743. 2016.

ABSTRACT: In this study, we assessed the chronic effects of the two antimicrobial substances triclocarban (TCC) and triclosan (TCS) on reproduction of a mollusk species by using the reproduction test with the New Zealand mudsnail Potamopyrgus antipodarum. Snails coming from a laboratory culture were exposed for 28 days to nominal concentrations ranging from 0.1 up to 10 mg/L for both chemicals (measured 0.082–8.85 mg TCC/L; 0.068–6.26 mg TCS/L). At the end of the experiment, snails were dissected and embryos in the brood pouch were counted to assess the individualized reproductive success of adult snails. Exposure to TCC resulted in an inverted u-shaped concentration–response relationship, with a stimulation of reproduction at low concentrations followed by an inhibition at higher concentrations. The no observed effect concentration (NOEC) and the lowest observed effect concentration (LOEC) were 0.082 and 0.287 mg/L, respectively. TCS caused significantly increased embryo numbers at all tested concentrations, except in the group of 0.170 mg/L. Therefore, the NOEC for TCS was 0.170 mg/L and the LOEC was 0.660 mg/L. These results indicate that TCC and TCS may cause reproductive effects at environmentally relevant concentrations indicating a potential risk for aquatic organisms in the environment.

Bruttoliste

1. 2, 4-Dichloro-6-nitrophenol, a photonitration product of 2, 4-dichlorophenol, caused anti-androgenic potency in Chinese rare minnows (*Gobiocypris rarus*).
Chen R, Liu C, Yuan L, Zha J, Wang Z.
Environmental Pollution. 216: 591-598. 2016.

2. A review of reproductive toxicity of microcystins.
Chen L, Chen J, Zhang X, Xie P.
Journal of Hazardous Materials. 301: 381-399. 2016.

3. Adaptive Significance of ER alpha Splice Variants in Killifish (*Fundulus heteroclitus*) Resident in an Estrogenic Environment.
Cotter KA, Nacci D, Champlin D, Yeo AT, Gilmore TD, Callard GV.
Endocrinology. 157(6): 2294-2308. 2016.

4. Age-dependent effects in fathead minnows from the anti-diabetic drug metformin.
Crago J, Bui C, Grewal S, Schlenk D.
General and Comparative Endocrinology. 232: 185-190. 2016.

5. Ameliorative Effect of Grape Seed Proanthocyanidin Extract on Cadmium-Induced Meiosis Inhibition During Oogenesis in Chicken Embryos.
Hou F, Xiao M, Li J, Cook DW, Zeng W, Zhang C, Mi Y.
Anatomical Record-Advances in Integrative Anatomy and Evolutionary Biology. 299(4): 450-460. 2016.

6. An aggregate analysis of personal care products in the environment: Identifying the distribution of environmentally-relevant concentrations.
Hopkins ZR, Blaney L.
Environment International. 92-93: 301-316. 2016.

7. Androgens modulate gene expression and specific DNA methylation pattern of steroid 5 alpha-reductases in the frog *Silurana tropicalis*.
Bissegger S, Langlois VS.
General and Comparative Endocrinology. 234: 123-132. 2016.

8. Are sex steroids essential for gonadal differentiation of the ornate frog, *Microhyla ornata*?
Mali P, V, Gramapurohit N.
General and Comparative Endocrinology. 233: 63-72. 2016.

9. Are we going about chemical risk assessment for the aquatic environment the wrong way?
Johnson AC, Sumpter JP.
Environmental Toxicology and Chemistry. 35(7): 1609-1616. 2016.

10. Assessment of the effects of the carbamazepine on the endogenous endocrine system of *Daphnia magna*.
Oropesa AL, Floro AM, Palma P.
Environmental Science and Pollution Research International. 23(17): 17311-17321. 2016.

11. BDE-99, but not BDE-47, is a transient aryl hydrocarbon receptor agonist in zebrafish liver cells.
Yang J, Zhu J, Chan KM.
Toxicology and Applied Pharmacology. 305: 203-215. 2016.

12. Changes in *Menidia beryllina* Gene Expression and *In Vitro* Hormone-Receptor Activation after Exposure to Estuarine Waters Near Treated Wastewater Outfalls.
Cole BJ, Brander SM, Jeffries KM, Hasenbein S, He G, Denison MS, Fangue NA, Connon RE.

Archives of Environmental Contamination and Toxicology. 71(2): 210-223. 2016.

13. Changes of concentrations and possibility of accumulation of bisphenol A and alkylphenols, depending on biomass and composition, in zooplankton of the Southern Baltic (Gulf of Gdansk).
Staniszewska M, Nehring I, Mudrak-Cegiolka S.
Environmental Pollution. 213: 489-501. 2016.

14. Chronic exposure to mono-(2-ethylhexyl)-phthalate causes endocrine disruption and reproductive dysfunction in zebrafish.
Zhu Y, Hua R, Zhou Y, Li H, Quan S, Yu Y.
Environmental Toxicology and Chemistry. 35(8): 2117-2124. 2016.

15. Common carp *Cyprinus carpio* responses to sub-chronic exposure to perfluorooctanoic acid.
Giari L, Vincenzi F, Badini S, Guerranti C, Dezfuli BS, Fano EA, Castaldelli G.
Environmental Science and Pollution Research. 23(15): 15321-15330. 2016.

16. Comparative sensitivity of juvenile and adult *Potamopyrgus antipodarum* (Mollusca: Hydrobiidae) under chronic exposure to cadmium and tributyltin.
Ruppert K, GeiSS C, Ostermann S, Theis C, Oehlmann J.
Journal of Environmental Science and Health Part A-Toxic/Hazardous Substances & Environmental Engineering. 51(9): 736-743. 2016.

17. Corticosterone levels in relation to trace element contamination along an urbanization gradient in the common blackbird (*Turdus merula*).
Meillere A, Brischoux F, Bustamante P, Michaud B, Parenteau C, Marciau C, Angelier F.
Science of the Total Environment. 566: 93-101. 2016.

18. Corticotropin-releasing hormone: Mediator of vertebrate life stage transitions?
Watanabe Y, Grommen SV, De Groef B.
General and Comparative Endocrinology. 228: 60-68. 2016.

19. DDT exposure of frogs: A case study from Limpopo Province, South Africa.
Viljoen IM, Bornman R, Bouwman H.
Chemosphere. 159: 335-341. 2016.

20. De novo transcriptome assembly of the marine gastropod *Reishia clavigera* for supporting toxic mechanism studies.
Ip JCH, Leung PTY, Ho KKY, Qiu JW, Leung KMY.
Aquatic toxicology. 178: 39-48. 2016.

21. Depressing Antidepressant: Fluoxetine Affects Serotonin Neurons Causing Adverse Reproductive Responses in *Daphnia magna*.
Campos B, Rivetti C, Kress T, Barata C, Dircksen H.
Environmental science & technology. 50(11): 6000-6007. 2016.

22. Determination of endocrine disrupting compounds in fish liver, brain, and muscle using focused ultrasound solid-liquid extraction and dispersive solid phase extraction as clean-up strategy.
Ros O, Vallejo A, Olivares M, Etxebarria N, Prieto A.
Analytical and Bioanalytical Chemistry. 408(21): 5689-5700. 2016.

23. Disruption of apoptosis pathways involved in zebrafish gonad differentiation by 17alpha-ethinylestradiol and fadrozole exposures.
Luzio A, Matos M, Santos D, Fontainhas-Fernandes AA, Monteiro SM, Coimbra AM.
Aquatic toxicology. 177: 269-284. 2016.

24. Drone exposure to the systemic insecticide Fipronil indirectly impairs queen reproductive potential.
Kairo G, Provost B, Tchamitchian S, Ben Abdelkader F, Bonnet M, Cousin M, Senechal J, Benet P, Kretzschmar A, Belzunces LP, Brunet JL.
Scientific Reports. 6: 31904. 2016.

25. Early Life Stage Exposure to BDE-47 Causes Adverse Effects on Reproductive Success and Sexual Differentiation in Fathead Minnows (*Pimephales promelas*).
Thornton LM, Path EM, Nystrom GS, Venables BJ, Jeffries MK.
Environmental Science & Technology. 50(14): 7834-7841. 2016.

26. Effects of 17 alpha-ethinylestradiol at different water temperatures on zebrafish sex differentiation and gonad development.
Luzio A, Santos D, Fontainhas-Fernandes AA, Monteiro SM, Coimbra AM.
Aquatic Toxicology. 174: 22-35. 2016.

27. Effects of anti-androgens cyproterone acetate, linuron, vinclozolin, and p,p'-DDE on the reproductive organs of the copepod *Acartia tonsa*.
Watermann BT, Albanis TA, Galassi S, Gnass K, Kusk KO, Sakkas VA, Wollenberger L.
Journal of Environmental Science and Health Part A, Toxic/Hazardous Substances & Environmental Engineering. 51(13): 1111-1120. 2016.

28. Effects of atrazine on growth and sex differentiation, in juveniles of the freshwater crayfish *Cherax quadricarinatus*.
Mac Loughlin C, Canosa I, Silveyra GR, Lopez Greco LS, Rodriguez EM.
Ecotoxicology and Environmental Safety. 131: 96-103. 2016.

29. Effects of developmental exposure to bisphenol A and ethinyl estradiol on spatial navigational learning and memory in painted turtles (*Chrysemys picta*).
Manshack LK, Conard CM, Johnson SA, Alex JM, Bryan SJ, Deem SL, Holliday DK, Ellersieck MR, Rosenfeld CS.
Hormones and Behavior. 85: 48-55. 2016.

30. Effects of dietary genistein on GH/IGF-I axis of Nile tilapia *Oreochromis niloticus*.
Chen D, Wang W, Ru S.
Chinese Journal of Oceanology and Limnology. 34(5): 1004-1012. 2016.

31. Effects of label-dose permethrin administration in yearling beef cattle: I. Bull reproductive function and testicular histopathology.
Dohlman TM, Phillips PE, Madson DM, Clark CA, Gunn PJ.
Theriogenology. 85(9): 1534-1539. 2016.

32. Effects of various LED light spectra on antioxidant and immune response in juvenile rock bream, *Oplegnathus fasciatus* exposed to bisphenol A.
Choi JY, Kim TH, Choi YJ, Kim NN, Oh SY, Choi CY.
Environmental Toxicology and Pharmacology. 45: 140-149. 2016.

33. Endocrine-disrupting chemicals in coastal lagoons of the Po River delta: sediment contamination, bioaccumulation and effects on Manila clams.
Casatta N, Stefani F, Pozzoni F, Guzzella L, Marziali L, Mascolo G, Vigano L.
Environmental Science and Pollution Research. 23(11): 10477-10493. 2016.

34. Endocrine disrupting compounds reduction and water quality improvement in reclaimed municipal wastewater: A field-scale study along Jialu River in North China.
Sun J, Ji X, Zhang R, Huang Y, Liang Y, Du J, Xie X, Li A.
Chemosphere. 157: 232-240. 2016.

35. Endocrine Disruption throughout the Hypothalamus-Pituitary-Gonadal-Liver (HPGL) Axis in Marine Medaka (*Oryzias melastigma*) Chronically Exposed to the Antifouling and Chemopreventive Agent, 3,3 '-Diindolylmethane (DIM).
Chen L, Ye R, Zhang W, Hu C, Zhou B, Peterson DR, Au DW, Lam PK, Qian PY.
Chemical Research in Toxicology. 29(6): 1020-1028. 2016.

36. Equol Induces Gonadal Intersex in Japanese Medaka (*Oryzias latipes*) at Environmentally Relevant Concentrations: Comparison with 17 beta-Estradiol.
Wang C, Zhang S, Zhou Y, Huang C, Mu d, Giesy JP, Hu J.
Environmental Science & Technology. 50(14): 7852-7860. 2016.

37. Evaluation of Potential Mechanisms of Atrazine-Induced Reproductive Impairment in Fathead Minnow (*Pimephales Promelas*) and Japanese Medaka (*Oryzias Latipes*).
Richter CA, Papoulias DM, Whyte JJ, Tillitt DE.
Environmental Toxicology and Chemistry. 35(9): 2230-2238. 2016.

38. Gene expression profiles in testis of developing male *Xenopus laevis* damaged by chronic exposure of atrazine.
Sai L, Dong Z, Li L, Guo Q, Jia Q, Xie L, Bo C, Liu Y, Qu B, Li X, Shao H, Ng JC, Peng C.
Chemosphere. 159: 145-152. 2016.

39. Global DNA methylation in gonads of adult zebrafish *Danio rerio* under bisphenol A exposure.
Liu Y, Zhang Y, Tao S, Guan Y, Zhang T, Wang Z.
Ecotoxicology and Environmental Safety. 130: 124-132. 2016.

40. H-1 NMR-based metabolomics of *Daphnia magna* responses after sub-lethal exposure to triclosan, carbamazepine and ibuprofen.
Kovacevic V, Simpson AJ, Simpson MJ.
Comparative Biochemistry and Physiology D-Genomics & Proteomics. 19: 199-210. 2016.

41. High-Content and Semi-Automated Quantification of Responses to Estrogenic Chemicals Using a Novel Translucent Transgenic Zebrafish.
Green JM, Metz J, Lee O, Trznadel M, Takesono A, Brown A, Owen SF, Kudoh T, Tyler CR.
Environmental Science & Technology. 50(12): 6536-6545. 2016.

42. High-throughput proteome dynamics for discovery of key proteins in sentinel species: Unsuspected vitellogenins diversity in the crustacean *Gammarus fossarum*.
Trapp J, Armengaud J, Gaillard JC, Pible O, Chaumot A, Geffard O.
Journal of Proteomics. 146: 207-214. 2016.

43. Impact of molt-disrupting BDE-47 on epidermal ecdysteroid signaling in the blue crab, *Callinectes sapidus*, *in vitro*.
Booth A, Zou E.
Aquatic toxicology. 177: 373-379. 2016.

44. Impaired anterior swim bladder inflation following exposure to the thyroid peroxidase inhibitor 2-mercaptobenzothiazole part II: Zebrafish.
Stinckens E, Vergauwen L, Schroeder AL, Maho W, Blackwell BR, Witters H, Blust R, Ankley GT, Covaci A, Villeneuve DL, Knapen D.
Aquatic Toxicology. 173: 204-217. 2016.

45. Impaired gonadal and somatic development corroborate vulnerability differences to the synthetic estrogen ethinylestradiol among deeply diverged anuran lineages.
Tamschick S, Rozenblut-Koscisty B, Ogielska M, Lehmann A, Lymberakis P, Hoffmann F, Lutz I, Schneider RJ, Kloas W, Stock M.
Aquatic toxicology. 177: 503-514. 2016.

46. *In silico* prediction and in vivo analysis of antiestrogenic potential of 2-isopropylthioxanthone (2-ITX) in juvenile goldfish (*Carassius auratus*).
Cocci P, Mozzicafreddo M, Angeletti M, Mosconi G, Palermo FA.
Ecotoxicology and Environmental Safety. 133: 202-210. 2016.

47. *In vivo* and *In vitro* neurochemical-based assessments of wastewater effluents from the Maumee River area of concern.
Arini A, Cavallin JE, Berninger JP, Marfil-Vega R, Mills M, Villeneuve DL, Basu N.
Environmental Pollution. 211: 9-19. 2016.

48. Influence of Lipophilicity on the Toxicity of Bisphenol A and Phthalates to Aquatic Organisms.
Mathieu-Denoncourt J, Wallace SJ, de Solla SR, Langlois VS.
Bulletin of Environmental Contamination and Toxicology. 97(1): 4-10. 2016.

49. Juvenile zebrafish in the vitellogenin blank period as an alternative test organism for evaluation of estrogenic activity of chemicals.
Wang J, Zhao F, Shan R, Tian H, Wang W, Ru S.
Environmental Toxicology and Chemistry. 35(7): 1783-1787. 2016.

50. Life cycle exposure of the frog *Silurana tropicalis* to arsenate: Steroid- and thyroid hormone-related genes are differently altered throughout development.
Gibson LA, Koch I, Reimer KJ, Cullen WR, Langlois VS.
General and Comparative Endocrinology. 234: 133-141. 2016.

51. Matrix solid-phase dispersion combined to liquid chromatography-tandem mass spectrometry for the determination of paraben preservatives in mollusks.
Villaverde-de-Saa E, Rodil R, Quintana JB, Cela R.
Journal of Chromatography A. 1459: 57-66. 2016.

52. Mechanism of action of endosulfan as disruptor of gonadal steroidogenesis in the cichlid fish *Cichlasoma dimerus*.
Da Cuna RH, Vazquez GR, Dorelle L, Rodriguez EM, Moreira RG, Lo Nostro FL.
Comparative Biochemistry and Physiology C-Toxicology & Pharmacology. 187: 74-80. 2016.

53. Mechanistic study of chlordecone-induced endocrine disruption: Based on an adverse outcome pathway network.
Yang L, Zhou B, Zha J, Wang Z.
Chemosphere. 161: 372-381. 2016.

54. Metabolite profiles of repeatedly sampled urine from male fathead minnows (*Pimephales promelas*) contain unique lipid signatures following exposure to anti-androgens.
Collette TW, Skelton DM, Davis JM, Cavallin JE, Jensen KM, Kahl MD, Villeneuve DL, Anldey GT, Martinovic-Weigelt D, Ekman DR.
Comparative Biochemistry and Physiology D-Genomics & Proteomics. 19: 190-198. 2016.

55. Methyltestosterone alters sex determination in the American alligator (*Alligator mississippiensis*).
Murray CM, Easter M, Merchant M, Rheubert JL, Wilson KA, Cooper A, Mendonca M, Wibbels T, Marin MS, Guyer C.
General and Comparative Endocrinology. 236: 63-69. 2016.

56. Minireview: Endocrine Disruptors: Past Lessons and Future Directions.
Schug TT, Johnson AF, Birnbaum LS, Colborn T, Guillette LJ, Crews DP, Collins T, Soto AM, vom Saal FS, McLachlan JA, Sonnenschein C, Heindel JJ.
Molecular Endocrinology. 30(8): 833-847. 2016.

57. Molecular identification of Kiss/GPR54 and function analysis with mRNA expression profiles exposure to 17 alpha-ethinylestradiol in rare minnow *Gobiocypris rarus*.
Yang Y, Gao J, Yuan C, Zhang Y, Guan Y, Wang Z.

Molecular Biology Reports. 43(7): 737-749. 2016.

58. Neuroendocrine biochemical effects in methylmercury-exposed yellow perch.
Arini A, Head JA, Murphy CA, Carvan MJ, Goetz R, Klingler RH, Nam DH, Basu N.
Comparative Biochemistry and Physiology C-Toxicology & Pharmacology. 187: 10-18. 2016.

59. No evidence of exposure to environmental estrogens in two feral fish species sampled from the Yarra River, Australia: A comparison with Northern Hemisphere studies.
Hassell K, Pettigrove V, Beresford N, Jobling S, Kumar A.
Ecotoxicology and Environmental Safety. 131: 104-117. 2016.

60. Organochlorine Contaminants, Immunocompetence and Vitellogenin in Herring Gulls (*Larus argentatus*) and Great Black-backed Gulls (*Larus marinus*) Nesting on Lake Ontario in 2001-2002.
Pekarik C, Barker IK, Weseloh D, V.
Waterbirds. 39: 180-201. 2016.

61. Oxidative stress and immune disturbance after long-term exposure to bisphenol A in juvenile common carp (*Cyprinus carpio*).
Qiu W, Chen J, Li Y, Chen Z, Jiang L, Yang M, Wu M.
Ecotoxicology and Environmental Safety. 130: 93-102. 2016.

62. Perchlorate Exposure Reduces Primordial Germ Cell Number in Female Threespine Stickleback.
Petersen AM, Earp NC, Redmond ME, Postlethwait JH, von Hippel FA, Buck C, Cresko WA.
Plos One. 11(7): e0157792. 2016.

63. Peroxisome proliferator-activated receptor gamma (PPARgamma) in brown trout: Interference of estrogenic and androgenic inputs in primary hepatocytes.
Lopes C, Madureira TV, Ferreira N, Pinheiro I, Castro LF, Rocha E.
Environmental Toxicology and Pharmacology. 46: 328-336. 2016.

64. Phthalate pollution in an Amazonian rainforest.
Lenoir A, Boulay R, Dejean A, Touchard A, Cuvillier-Hot V.
Environmental Science and Pollution Research International. 23(16): 16865-16872. 2016.

65. Pilot-scale UV/H2O2 advanced oxidation process for municipal reuse water: Assessing micropollutant degradation and estrogenic impacts on goldfish (*Carassius auratus L.*).
Shu Z, Singh A, Klamerth N, McPhedran K, Bolton JR, Belosevic M, Gamal El-Din M.
Water Research. 101: 157-166. 2016.

66. Postnatal development and histofunctional differentiation of the oviduct in the broad-snouted caiman (*Caiman latirostris*).
Galoppo GH, Stoker C, Canesini G, Schierano-Marotti G, Durando M, Luque EH, Munoz-de-Toro M.
General and Comparative Endocrinology. 236: 42-53. 2016.

67. Pyrethroid Pesticides as Endocrine Disruptors: Molecular Mechanisms in Vertebrates with a Focus on Fishes.
Brander SM, Gabler MK, Fowler NL, Connon RE, Schlenk D.
Environmental Science & Technology. 50(17): 8977-8992. 2016.

68. Quantification of 11 thyroid hormones and associated metabolites in blood using isotope-dilution liquid chromatography tandem mass spectrometry.
Hansen M, Luong X, Sedlak DL, Helbing CC, Hayes T.
Analytical and Bioanalytical Chemistry. 408(20): 5429-5442. 2016.

69. Reproductive toxicity of inorganic mercury exposure in adult zebrafish: Histological damage, oxidative stress, and alterations of sex hormone and gene expression in the hypothalamic-pituitary-gonadal axis.

Zhang QF, Li YW, Liu ZH, Chen QL.
Aquatic toxicology. 177: 417-424. 2016.

70. Revealing ecological risks of priority endocrine disrupting chemicals in four marine protected areas in Hong Kong through an integrative approach.
Xu EG, Ho PW-L, Tse Z, Ho SL, Leung KMY.
Environmental Pollution. 215: 103-112. 2016.

71. Septic systems, but not sanitary sewer lines, are associated with elevated estradiol in male frog metamorphs from suburban ponds.
Lambert MR, Giller GS, Skelly DK, Bribiescas RG.
General and Comparative Endocrinology. 232: 109-114. 2016.

72. Several synthetic progestins disrupt the glial cell specific-brain aromatase expression in developing zebra fish.
Cano-Nicolau J, Garoche C, Hinfray N, Pellegrini E, Boujrad N, Pakdel F, Kah O, Brion F.
Toxicology and Applied Pharmacology. 305: 12-21. 2016.

73. Sex-specific changes in thyroid gland function and circulating thyroid hormones in nestling American kestrels (*Falco sparverius*) following embryonic exposure to polybrominated diphenyl ethers by maternal transfer.
Fernie KJ, Marteinson SC.
Environmental Toxicology and Chemistry. 35(8): 2084-2091. 2016.

74. Steroid Androgen Exposure during Development Has No Effect on Reproductive Physiology of *Biomphalaria glabrata*.
Kaur S, Baynes A, Lockyer AE, Routledge EJ, Jones CS, Noble LR, Jobling S.
Plos One. 11(7): e0159852. 2016.

75. Steroidal estrogen sources in a sewage-impacted coastal ocean.
Griffith DR, Soule MC, Eglinton TI, Kujawinski EB, Gschwend PM.
Environmental Science-Processes & Impacts. 18(8): 981-991. 2016.

76. Steroids in house sparrows (*Passer domesticus*): Effects of POPs and male quality signalling.
Nossen I, Ciesielski TM, Dimmen MV, Jensen H, Ringsby TH, Polder A, Ronning B, Jenssen BM, Styrishave B.
Science of the Total Environment. 547: 295-304. 2016.

77. Structural changes in female-to-male sex-reversing gonads of *Rana RUGOSA*.
Sakamoto D, Cho A, Abe T, Nakamura Y, Oike A, Kodama M, Nakamura M.
Journal of Experimental Zoology Part A-Ecological Genetics and Physiology. 325(3): 209-218. 2016.

78. Survey of Intersex Occurrence in Largemouth Bass (*Micropterus salmoides*) from the Upper Illinois River Waterway.
Fritts MW, Deboer JA, Fritts AK, Kellock KA, Bringolf RB, Casper AF.
American Midland Naturalist. 176(1): 158-165. 2016.

79. Testicular transcript responses in rare minnow *Gobiocypris rarus* following different concentrations bisphenol A exposure.
Zhang Y, Yuan C, Gao J, Liu Y, Wang Z.
Chemosphere. 156: 357-366. 2016.

80. The antimicrobial agents triclocarban and triclosan as potent modulators of reproduction in *Potamopyrgus antipodarum* (Mollusca: Hydrobiidae).
GeiSS C, Ruppert K, Heidelbach T, Oehlmann J.
Journal of Environmental Science and Health Part A, Toxic/Hazardous Substances & Environmental Engineering. 51(13): 1173-1179. 2016.

81. The Effects of Disturbance on Hypothalamus-Pituitary-Thyroid (HPT) Axis in Zebrafish Larvae after Exposure to DEHP.
Jia PP, Ma YB, Lu CJ, Mirza Z, Zhang W, Jia YF, Li WG, Pei DS.
Plos One. 11(5): e0155762. 2016.

82. The Herbicide Atrazine Induces Hyperactivity and Compromises Tadpole Detection of Predator Chemical Cues.
Ehrsam M, Knutie SA, Rohr JR.
Environmental Toxicology and Chemistry. 35(9): 2239-2244. 2016.

83. The plasticizer bisphenol A affects somatic and sexual development, but differently in pipid, hylid and bufonid anurans.
Tamschick S, Rozenblut-Koscisty B, Ogielska M, Kekenj D, Gajewski F, Kruger A, Kloas W, Stock M.
Environmental pollution. 216: 282-291. 2016.

84. The potential immune modulatory effect of chronic bisphenol A exposure on gene regulation in male medaka (*Oryzias latipes*) liver.
Qiu W, Shen Y, Pan C, Liu S, Wu M, Yang M, Wang KJ.
Ecotoxicology and Environmental Safety. 130: 146-154. 2016.

85. Thyroid hormone-disrupting activity and ecological risk assessment of phosphorus-containing flame retardants by *in vitro*, *in vivo* and *in silico* approaches.
Zhang Q, Ji C, Yin X, Yan L, Lu M, Zhao M.
Environmental Pollution. 210: 27-33. 2016.

86. Time course of hepatic gene expression and plasma vitellogenin protein concentrations in estrone-exposed juvenile rainbow trout (*Oncorhynchus mykiss*).
Osachoff HL, Brown LL, Tirrul L, van Aggelen GC, Brinkman FS, Kennedy CJ.
Comparative Biochemistry and Physiology D-Genomics & Proteomics. 19: 112-119. 2016.

87. Toxicogenomic applications of Chinese rare minnow (*Gobiocypris rarus*) in aquatic toxicology.
Liang X, Zha J.
Comparative Biochemistry and Physiology D-Genomics & Proteomics. 19: 174-180. 2016.

88. Transcriptional and morphological effects of tamoxifen on the early development of zebrafish (*Danio rerio*).
Xia L, Zheng L, Zhou JL.
Journal of Applied Toxicology. 36(6): 853-862. 2016.

89. 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.

90. Transcriptomic responses of marine medaka's ovary to hypoxia.
Lai KP, Li JW, Tse ACK, Cheung A, Wang S, Chan TF, Kong RYC, Wu RSS.
Aquatic toxicology. 177: 476-483. 2016.

91. Tributyltin affects shoaling and anxiety behavior in female rare minnow (*Gobiocypris rarus*).
Zhang J, Zhang C, Sun P, Shao X.
Aquatic toxicology. 178: 80-87. 2016.

92. Uptake, depuration and bioconcentration of bisphenol AF (BPAF) in whole-body and tissues of zebrafish (*Danio rerio*).
Shi J, Yang Y, Zhang J, Feng Y, Shao B.
Ecotoxicology and Environmental Safety. 132: 339-344. 2016.

93. Wastewater treatment plant effluent alters pituitary gland gonadotropin mRNA levels in juvenile coho salmon (*Oncorhynchus kisutch*).
Harding LB, Schultz IR, da Silva DAM, Ylitalo GM, Ragsdale D, Harris SI, Bailey S, Pepich BV, Swanson P.
Aquatic toxicology. 178: 118-131. 2016.

94. Waterborne exposure to triadimefon causes thyroid endocrine disruption and developmental delay in *Xenopus laevis* tadpoles.
Li M, Li S, Yao T, Zhao R, Wang Q, Zhu G.
Aquatic toxicology. 177: 190-197. 2016.