Global Assessment of Bisphenol A in the Environment: Review and Analysis of Its Occurrence and Bioaccumulation

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Abstract
Because bisphenol A (BPA) is a high production volume chemical, we examined over 500 peer-reviewed studies to understand its global distribution in effluent discharges, surface waters, sewage sludge, biosolids, sediments, soils, air, wildlife, and humans. Bisphenol A was largely reported from urban ecosystems in Asia, Europe, and North America; unfortunately, information was lacking from large geographic areas, megacities, and developing countries. When sufficient data were available, probabilistic hazard assessments were performed to understand global environmental quality concerns. Exceedances of Canadian Predicted No Effect Concentrations for aquatic life were >50% for effluents in Asia, Europe, and North America but as high as 80% for surface water reports from Asia. Similarly, maximum concentrations of BPA in sediments from Asia were higher than Europe. Concentrations of BPA in wildlife, mostly for fish, ranged from 0.2 to 13 000 ng/g. We observed 60% and 40% exceedences of median levels by the US Centers for Disease Control and Prevention’s National Health and Nutrition Examination Survey in Europe and Asia, respectively. These findings highlight the utility of coordinating global sensing of environmental contaminants efforts through integration of environmental monitoring and specimen banking to identify regions for implementation of more robust environmental assessment and management programs.

Keywords
urban ecosystems, biomonitoring, environmental exposure, probabilistic hazard assessment

Introduction
As countries develop and urbanize, production demands, such as food and beverage packaging, medical equipment, electronics, flame retardants, adhesives, building materials, automobiles, and paper coatings increase globally (Staples et al. 1998; vom Saal and Hughes 2005; Kanga et al. 2006; Calafat et al. 2008; Chapin et al. 2008; Flint et al. 2012). As a result, consumption of bisphenol A (BPA), 2,2-bis(4-hydroxyphenyl) propane (CAS No. 80-05-7), a common industrial chemical component in many products, has steadily grown over the last 58 years. Commercial production of BPA began in the United States in 1957 and then in Europe a year later. Growth of global production has consistently ranged between 0% and 5% annually, with the latest strongest growth occurring in China (Burridge 2008). In fact, between 2000 and 2006, the BPA market in Asia alone grew at an average of 13% annually (Huang et al. 2012). In 2004, the estimated production of BPA in the United States was approximately 1 million tons (2.3 billion pounds) and just above 1 million tons was also produced in Western Europe in 2005 and 2006 (European Commission Joint Research Center 2008; U.S. National Toxicology Program 2008). Therefore, BPA is classified as a high production volume chemical in the United States.

The purpose of this review was to examine the occurrence of BPA in the natural environment throughout different regions of the world. We included over 500 peer-reviewed studies that reported specific concentrations of BPA measured in aquatic systems, wildlife, and humans. This compilation of data on BPA was intended to support an understanding of

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region-specific environmental occurrence, exposure, and bioaccumulation.

**Sources of BPA**

Bisphenol A does not occur naturally but has become ubiquitous in the environment as a result of its high production, consumption, and subsequent environmental introduction (Tsai 2006). Environmental sources of BPA can be classified as preconsumer and postconsumer products. Preconsumer sources include those attributed to the manufacture of BPA and BPA-containing products, where the first source of BPA release is from effluent discharge of manufacturing plants (Staples et al. 1998; Cousins et al. 2008; Klecka et al. 2009). Transport and processing of BPA and BPA-containing products are additional sources for its preconsumer release (Staples et al. 1998; Flint et al. 2012).

Postconsumer sources include those associated with disposal or waste including effluent discharge from municipal wastewater treatment plants (WWTP), leaching from landfills, combustion of domestic waste, and degradation of plastics in the environment (Teuten et al. 2009; Fu and Kawamura 2010; Flint et al. 2012). In 2000, Fürhacker et al. reported that 90% of BPA was removed during wastewater treatment in a plant located in southern Austria; similar findings were reported in the United States (Dorn et al. 1987). However, despite efforts to treat BPA, detection in the environment continues to be reported (Fromme et al. 2002; Leusch et al. 2006; Musolf et al. 2010; Xu et al. 2014a, b). For example, detection of BPA was reported up to 17.2 mg/L in hazardous waste landfill leachates from Japan (Yamamoto et al. 2001) and 12 µg/L in effluents in the United States (Kolpin et al. 2002). In addition to environmental occurrence, contact with heat and acidic or basic conditions accelerates the hydrolysis of the ester bonds between BPA molecules, which results in human and domesticated animal exposure from heating of cans to sterilize food, the presence of acidic or basic food or beverages in cans and polycarbonate plastic, and repeated heating and washing of these products (Howdeshell et al. 2003; Kang et al. 2003; Vanderberg et al. 2007; von Goetz et al. 2010). Inhalation of indoor dust and dental sealants represents other sources of human exposure (Olea et al. 1996; Calafat et al. 2008; Geens et al. 2009b).

Bisphenol A is synthesized by the condensation of phenol with acetone in the presence of a catalyst, a strongly acidic ion-exchange resin. The molecular structure of BPA consists of a central tetrahedral carbon atom with 2 methyl groups and 2 phenol groups (Table 1). Bisphenol A is a moderately water-soluble compound (120-300 mg/L at room temperature; US Environmental Protection Agency, 2014), and it dissociates in alkaline matrices (pK<sub>a</sub> 10.29 ± 0.69). The U.S. National Institutes of Health Hazardous Substances Data Bank reports a log K<sub>ow</sub> of 3.64 ± 0.32 for BPA. Thus, BPA would be historically considered to possess moderate bioaccumulation (Staples et al. 1998; Heinonen et al. 2002), although more recent studies highlight the importance of understanding bioaccumulation and the toxicological relevance of moderately lipophilic substances (Valenti et al. 2012, Nichols et al. 2015). In addition, low volatility results from low vapor pressure, high melting point, and moderate solubility (Staples et al. 1998). Rapid photo-oxidation and breakdown in the atmosphere explains the low half-life of BPA in air (0.2 days). Despite the low half-life and only a moderate potential for bioaccumulation, BPA has been detected in multiple environmental matrices (eg, water, soil, and air), including wildlife and humans as subsequently discussed further below.

**Bisphenol A in Effluent and Surface Water**

Detection of BPA in water began in the late 1990s, with publications of environmental occurrence steadily increasing since these earlier observations (Figure 1). Publication topics span from chemical and biological detection and quantification method development studies to best management practice...
studies on the transformation of BPA prior to environmental release (e.g., ozonation and bacterial degradation). Although BPA is a highly studied compound, we examined the literature to gain an understanding of its relative distribution in various parts of the world (Figure 2). For example, water occurrence studies largely have occurred in Europe, Asia, and North America with 86, 69, and 27 articles, respectively (Figure 2; Supplemental Table S1). Notably, no published studies were identified from Russia, India, South America (with Brazil as an exception), Central America, or Africa (with Tunisia as an exception). Thus, although we report and analyzed global patterns of freshwater BPA contamination, it is largely comprised of data from 3 continents and lacks data from the majority of developing countries around the globe (Figure 2).

Bisphenol A concentrations in WWTP effluent ranged from nondetect to 370 \( \mu \text{g/L} \), but in most cases, effluent levels were less than 5 \( \mu \text{g/L} \) (Supplemental Table S1). Limit of detection among studies also displayed a wide range from 0.006 ng/L to 10 \( \mu \text{g/L} \), which inherently resulted from inconsistencies among the specific analytical methods employed in each study. Technological advances often result in analytical improvements for instrumental precision, accuracy, and sensitivity through time. However, water detection limits appear to be comparatively similar for BPA over the last 2 decades. Moreover, gas chromatography coupled with mass spectrometry (MS) continues to be the most common method employed followed by liquid chromatography coupled with MS.
In surface water, BPA ranged from nondetect to 56 μg/L (Supplemental Table S1). While surface water samples in most studies represented river sites upstream of a WWTP, BPA was also measured in coastal and marine systems (Sánchez-Avila et al. 2011; Sánchez-Avila et al. 2012; Martinez et al. 2013; Rocha et al. 2013). In the Baltic Sea, surface water samples had the highest concentrations (193 ng/L) of BPA compared to slightly lower observations (39 ng/L) in subsurface and bottom waters (Staniszewska et al. 2014). Slightly lower levels of BPA were reported in 291 potable tap water samples (Colin et al. 2014) with mean and maximum levels of 14 ng/L and 1.3 μg/L, respectively.

After reviewing the peer-reviewed literature, we compared measured environmental concentrations of BPA in effluent and surface water among Asia, Europe, and North America studies (Figure 3). Because reports of minimum, median, and mean values were not consistently described and raw data were not obtained, we conservatively focused on maximum reported concentrations (Supplemental Table S1). We then employed probabilistic hazard assessment approaches to compare observations from different regions. Seventy-eight maximum values of BPA in effluents from Europe (41), Asia (21), and North America (16) were ranked using the Weibull formula using approaches previously reported by our research team (Dobbins et al. 2008,2009; Berninger and Brooks 2010; Berninger et al. 2011; James et al. 2011; Connors et al. 2014; Dreier et al. 2015). These distributions were fairly similar; for example, 5th centiles of 1.29, 2.80, and 3.41 ng/L were observed for Asia, Europe, and North America, respectively. For surface water, a total of 105 data points were utilized to represent Asia (45), Europe (49), and North America (11; Table 2). These observations were generally higher than those detected in effluent; for example, 5th centile values identified that the likelihood of encountering higher surface water concentrations of BPA exists in Asia compared to Europe and North America (Figure 3; Table 2).

We then further employed probabilistic hazard assessment to examine the likelihood of encountering exceedences of proposed Predicted No Effect Concentrations (PNECs), which ranged from 750 ng/L in Canada, to 1500 ng/L in the European Union (EU) and 1600 ng/L in Japan. As noted earlier, distributions among regions were quite similar; thus, it was not surprising to observe similar patterns of PNEC exceedences. For example, the highest exceedance of the Canadian PNEC in...
Biosolids, Sediments, Soil, and Air

Concentrations of BPA in Sewage Sludge and Biosolids

A total of 20 studies of BPA in sewage sludge and biosolids were found in the literature, most of which were from Europe (8) and North America (8), with the remainder originating from Asia (3) and Australia (1). Bisphenol A is a ubiquitous environmental contaminant in these sludge and biosolid reports, with concentrations ranging from 10 to >100 000 μg/kg dry weight (DW; Supplemental Table S2). Concentrations depended largely on the amount and type of influent source and effluent treatment processes involved (such as primary and secondary treatment). For most municipal WWTPs, concentrations of BPA ranged from 10 to 10 000 μg/kg DW. However, higher levels (>100 000 μg/kg) were found in the sludge of WWTPs receiving elevated industrial effluent (Meesters and Schroder 2002). Geographic differences of BPA in sludge were recently examined by Staples et al. (2010) who developed probabilistic exposure distributions of BPA in sewage sludge and proposed median (50th percentile) and 95th percentile values of 780 and 14 200 μg/kg for North America and 160 and 95 000 μg/kg for Europe.

Concentrations of BPA in Soil

Only 6 studies on the occurrence of BPA in soil were found in the literature, of which 2 each were from Asia and North America and 1 was from Europe (Supplemental Table S2). Primary sources of BPA to terrestrial soils include the application of sewage sludge (Kinney et al. 2008; Langdon et al. 2012), irrigation with wastewater effluent (Chen et al. 2011), discharge of landfill leachate (Fent et al. 2003), and disposal and recycling of electronic waste (Huang et al. 2014). Concentrations in soil varied across several orders of magnitude (ie, <0.01-1000 μg/kg) depending on the amount and type of effluent or waste received (Supporting Table S2). Soils specifically treated with sewage sludge generally contained BPA concentrations ranging from 1 to 150 μg/kg (Kinney et al. 2008; Langdon et al. 2012). Although the presence of BPA in agricultural fields irrigated with wastewater effluent is limited, Chen et al. (2011) reported BPA concentrations of less than 10 μg/kg. However, BPA levels greater than 100 μg/kg have been observed at electronic waste recycling and disposal sites in China (Huang et al. 2014).

Concentrations of BPA in Sediments

Fifty studies on the presence of BPA in sediments were identified and spanned multiple continents including Asia (29), Europe (17), and North America (4) (Supplemental Table S2). No studies were found for Australia, Antarctica, Central America, South America, or Africa. Like in soils, reported concentrations of BPA in sediments span several orders of magnitude and depend on loading from upstream sources, such as municipal and industrial WWTP effluent. Concentrations between 100 and 1000 μg/kg DW were commonly reported downstream of heavily populated urban areas, WWTPs, and industrial discharges (Yang et al. 2005; Gong et al. 2011).

Not surprisingly, most studies focused sampling efforts on heavily urbanized watersheds and conveyances downstream from WWTPs. The highest concentrations reported in the literature were from Taiwan (10,500 μg/kg, Lin 2001), China (3,400-3,600 μg/kg, Yang et al. 2005; Zhang et al. 2011), and Germany (1,630 μg/kg, Stachel et al. 2005). Maximum detected BPA concentrations from Asia were comparable to those of studies in Europe (Figure 4). Specifically, 95th and 99th percentile (Table 3) sediment concentrations for Asia (3458 and 20 136 μg/kg DW) were higher than those of Europe (3384 and 13 392 μg/kg DW). It is important to note the limited number of studies conducted in North America (4) or Europe (17) compared to Asia (29) (Supplemental Table S2).

Beyond total organic carbon content, the ability to predict partitioning of BPA to sediments is dependent on pH (Zeng et al. 2006), black carbon (Zeng et al. 2006), ionic strength (Zeng et al. 2006; Xu et al. 2008), and temperature (Xu et al. 2008). Bisphenol A has a pKa of 10.29 ± 0.69 (Table 1), which results in enhanced sorption at lower pH values and higher solubility or desorption at pH values closer to the pKa. At lower pH values (eg, pH <7), BPA is subject to a “salting out” effect, whereby increasing ionic strength will enhance sorption to sediments (Zeng et al. 2007; Tian et al. 2009), whereas the reverse occurs at a pH closer to the pKa (eg, pH of 8; Xu et al. 2008). Although organic carbon normalized partitioning coefficients (KOC) are typically used to predict
The absorption of BPA to sediments, these values can vary from 1355 L/kg to 447 L/kg based solely on the presence of organic or humic substances (Xu et al. 2008). Additional efforts are needed to describe Kd values for BPA across sediment types and pH ranges, and then how these environmental gradients influence bioavailability and bioaccumulation.

Concentrations of BPA in Air

Only 6 studies were identified which reported BPA levels in air (3 in Asia, 2 in North America, and 1 in Europe; Table 2). These studies investigated the presence of BPA in outdoor air (Berkner et al. 2004; Fu and Kawamura 2010), in indoor air of homes (Rudel et al. 2001; Wilson et al. 2007) and workplace offices (Rudel et al. 2001), and occupational exposure in plastics factories (He et al. 2009). Maximum indoor air concentrations were reported in BPA at resin factories in China (>50,000 ng/m^3), whereas lower (<100 ng/m^3) concentrations are found in residential and commercial buildings (Rudel et al. 2001; Wilson et al. 2007).

Sources of BPA to outdoor air include the burning of domestic and electronic waste (Owens et al. 2007; Fu and Kawamura 2010) and paint spraying (Peltonen and Pukkila 1988). Due to the low volatility of BPA, low air emissions, and rapid photodegradation half-life (<7 hours), BPA is expected to have a negligible presence in the atmosphere (Cousins et al. 2002). Fu and Kawamura (2010) investigated atmospheric aerosol concentrations of BPA in a wide range of geographic and demographic locations. For example, in urban areas of India, China, Japan, New Zealand, and the United States, BPA levels ranged from 0.004 to 17 ng/m^3, while BPA ranged from 0.005 to 0.2 ng/m^3 in rural areas of China and Germany. In marine areas of the Pacific, Atlantic, and Indian Oceans, BPA was detected between 0.001 and 0.03 ng/m^3, with the highest concentrations in urban coastal regions. Furthermore, in aerosol samples collected from polar regions, BPA concentrations ranged between 0.001 and 0.017 ng/m^3. Because BPA does not occur naturally and it is in high demand by society, it is expected to be reported in highest concentrations in urban areas, but BPA is also present in remote areas of the globe. How much and at what rate atmospheric BPA is differentially deposited to the world oceans remains to be determined.

Bioaccumulation of BPA in Wildlife

Since 1999, a total of 63 studies have been published on BPA concentrations in wildlife (Supporting Table S3). Sixty-two percent of these articles reported BPA in wildlife from the field, while the remaining reports are derived from controlled laboratory studies. About half of the field studies occurred in Europe and Asia (Figure 1C). Only 2 studies reported tissue data collected in North America (Supplemental Table S3), and no data have been reported on BPA levels in wildlife from other regions of the world. Such observations appear to be increasing recently; for example, from 1999 to 2012, between 0 and 3 publications were released each year, but an average of 6 articles were published in each of 2013 and 2014 (Supplemental Table S3).

Bisphenol A has been detected in tissues of several different aquatic species collected from marine and freshwater systems. In fish, the group of organisms for which most of the data on wildlife tissue levels exists, BPA has been detected at concentrations ranging from 0.2 to 13 000 ng/g (Supplemental Table S3). Bisphenol A has also been measured in amphibians, mollusks, gastropods, crustaceans, aquatic insects, polychaetes, algae, and diatoms (Supplemental Table S3) at concentrations similar to those reported in fish in the ppt to low ppb range. The only terrestrial organisms for which field BPA accumulation data are available is for the earthworm (Eisenia fetida). In this species, Markman et al. (2007) measured BPA tissue levels in adult earthworms collected from sewage percolating beds.

Based on laboratory-derived data, BPA shows little ability to accumulate significantly from water in tissues of biota. Bisphenol A biocaccumulation factors (BCFs) for fish range from 1.7 to 182 (Supplemental Table S3), values that are well below the lower thresholds used by regulatory agencies to identify a substance as bioaccumulative. Similar to those of fish, BCFs for marine and freshwater bivalves are fairly low, with values ranging from 4.5 to 144. In amphibians and phytoplanktons, BCFs have been reported up to 458 and 382, respectively (Supplemental Table S3). The BCFs for these organisms are higher than fish but still below typical regulatory thresholds.

The low BCFs reported previously correlate well with results gathered from toxicokinetic experiments using BPA in fish. Lindholm et al. (2001) demonstrated that after an intraperitoneal injection of 154 μmol BPA/kg of fish, BPA was readily absorbed from the body cavity into the liver, plasma, and muscle of rainbow trout. In this study, each of the compartments reached maximum (100%) BPA concentrations 2 hours after injection. Twenty-four hours following injection, only 1.5%,
2.0%, and 1.7% BPA remained in the liver, plasma, and muscle, respectively. Similar to observations from injected fish, inhalational exposure of BPA through water had a relatively short (<6 hours) half-life in fish plasma and tissues (Lindholst et al. 2001; Lindholst et al. 2003). The fast elimination of BPA in fish is likely due to its metabolism. In an aqueous exposure, rainbow trout and zebrafish rapidly converted BPA to BPA glucoronic acid and, to a much lesser extent, BPA sulfate; BPA glucuronide was reported to be primarily excreted in bile through the intestine (Yokota et al. 2002; Lindholst et al. 2003). Introduction of a glucoronyl group reduces the Kow of a chemical by 2 orders of magnitude (Giroud et al. 1998). As with injected and aqueous exposed fish, rainbow trout dosed orally also demonstrate quick elimination of BPA (Bjerregaard et al. 2003).

Although laboratory BCFs are fairly low, field bioaccumulation factors (BAFs) for BPA are typically much higher. Yang et al. (2014), for example, reported BAFs for common carp (Cyprinus carpio) ranging from 3583 to 14178. These values are over an order of magnitude higher than the highest reported laboratory BCF for fish. The large difference between fish BCFs and the accumulation factors calculated by Yang et al. (2014) could be attributed to several different factors. First, the authors measured BPA in carp, a benthic species that was never used in any of the laboratory-derived BCF experiments with pelagic fish. Thus, differences between Yang et al. (2014) findings and previous investigations could be due to sediment exposure in the field. These differences could also have resulted from species-specific differences in metabolism. For example, Lindholst et al. (2003) demonstrated that zebrafish metabolized BPA faster than rainbow trout, which could be attributed to the lower estrogenic sensitivity of zebrafish to BPA. Second, Yang et al. (2014) measured BPA in bile, but previous laboratory-derived BCF studies determined accumulation levels in plasma and tissues. In fish, bilary excretion is the main route of BPA elimination, and more BPA accumulates in bile than in plasma, muscle, and liver (Lindholst et al. 2003). Finally, if BPA primarily accumulates through another route, such as dietary exposure from benthic organisms inhabiting contaminated sediments, laboratory-derived BCFs would be much lower than BAFs because in these controlled laboratory studies fish were only exposed via water.

Bioaccumulation factors can be estimated using a regression equation that assumes bioconcentration is a thermodynamically driven partition process between the water and the lipid phase of an exposed organism (Meylan et al. 1999). The equation, originally developed by Veith et al. (1979), is based exclusively on the compound’s log Kow. Given that BPA has a Log D of 3.64 at a pH of 7.4, the estimated BCF is 344 (SciFinder 2015). In addition, we observed the BCF estimate of 71.85 (log P = 3.32) derived by the U.S. Environmental Protection Agency’s Estimation Programs Interface (EPI) Suite software (http://www.epa.gov/opptintr/exposure/pubs/episuitetd.htm) to be much closer to laboratory-derived BCFs. Although this prediction is higher than laboratory-derived values for fish, invertebrates, and bivalves, it still falls below common regulatory thresholds (EPA = 1000; EU = 2000), as demonstrated with the experimental BCFs. The higher value derived from the equation could be attributed to the equation’s lack of metabolism component. As stated earlier, BPA has been demonstrated to undergo glucoronate and sulfate conjugation in fish. Unfortunately, comparative metabolism and detoxification differences among fish and other species are not understood but are necessary to advance an understanding of bioaccumulation and risks to wildlife from BPA and other contaminants.

Whether BPA displays trophic transfer is yet to be determined. Ishihara and Nakajima (2003) suggested that BPA can accumulate in zooplankton via phytoplankton. This conclusion was grounded on the observation that in water and marine phytoplankton (Nannochloropsis sp) spiked with 24 µmol/L BPA, recovery of the compound was 11% and 46%, respectively; while the recovery from medium and zooplankton (Artemia sp or Brachionus sp) was >80% and <7%, respectively, in a separate study (Ishihara and Nakajima 2003). However, >40% of the spiked BPA was recovered in the zooplankton when phytoplankton and zooplankton were exposed concurrently.

To better characterize the accumulation potential of BPA in aquatic species and food chains, more experimental data are needed. In particular, in vitro metabolism experiments, such as fish S9 assays, would help clarify the rate at which BPA undergoes metabolism and the degree to which metabolic processes affect bioconcentration and bioaccumulation of BPA in aquatic biota. This in vitro data would aid in the development of methods to model and estimate accumulation of industrial compounds such as BPA, which undergo metabolism in aquatic species. Similarly, field and mesocosm studies aimed at calculating trophic magnification or dilution factors for BPA, particularly in effluent-dependent surface waters (Du et al. 2014), are necessary to further understand bioaccumulation in wildlife.
Bisphenol A in Humans

Numerous studies have documented the presence of BPA in canned foods (see Aerts et al. 2012; Geens et al. 2012a). Heat associated with sterilization of the container and acidity of the contents appear to be important determinants of the rate of migration (Goodson et al. 2004; Robin et al. 2004). In humans, the scientific consensus is that the primary route of exposure is consumption of canned food. For example, Carwile et al. (2011) and others observed a 1200% increase in urine BPA concentrations following consumption of 1 serving of canned soup versus fresh food over a 5-day period (Ye et al. 2011). Diet modification that removes canned or packaged foods was also shown to sharply reduce urinary BPA concentrations (Gray et al. 2011; Rudel et al. 2011).

Moreover, BPA migrates out of polycarbonate in reusable containers for food and water; for example, the product that has by far received the most attention is baby bottles (Hauser et al. 2007; Vandenberg et al. 2013; EFSA 2015). The EU banned the use of polycarbonate in baby bottles in 2011, and the US Food and Drug Administration followed in 2012. A definitive review of the presence of BPA in simulated food in polycarbonate baby bottles in the EU was recently published by Hoekstra and Simonneau (2013). The authors concluded that contact time, temperature, and pH are the main determinants of migration of BPA into the food. For children, the estimated exposure range from 0.01 to 13 μg/kg/d, with the highest for children who were bottle fed; for adults, the highest estimated exposure was 4.2 μg/kg/d (Aerts et al. 2012; Geens et al. 2012a).

Thermal paper, as used in credit card receipt printers and other types of retail applications, represents an additional source of BPA (20 mg/g paper) as a reactant in the process of heat printing (Hormann et al. 2014; Vom Saal et al. 2014; Vom Saal and Welshons 2014). Tens to hundreds of micrograms of BPA can be transferred from heat-printed receipts in relatively transient contact. Although the rate of skin penetration for BPA is uncertain, a study of a limited number of volunteers indicates that these exposures are associated with significant increases in unconjugated BPA in serum (Hormann et al. 2014; Vom Saal et al. 2014). Furthermore, elevated levels of BPA in urine have been observed in cashiers (Braun et al. 2011; Kalkbrenner et al. 2011; Calafat et al. 2014; Ehrlich et al. 2014). It has been estimated that dermal exposures of this type amount to between 0.1 and 0.58 μg/kg/d, although it could account for as much as 51% of total exposure in occupationally exposed persons (Geens et al. 2011; Liao and Kannan 2011; Aerts et al. 2012; Heinala et al. 2014; Porras et al. 2014). This application is likely also responsible for widespread environmental contamination with BPA as well as contamination of paper currency (Shiraishi et al. 2007; Terasaki et al. 2007; Liao and Kannan 2011; Aerts et al. 2012; Geens et al., 2011, 2012a; Schwartz and Landrigan 2012).

Dental fillings comprising composite epoxy resins frequently contain BPA (Rubin 2011; Aerts et al. 2012; Geens et al. 2012a). A meta-analysis by Van Landuyt et al. (2011) concluded that 0.013 to 30 mg of BPA may be released within 24 hours of implantation (Nawrot et al. 2011; Van Landuyt et al. 2011). The worst-case scenario of 30 mg represents a significant exposure (10-fold higher than the EPA RfD) although it is of short duration (Aerts et al. 2012; Geens et al. 2012a). Other minor sources of exposure include medical devices, mouthing of toys by children, cigarette filters, household detergents, and personal care products (Aerts et al. 2012; Geens et al. 2012a; Hunt et al. 2013; Vandenberg et al. 2013).

The current U.S. EPA (Environmental Protection Agency) reference dose for BPA is 50 μg/kg/d, based on a Lowest Observed Adverse Effect Level (LOAEL) (reduced body weight in a National Toxicology Program chronic oral study published in 1982) and a safety factor of 1000 (http://www.epa.gov/iris/subst/0356.htm). The European Food Safety Authority (EFSA) has recently lowered their safe exposure level from 50 to 4 μg/kg/d based on observations from a 2-generation toxicity study in mice and notes that another reevaluation may take place following completion of an NTP (National Toxicology Program) study in 3 years (http://www.efsa.europa.eu/en/press/news/150121.htm; EFSA 2015, http://www.efsa.europa.eu/en/efsajournal/pub/3978.htm). The EFSA’s evaluation estimated the highest aggregate exposure at 1.449 μg/kg/d for adolescents, and thus concluded that “there is no health concern for any age group from dietary exposure or from aggregated exposure” to BPA. However, Geens et al. (2012a) estimated exposure from food sources alone to range from 0.1 to 5 μg/kg body weight/d and up to 13 μg/kg/d for children. This discrepancy is possibly due to differences in default and refined exposure parameters (eg, diet) between the EU and other geographic regions.

When assessing BPA bioaccumulation, the scientific and regulatory communities have frequently relied on a study conducted by Volkel et al. (2002) and Colnot et al. (2002), which concluded that BPA was rapidly eliminated (1/2 5.3 hours), primarily through glucuronidation. However, concerns have been raised about these conclusions, including the limits of detection (Vandenberg et al. 2007, 2010; Chahoud et al. 2010; Rubin 2011). Although ingestion of canned food is thought to be the primary route of exposure for most persons, a study of BPA levels in fasting adults did not demonstrate the rapid clearance that was expected (Colnot et al. 2002; Volkel et al. 2002; Stahlhut et al. 2009; Welshons et al. 2009).

There is significant disagreement about the half-life of BPA in humans. The scientific and regulatory community has frequently relied on a study conducted by Voelkel et al. (2002) who used humans and nonhuman primates to demonstrate that orally administered BPA is quickly absorbed by the gastrointestinal tract. Other studies have shown that BPA undergoes extensive first pass metabolism in the gut wall (Inoue et al., 2003) and in the liver (Pritchett et al., 2002), whereby the compound is primarily conjugated to BPA-glucorononide and, to a lesser extent, BPA-sulfate (Ye et al. 2005; Hanioka et al. 2008). After conjugation, BPA is rapidly removed from the blood by the kidneys and excreted in urine (Vökel et al. 2002; Teegarden et al. 2011). More than 90% of BPA is excreted in urine within the first 6 hours following uptake, with the majority of the compound being released as BPA-G (Vökel et al. 2002).
The concentrations reported from these studies are typically less than maternal uptake (Hengstler et al. 2011). Additionally, few studies have been conducted to determine BPA body burdens in fetuses and the degree to which uptake from the maternal to fetal compartment occurs. For these reasons, future research should aim to include experimental pharmacokinetic studies of chronic BPA exposure and further investigate the presence of BPA in human adipose and fetal tissues.

Because BPA is relatively nonpersistent (biological half-life <6 hours) and a sufficient amount of it undergoes rapid excretion in urine as a major metabolite or unchanged, urinary measurements of BPA are most preferred in estimating human uptake or exposure (Geens et al. 2012a). Hence, the majority of human biomonitoring studies on BPA report urinary concentrations. The concentrations reported from these studies are typically <10 ng/mL, values similar to what has been reported in plasma (Supplemental Table S4). The median BPA concentration for urine samples collected from 2749 Americans ≥6 years of age during the 2009 to 2010 CDC NHANES was 1.90 ng/mL. This median is fairly close to those gathered from other biomonitoring studies in Asia, Europe, and North America (Table 4). We examined the likelihood of exceeding this NHANES median value based on available literature values from Asia, Europe, and North America (Figure 5). Although urine levels from Europe exceeded the 2009 to 2010 CDC NHANES median 60% of the time, lower exceedence frequencies were reported from Asia (40%) and North America (20%; Supplemental Table S4).

**Conclusion**

Herein, we examined over 500 articles from the peer-reviewed literature to understand global distribution of BPA levels in effluent discharges, surface waters, sewage sludge, biosolids, sediments, soils, air, wildlife, and humans. Unfortunately, such information is decidedly lacking from many large geographic regions, megacities, and developing countries. When data were available from environmental matrices, probabilistic hazard assessments were performed to understand potential global “hot spot” environmental quality concerns. Based on the approach taken here and data availability, PNEC values
proposed by Canada were exceeded the majority of the time in effluent discharges and surface waters of Asia, Europe, and North America. For example, the likelihood of exceeding this PNEC value was observed 80% of the time in surface water reports from Asia. These findings highlight the utility of coordinating global sensing efforts using integration of environmental monitoring and specimen banks for environmental contaminants to identify regions for implementation of more robust environmental assessment and management programs.

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Supplemental Material
The online tables are available at http://dos.sagepub.com/supplemental.

References
Aguayo S, Munoz MJ, de la Torre A, Roset J, de la Peña E, and Carballo M. 2004. Identification of organic compounds and ecotoxicological assessment of sewage treatment plants (STP) efﬂuents. Sci Total Environ 328:69-81
Andrew-Priestley M, O’Connor W, Dunstan R, Van Zwieten L, Tyler T, Kumar A, and MacFarlane G. 2012. Estrogen mediated effects in the Sydney rock oyster, Saccostrea glomerata, following field exposures to sewage effluent containing estrogenic compounds and activity. Aquat Toxicol 120:99-108
Arakawa C, Fujimaki K, Yoshinaga J, Imai H, Serizawa S, and Shiraishi H. 2004. Daily urinary excretion of bisphenol A. EHPM 9:22-26
Arbuckle TE, Davis K, Marro L, Fisher M, Legrand M, LeBlanc A, Gaudreau A, Foster WG, Choeurg V, Fraser WD, and Grp MS. 2014. Phthalate and bisphenol A exposure among pregnant women in Canada - Results from the MIREC study. Environ Int 68:55-65
Ardisoglu A and Voutsa D. 2010. Partitioning of endocrine disrupting compounds in inland waters and wastewaters discharged into the coastal area of Thessaloniki, Northern Greece. Environ Sci Pollut Res 17:529-538
Aris A. 2014. Estimation of bisphenol A (BPA) concentrations in pregnant women, fetuses and nonpregnant women in Eastern Townships of Canada. Reprod Toxicol 45:8-13
Arnold SM, Clark KE, Staples CA, Klecka GM, Dimond SS, Caspers N, and Hentges SG. 2013. Relevance of drinking water as a source of human exposure to bisphenol A. J Expo Sci Environ Epid 23:137-144
Asakura H, Matsuto T, and Tanaka N. 2004. Behavior of endocrine-disrupting chemicals in leachate from MSW landfill sites in Japan. Waste Manage 24:613-622
Ávila C, Reyes C, Bayona JM, and Garcia J. 2013. Emerging organic contaminant depending on primary treatment and operational strategy in horizontal subsurface flow constructed wetlands: influence of redox. Water Res 47:315-325
Azvedo DdA, Lacorte S, Viana P, and Barceló D. 2001. Occurrence of nonylphenol and bisphenol-A in surface waters from Portugal. J Brazilian Chem Soc 12:532-537
Balabanić D and Krivograd Klemenčič A. 2011. Presence of phthalates, bisphenol A, and nonylphenol in paper mill wastewaters in Slovenia and efficiency of aerobic and combined aerobic-anaerobic biological wastewater treatment plants for their removal. Fresen Environ Bull 20:86-92
Ballestero-Gómez A, Ruiz FJ, Rubio S, and Pérez-Bendito D. 2007. Determination of bisphenols A and F and their diglycidyl ethers in wastewater and river water by conservative extraction and liquid chromatography–ﬂuorimetry. Anal Chim Acta 603:51-59
Barber LB, Brown GK, and Zaugg SD. 2000. Potential endocrine disrupting organic chemicals in treated municipal wastewater and river water. Anal Environ Endocrine Dis 747:97-123
Basheer C, Lee HK, and Tan KS. 2004. Endocrine disrupting alkylphenols and bisphenol-A in coastal waters and supermarket seafood from Singapore. Mar Pollut Bull 48:1161-1167
Baugsos JB, Giroud B, Dessalces G, Grenier-Loustalot MF, and Cren-Azevedo DdA, Lacorte S, Viana P, and Barceló D. 2001. Occurrence of nonylphenol and bisphenol-A in surface waters from Portugal. J Brazilian Chem Soc 12:532-537

Figure 5. Measured human concentration distributions of median bisphenol A (BPA) concentrations in urine sampled from populations in Asia, Europe, and North America. Vertical line corresponds to the median BPA urinary level reported by the US National Health and Nutrition Examination Survey, Centers for Disease Control and Prevention (NHANES 2009-2010).
Bolz U, Koerner W, and Hagenmaier H. 1999. Determination of phenolic xenoestrogens in sediments and sewage sludges by HRGC/LRMS. Organohalogen Compd 40:65-68.

Boni M, Staffoni S, Tedesco P, and Vaccari M. 2012. Mass balance of emerging organic micropollutants in a small wastewater treatment plant. WIT Trans Ecol Envir 164:345-356.

Boyd GR, Reemtsma H, Grimm DA, and Mitra S. 2003. Pharmaceutical and personal care products (PPCPs) in surface and treated waters of Louisiana, USA and Ontario, Canada. Sci Total Environ 311:135-149.

Braun JM, Kalkbrenner AE, Calafat AM, Bernert JT, Ye X, Silva MJ, Barr DB, Sathyarayana S, and Lanphear BP. 2011. Variability and predictors of urinary bisphenol A concentrations during pregnancy. Environ Health Perspect 119:131-137.

Braun JM, Kalkbrenner AE, Just AC, Yolton K, Calafat AM, Sjodin A, Hauser R, Webster GM, Chen A, and Lanphear BP. 2014. Gestational Exposure to Endocrine-Disrupting Chemicals and Reciprocal Social, Repetitive, and Stereotypic Behaviors in 4- and 5-Year-Old Children: The HOME Study. Environ Health Persp 122:513-520.

Braun JM, Smith KW, Williams PL, Calafat AM, Berry K, Ehrlich S, and Hauser R. 2012. Variability of Urinary Phthalate Metabolite and Bisphenol A Concentrations before and during Pregnancy. Environ Health Persp 120:739-745.

Brock JW, Yoshimura Y, Barr JR, Maggio VL, Graiser SR, Nakazawa H, and Needham LL. 2001. Measurement of bisphenol A levels in human urine. J Expo Anal Epidemiol 11:323-328.

Brooks BW, Riley TM, and Taylor RD. 2006. Water quality of effluent-dominated stream ecosystems: ecotoxicological, hydrological, and management considerations. Hydrobiologia 556: 365-379.

Burkhardt MR, Revello RC, Smith SG, and Zaugg SD. 2005. Pressurized liquid extraction using water/isopropanol coupled with solid-phase extraction cleanup for industrial and anthropogenic waste-indicator compounds in sediment. Anal Chim Acta 534:89-100.

Burridge E. 2008. Chemical profile: bisphenol A. ICIS Chemical Business on the web. http://www.icis.com/resources/news/2008/10/13/9162868/chemical-profile-bisphenol-a/ (accessed January 29, 2015).

Bursch W, Führhacker M, Gemeiner M, Grillitsch B, Jungbauer A, Kreuzinger N, and Skutan S. 2004. Endocrine disruptors in the aquatic environment: the Austrian approach-ARCEM. Water Sci and Technol 50:293-300.

Calafat AM, Kuklenyik Z, Reidy JA, Caudill SP, Ekonj I, and Needham LL. 2005. Urinary concentrations of bisphenol A and 4-nonylphenol in a human reference population. Environ Health Perspec 113:391-395.

Calafat AM, Weuve J, Ye X, Jia LT, Hu H, Ringer S, Huttner K, and Hauser R. 2009. Exposure to bisphenol A and other phenoines in neonatal intensive care unit premature infants. Environ Health Perspect 117:639-644.

Calafat AM, Ye X, Wong LY, Reidy JA, and Needham LL. 2008. Exposure of the U.S. population to bisphenol A and 4-tertiary-octylphenol: 2003-2004. Environ Health Perspect 116:39-44.

Cao XL and Corriveau J. 2008a. Migration of bisphenol A from polycarbonate baby and water bottles into water under severe conditions. J Agric Food Chem 56:6378-6381.
Cao XL and Corriveau J. 2008b. Survey of bisphenol A in bottled water products in Canada. Food Addit Contam Part B Surveill 1:161-164

Cao XL, Perez-Locas D, Dufesne G, Clement G, Popovic S, Beraldin F, Dabeka RW, and Feeley M. 2011. Concentrations of bisphenol A in the composite food samples from the 2008 Canadian total diet study in Quebec City and dietary intake estimates. Food Addit Contam Part A Chem Anal Control Expo Risk Assess 28:791-798

Cao XL, Zhang J, Goodyer CG, Hayward S, Cooke GM, and Curran IHA. 2012. Bisphenol A in human placental and fetal liver tissues collected from Greater Montreal area (Quebec) during 1998-2008. Chemosphere 89:505-511

Careghini A, Mastorgio AF, Saponaro S, and Zezenna E. 2014. Bisphenol A, nonylphenols, benzenophenones, and benzotriazoles in soils, groundwater, surface water, sediments, and food: a review. Environ Sc Pollut Res. DOI 10.1007/s11356-014-3974-5

Carriot A, Dupuis A, Albouy-Llaty M, Legube B, and Rabouan S, Migeot. 2012. Reliable quantification of bisphenol A and its chlorinated derivatives in human breast milk using UPLC-MS/MS method. Talanta 100:175-182

Carwile JL, Luu HT, Bassett LS, Driscoll DA, Yuan C, Chang JY, Ye XY, Calafat AM, and Michels KB. 2009. Polycarbonate Bottle Use and Urinary Bisphenol A Concentrations. Environmental Health Perspectives 117:1368-1372

Carwile JL, Ye X, Zhou X, Calafat AM, and Michels KB. 2011. Canned soup consumption and urinary bisphenol A: a randomized crossover trial. JAMA 306:2218-2220

Casas L, Fernández MF, Llop S, Guxens M, Ballester F, Olea N, Irurzun MB, Rodríguez LSM, Riano I, Tardón A, Vrijheid M, Calafat AM, and Sunyer J. 2011. Urinary concentrations of phthalates and phenols in a population of Spanish pregnant women and children. Environ Int 37:858-866

Cases V, Alonso V, Argandoña V, Rodríguez M, and Prats D. 2011. Endocrine disrupting compounds: A comparison of removal between conventional activated sludge and membrane bioreactors. Desalination 272:240-245

CDC, Center for Disease Control. March 2013. Fourth National Report on Human Exposure to Environmental Chemicals - Updated tables. http://www.cdc.gov/exposurerreport/pdf/FourthReport_UpdatedTables_Mar2013.pdf [accessed 24 February, 2015].

Céspedes R, Lacorte S, Ginebreda A, and Barceló D. 2006. Chemical monitoring and occurrence of alkylphenols, alkylphenol ethoxylates, alcohol ethoxylates, phthalates and benzoazinoides in sewage treatment plants and receiving waters along the Ter River basin (Catalonia, NE Spain). Anal Bioanal Chem 385:992-1000

Céspedes R, Petrovic M, Raldúa D, Saura Ú, Piña B, Lacorte S, . . . Barceló D. 2004. Integrated procedure for determination of endocrine-disrupting activity in surface waters and sediments by use of the biological technique recombinant yeast assay and chemical analysis by LC–ESI-MS. Anal Bioanal Chem 378:697-708

Chapin RE, Adams I, Boekelheide K, Gray LE Jr, Hayward SW, Lees PSJ, McIntyre BS, Portier KM, Schnorr TM, Selevan SG, Vandenbergh JG, and Woskie SR. 2008. NTP-CERHR Expert Panel Report on the Reproductive and Developmental Toxicity of Bisphenol A. Birth Defects Res B 83:157-395

Chen F, Ying GG, Kong LX, Wang L, Zhao JL, Zhou LJ, and Zhang LJ. 2011a. Distribution and accumulation of endocrine-disrupting chemicals and pharmaceuticals in wastewater irrigated soils in Hebei, China. Environ Pollut 159:1490-1498

Chen M, Edlow AG, Lin T, Smith NA, McElrath TF, and Lu C. 2011b. Determination of bisphenol-A levels in human amniotic fluid samples by liquid chromatography coupled with mass spectrometry. J Sep Sci 34:1648-1655

Chen TC, Shue MF, Yeh YL, and Kao TJ. 2010. Bisphenol A occurred in Kao-Pin River and its tributaries in Taiwan. Environ Monit Assess 161:135-145

Chen TC, Shue MF, Yeh YL, Hsieh CY, Kuo YT, and Kuo CT. 2009. Variation, correlation, and toxicity of phenolic endocrine-disrupting compounds in surface water. J Environ Sci Heal A 44:1244-1250

Chen WL, Gwo JC, Wang GS, and Chen CY. 2014. Distribution of feminizing compounds in the aquatic environment and bioaccumulation in wild tilapia tissues. Environ Sci Pollut R 21:11349-11360

Chen WL, Wang GS, Gwo JC, and Chen CY. 2012. Ultra-high performance liquid chromatography/tandem mass spectrometry determination of feminizing chemicals in river water, sediment and tissue pretreated using disk-type solid-phase extraction and matrix solid-phase dispersion. Talanta 89:237-245

Chen X, Chen M, Xu B, Tang R, Han X, Qin Y, Xu B, Hang B, Mao Z, Huo W, Xia Y, Xu Z, and Wang X. 2013. Parental phenols exposure and spontaneous abortion in Chinese population residing in the middle and lower reaches of the Yangtze River. Chemosphere 93:217-222

Chou PH, Liu TC, and Lin YL. 2014. Monitoring of xenobiotic ligands for human estrogen receptor and aryl hydrocarbon receptor in industrial wastewater effluents. J Hazardous Mat 277:13-19

Chou WC, Chen JL, Lin CF, Chen YC, Shih FC, and Chuang CY. 2011. Biomonitoring of bisphenol A concentrations in maternal and umbilical cord blood in regard to birth outcomes and adipokine expression: a birth cohort study in Taiwan. Environmental Health 10:1-10

Chu S, Haffner GD, and Letcher RJ. 2005. Simultaneous determination of tetrabromobisphenol A, tetrachlorobisphenol A, bisphenol A and other halogenated analogues in sediment and sludge by high performance liquid chromatography-electrospray tandem mass spectrometry. J Chromatogr A 1097:25-32

Cladière M, Gasperi J, Gilbert S, Lorgeoux C, and Tassin B. 2010. Alkylphenol ethoxylates and bisphenol A in surface water within a heavily urbanized area, such as Paris. Water Pollution X. WIT Trans Ecol Environ. WIT Press, Southampton, 131-142

Cladière M, Gasperi J, Lorgeoux C, Bonhomme C, Rocher V, and Tassin B. 2013. Alkylphenolic compounds and bisphenol A contamination within a heavily urbanized area: case study of Paris. Environ Sci Pollut Res 20:2973-2983

Cladière M, Gasperi J, Lorgeoux C, Bonhomme C, Rocher V, Troupe M, and Tassin B. 2011. Bispéthon A: premiers résultats sur le bassin de la Seine-Bisphénon A: first results on Seine River basin. Tech Sci Méth 11:43-52

Clara M, Strebn B, Gans O, Martinez E, Kreuzinger N, and Kroiss H. 2005. Removal of selected pharmaceuticals, fragrances and
endocrine disrupting compounds in a membrane bioreactor and conventional wastewater treatment plants. Water Res 39:4797-4807

Cobellis L, Colacurci N, Trabucco E, Carpentiero C, and Grumetto L. 2009. Measurement of bisphenol A and bisphenol B levels in human blood sera from endometriotic women. Biomed Chromatogr 23:1186-1190

Colin A, Bach C, Rosin C, Munoz JF, and Dauchy X. 2014. Is drinking water a major route of human exposure to alkylphenol and bisphenol contaminants in France? Arch Environ Cont Toxicol 66:86-99

Connors KA, Vouchkova-Kostal AM, Kostal J, Anastas P, Zimmerman JB, and Brooks BW. 2014. Reducing aquatic toxicity: Probabilistic hazard evaluation of sustainable molecular design guidelines. Environ Toxicol Chem 33:1894-1902.

Cooper JE, Kendig EL, and Belcher SM. 2011. Assessment of bisphenol A released from reusable plastic, aluminium and stainless steel water bottles. Chemosphere 85:943-947

Coquery M, Ponnies M, Martin-Ruel S, Budzinski H, Miège C, Esperanza M, ... Choubert JM. 2011. Mesurer les micropolluants dans les eaux usées brutes et traitées-Protocoles et résultats pour l’analyse des concentrations et des flux. Tech Sci Méth 1-2:25-43

Couderc M, Poirier L, Zalouk-Vergnoux A, Kamari A, Blanchet-Letrourvé I, Marchand P, Vénisseau B, Veyrand B, Mouneyrac C, and Le Bizec B. 2015. Occurrence of POPs and other persistent organic contaminants in the European eel (Anguilla anguilla) from the Loire estuary, France. Sci Total Environ 505:199-215

Cousins IT, Staples CA, Klečka GM, and Mackay D. 2002. A multimedia assessment of the environmental fate of bisphenol A. Hum Ecol Risk Assess 8:1107-1135

Crain DA, Eriksen M, Iguchi T, Jobling S, Laufer H, LeBlanc GA, and Guillette LJ. 2007. An ecological assessment of bisphenol-A: Evidence from comparative biology. Reprod Toxicol 24:225-239

Creusot N, Kinani S, Balaguier P, Tapie N, LeMenach K, Maillot-Maréchal E, ... Ait-Aissa S. 2010. Evaluation of an LPXR reporter gene assay for the detection of aquatic emerging pollutants: screening of chemicals and application to water samples. Anal Bioanal Chem 396:569-583

da Silva DAM, Buzitis J, Reichert WL, West JE, O’Neill SM, Johnson LL, Collier TK, and Ylitalo GM. 2013. Endocrine disrupting chemicals in fish bile: A rapid method of analysis using English sole (Parophrys vetulus) from Puget Sound, WA, USA. Chemosphere 92:1550-1556

De Coensel N, David F, and Sandra P. 2009. Study on the migration of bisphenol-A from baby bottles by stir bar sorptive extraction-thermal desorption-capillary GC-MS. J Sep Sci 32:3829-3836

de Sousa Leite G, Afonso RJdCF, and de Aquino SF. 2010. Caracterização de contaminantes presentes em sistemas de tratamento de esgotos, por cromatografia líquida acoplada à espectrometria de massas tandem em alta resolução. Quim Nova 33:734-738

Deblonde T, Cossu-Leguille C, and Hartemann P. 2011. Emerging pollutants in wastewater: a review of the literature. Int J Hyg Environ Heal 214:442-448

Di Carro M, Scapolla C, Liscio C, and Magi E. 2010. Development of a fast liquid chromatography–tandem mass spectrometry method for the determination of endocrine-disrupting compounds in waters. Anal Bioanal Chem 398:1025-1034

Dias DF, Possmoser-Nascimento TE, Rodrigues VA, and von Sperling M. 2014. Overall performance evaluation of shallow maturation ponds in series treating UASB reactor effluent: Ten years of intensive monitoring of a system in Brazil. Ecol Eng 71:206-214

Dietert R and Andrews RC. 2013. The impact of alum coagulation on pharmaceutically active compounds, endocrine disrupting compounds and natural organic matter. Water Sci Technol Water Supply 13:1348-1357

Diniz MS, Mauricio R, Petrovic M, De Alda MJL, Amaral L, Peres I, ... Santana F. 2010. Assessing the estrogenic potency in a Portuguese wastewater treatment plant using an integrated approach. J Environ Sci 22:1613-1622

Dirtu AC, Roosens L, Geens T, Gheorghe A, Neels H, and Covaci A. 2008. Simultaneous determination of bisphenol A, triclosan, and tetrabromobisphenol A in human serum using solid-phase extraction and gas chromatography-electron capture negative-ionization mass spectrometry. Anal Bioanal Chem 391:1175-1181

Dobbins LL, Brain RA, and Brooks BW. 2008. Comparison of the sensitivities of common in vitro and in vivo assays of estrogenic activity: Application of chemical toxicity distributions. Environ Toxicol Chem 27:2608-2616.

Dobbins LL, Usenko S, Brain RA, and Brooks BW. 2009. Probabilistic ecological hazard assessment of parabens using Daphnia magna and Pimephales promelas. Environ Toxicol Chem 28:2744-2753.

Dong J, Li XL, Ruan TG, Zhou SC, and Lin L. 2009b. Phenol pollution in the sediments of the Pearl River estuary area and its potential risk assessment to the eco-security. J Safety Environ 9:113-6

Dreier DA, Connors KA, and Brooks BW. 2015. Comparative end-point sensitivity of in vitro estrogen agonist assays. Reg Toxicol Pharm 72:185-193.

Drewes JE, Hemming J, Ladenburger SJ, Schauer J, and Sonzogni W. 2005. An assessment of endocrine disrupting activity changes during wastewater treatment through the use of bioassays and chemical measurements. Water Environ Res 77:12-23

Du B, Haddad SP, Luek A, Scott WC, Saari GN, Kristofco LA, Connors KA, Rash C, Rasmussen JB, Chamblish CK, and Brooks BW. 2014. Bioaccumulation and trophic dilution of human pharmaceuticals across trophic levels of an effluent-dependent wadeable stream. Phil Trans R Soc B 1656:20140058.

Dun Y, Tang C, and Zhang Y. 2014. Characteristics, behavior and potential risks of phenolic endocrine-disrupting chemicals in surface water and suspended particle matter of the Xiahe River, North China Plain, China. Fresen Environ Bull 23:620-629.

Duong CN, Ra JS, Cho J, Kim SD, Choi HK, Park JH, and Kim SD. 2010. Estrogenic chemicals and estrogenicity in river waters of South Korea and seven Asian countries. Chemosphere 78:286-293

Dupuis A, Migeot V, Cariot A, Alouby-Llaty M, Legube B, and Rabouan S. 2012. Quantification of bisphenol A, 353-nonylphenol and their chlorinated derivatives in drinking water treatment plants. Environ Sci Pollut R 19:4193-4205

Edlow AG, Chen M, Smith NA, Lu C, and McElrath TF. 2012. Fetal bisphenol A exposure: Concentration of conjugated and
unconjugated bisphenol A in amniotic fluid in the second and third trimesters. Reprod Toxicol 34: 1-7
EFSA. 2015. Scientific opinion on the risks to public health related to the presence of bisphenol A (BPA) in foodstuffs: Part 1 - exposure assessment. EFS A Journal 13:3978
Ehrlich S, Williams PL, Missmer SA, Flaws JA, Ye X, Calafat AM, Petrozza JC, Wright D, and Hauser R 2012. Urinary bisphenol A concentrations and early reproductive health outcomes among women undergoing IVF. Hum Reprod 27:3583-3592
Ehrlich S, Calafat AM, Humblet O, Smith T, and Hauser R. 2014. Handling of thermal receipts as a source of exposure to bisphenol A. JAMA 31:859-860
Ennett P, Gaw N, Northcott G, Storey B, and Graham L. 2015. Personal care products and steroid hormones in the Antarctic coastal environment associated with two Antarctic research stations, McMurdo Station and Scott Base. Environ Res 136:331-342
Engel SM, Levy B, Liu ZS, Kaplan D, and Wolff MS. 2006. Xenobiotic phenols in early pregnancy amniotic fluid. Reprod Toxicol 21:110-112
European Commission Joint Research Center. 2008. European Union Risk Assessment Report CAS: 80-05-7 EINECS No: 201-245-8. Environment Addendum.
Falud T, Vasanits-Zigrat A, Zaray G, and Molnár-Perl I. 2015. Identification, quantification and distribution of substituted phenols in the dissolved and suspended phases of water samples by gas chromatography tandem mass spectrometry: Derivatization, mass fragmentation and acquisition studies. Microchem J 118:45-54
Fan J, Guo H, Liu G, and Peng P. 2007. Simple and sensitive fluorimetric method for determination of environmental hormone bisphenol A based on its inhibitory effect on the redox reaction between peroxyl radical and rhodamine 6G. Anal Chim Acta 585: 134-138
Félix–Cañedo TE, Durán–Alvarez JC, and Jiménez–Cisneros B. 2013. The occurrence and distribution of a group of organic micropollutants in Mexico City’s water sources. Sci Total Environ 454:109-118
Fenchel P, Dechaux H, Harthe C, Gal J, Ferrari P, Pacini P, Wagner-Mahler K, Pugeat M, and Brucker-Davis F. 2012. Unconjugated bisphenol A cord blood levels in boys with descended or undescended testes. Hum Reprod 27:983-990
Fenlon KA, Johnson AC, Tyler CR, and Hill EM. 2010. Gas–liquid chromatography–tandem mass spectrometry methodology for the quantification of estrogentic contaminants in bile of fish exposed to wastewater treatment works effluents and from wild populations. J Chromatogr A 1217:112-118
Fent G, Hein WJ, Moendel MJ, and Kubiak R. 2003. Fate of 14C-bisphenol A in soils. Chemosphere 51:735-746
Fernández MF, Arrebola JP, Taoufiki J, Navalon A, Ballesteros O, Pulgar R, Vílchez JL, and Olea N. 2007b. Bisphenol-A and chlorinated derivatives in adipose tissue of women. Reprod Toxicol 24: 259-264
Fernández MP, Ikonomou MG, and Buchanan I. 2007a. An assessment of estrogenic organic contaminants in Canadian wastewaters. Sci Total Environ 373:250-269
Fint S, Markle T, Thompson S, and Wallace E. 2012. Bisphenol A exposure, effects, and policy: A wildlife perspective. J Environ Manage 104:19-34
Fjeld E, Schlabach M, Berge JA, Eggen T, Snilsberg P, Kallberg G, Rognerud S, Enge EK, Borgen A, and Gundersen H. 2004. Screening of selected new organic contaminants - brominated flame retardants, chlorinated paraffins, bisphenol-A and trichloroan. Norsk institutt for vannforskning (NIVA).
Flint S, Markle T, Thompson S, and Wallace E. 2012. Bisphenol A exposure, effects, and policy: a wildlife perspective. J Environ Manage 104:19-34
Focazio MJ, Kolpin DW, Barnes KK, Furlong ET, Meyer MT, Zaug SD, … Thurman ME. 2008. A national reconnaissance for pharmaceuticals and other organic wastewater contaminants in the United States—II) Untreated drinking water sources. Sci Total Environ 402:201-216
Foreman WT, Gray JL, ReVello RC, Lindley CE, and Losche SA. 2013. An isotope-Dilution Standard GC/MS/MS Method for Steroid hormones in Water. U.S. Geological Survey, National Water Quality Laboratory. In: Evaluating veterinary pharmaceutical behavior in the environment. Cobb G et al ACS Symposium Series, pp 57-136. American Chemical Society: Washington, D.C.
Friederich H, Fragemann HJ, Stock HD, Barlowski D, and Racek F. 2004. New test results for activated sludge loading with organic contaminants. Gewaesserschutz-Wasser- Abwasser 193:1-18
Frohner S, Machado KS, Falcio F, Monnich C, and Bessa M. 2011. Inputs of domestic and industrial sewage in Upper Iguassu, Brazil identified by emerging compounds. Water Air Soil Poll 215: 251-259
Fromme H, Küchler T, Otto T, Pilz K, Müller J, and Wenzel A. 2002. Occurrence of phthalates and bisphenol A and F in the environment. Water Res 36:1429-1438
Fu M, Li Z, and Gao H. 2007. Distribution characteristics of nonylphenol in Jiaozhou Bay of Qingdao and its adjacent rivers. Chemosphere 69:1009-1016
Fu P and Kawamura K. 2010. Ubiquity of bisphenol A in the atmosphere. Environ Pollut 158:3138-3143
Fuerhacker M. 2003. Bisphenol A emission factors from industrial sources and elimination rates in a sewage treatment plant. Water Sci Technol 47:117-122
Fukazawa H, Hoshino K, Shiozawa T, Matsuhashi H, and Terao Y. 2001. Identification and quantification of chlorinated bisphenol A in wastewater from wastepaper recycling plants. Chemosphere 44: 973-979
Fukazawa H, Watanabe M, Shiraishi F, Shiraishi H, Shiozawa T, Matsuhashi H, and Terao Y. 2002. Formation of Chlorinated Derivatives of Bisphenol A in Waste Paper Recycling Plants and Their Estrogenic Activities. J Health Sci 48:242-249
Funakoshi G and Kasuya S. 2009. Influence of an estuary dam on the dynamics of bisphenol A and alkylphenols. Chemosphere 75: 491-497
Führacker M, Scharf S, and Weber H. 2000. Bisphenol A: emissions from point sources. Chemosphere 41:751-756
Furuchi T, Kannan K, Suzuki K, Tanaka S, Giesy JP, and Masunaga S. 2006. Occurrence of estrogenic compounds in and removal by a swine farm waste treatment plant. Environ Sci Technol 40: 7896-7902
Galloway T, Cipelli R, Guralnik J, Ferrucci L, Bandinelli S, Corsi AM, Money C, McCormack P, and Melzer D. 2010. Daily
Bisphenol A Excretion and Associations with Sex Hormone Concentrations: Results from the InCHIANTI Adult Population Study. *Environ Health Persp* 118:1603-1608

Garcia-Prieto A, Lunar ML, Rubio S, and Perez-Bendito D. 2008. Determination of urinary bisphenol A by coacervative microextraction and liquid chromatography-fluorescence detection. *Anal Chim Acta* 630:19-27

Gasperi J, Sebastian C, Ruban V, Delamain M, Percot S, Wiest L, ... Kessoo MDK. 2014. Micropollutants in urban stormwater: occurrence, concentrations, and atmospheric contributions for a wide range of contaminants in three French catchments. *Environ Sci Pollut Res* 21:5267-5281

Gatidou G, Thomaidis NS, Stasinakis AS, and Lekkas TD. 2007. Simultaneous determination of the endocrine disrupting compounds nonylphenol, nonylphenol ethoxylates, triclosan and bisphenol A in wastewater and sewage sludge by gas chromatography-mass spectrometry. *J Chromatogr A* 1138:32-41

Gatidou G, Vassalou E, and Thomaidis NS. 2010. Bioconcentration of selected endocrine disrupting compounds in the Mediterranean mussel, *Mytilus galloprovincialis*. *Mar Pollut Bull* 60:2111-2116

Gattullo CE, Bährs H, Steinberg CEW, and Loffredo E. 2012. Removal of bisphenol A by the freshwater green alga *Monoraphidium braunii* and the role of natural organic matter. *Sci Total Environ* 416:501-506

Ge J, Cong J, Sun Y, Li G, Zhou Z, Qian C, and Liu F. 2010. Determination of endocrine disrupting chemicals in surface water and industrial wastewater from Beijing, China. *B Environ Contam Tox* 84:401-405

Geens T, Aerts D, Berthot C, Bourguignon JP, Goeyens L, Lecomte P, Maghuin-Rogister G, Pironnet AM, Pussemier L, Scippo ML, Van Loco J, and Covaci A. 2012a. A review of dietary and non-dietary exposure to bisphenol-A. *Food Chem Toxicol* 50:3725-3740

Geens T, Goeyens L, and Covaci A. 2011. Are potential sources for human exposure to bisphenol-A overlooked? *Int J Hyg Environ Health* 214:339-347

Geens T, Neels H, and Covaci A. 2009a. Sensitive and selective method for the determination of bisphenol-A and triclosan in serum and urine as pentafluorobenzoate-derivatives using GC-ECNI/MS. *J Chromatogr B* 877:4042-4046

Geens T, Neels H, and Covaci A. 2012b. Distribution of bisphenol-A, triclosan and n-nonylphenol in human adipose tissue, liver and brain. *Chemosphere* 87:796-802

Giger W, Gabriel FL, Jonkers N, Wettstein FE, and Kohler HPE. 2009. Environmental fate of phenolic endocrine disruptors: field and laboratory studies. *Philos Trans R Soc A* 367:3941-3963

Gill L, Misstear B, Johnston P, and O’Luanigh N. 2009. Natural attenuation of endocrine disrupting chemicals in on-site domestic wastewater treatment systems. *J ASTM Int* 6:1-13

Giroud Y, Currat PA, Pagliara A, Testa B, and Dickinson RG. 1998. Intrinsic and Intramolecular Lipophilicity Effects in O-Glucuronides. *Hely Chim Acta* 81:330-341

Gómez M, Agüera A, Mezcua M, Hurtado J, Mocholi F, and Fernández-Alba A. 2007. Simultaneous analysis of neutral and acidic pharmaceuticals as well as related compounds by gas chromatography–tandem mass spectrometry in wastewater. *Talanta* 73:314-320

Gómez MJ, Bueno MM, Lacorte S, Fernández-Alba A, and Agüera A. 2007. Pilot survey monitoring pharmaceuticals and related compounds in a sewage treatment plant located on the Mediterranean coast. *Chemosphere* 66:993-1002

Gómez MJ, Mezcua M, Martínez MJ, Fernández-Alba AR, and Agüera A. 2006. A new method for monitoring oestrogens, N-octylphenol, and bisphenol A in wastewater treatment plants by solid-phase extraction–gas chromatography–tandem mass spectrometry. *Int J Environ An Ch* 86:3-13

Gong J, Ran Y, Chen DY, and Yang Y. 2011. Occurrence of endocrine-disrupting chemicals in riverine sediments from the Pearl River Delta, China. *Mar Pollut Bull* 63:556-563

Gong Y, Tian H, Wang L, Yu S, and Ru S. 2014. An integrated approach combining chemical analysis and an in vivo bioassay to assess the estrogenic potency of a municipal solid waste landfill leachate in Qingdao. *PloS One* 9: e95597

Goodson A, Robin H, Summerfield W, and Cooper I. 2004. Migration of bisphenol A from can coatings—effects of damage, storage conditions and heating. *Food Addit Contam* 21:1015-1026

Gorga M, Petrovic M, and Barceló D. 2013. Multi-residue analytical method for the determination of endocrine disruptors and related compounds in river and waste water using dual column liquid chromatography switching system coupled to mass spectrometry. *J Chromatogr A* 1295: 57-66

Guerranti C, Baini M, Casini S, Focardi SE, Giannetti M, Mansuciu C, Marsili L, Perra G, and Fossi MC. 2014. Pilot study on levels of chemical contaminants and porphyrins in Caretta caretta from the Mediterranean Sea. *Mar Environ Res* 100:33-37

Gust M, Gagne F, Berlioz-Barbier A, Besse JP, Buronfosse T, Tournier M, Tutundjian R, Garric J, and Cren-Olive C. 2014. Caged mudsnail *Potamopyrgus antipodarum* (Gray) as an integrated field biomonitoring tool: Exposure assessment and reprotoxic effects of water column contamination. *Water Res* 54:222-236

Gyllenhammar I, Glynn A, Darnerud PO, Lignell S, van Delft R, and Aune M. 2012. 4-Nonylphenol and bisphenol A in Swedish food and exposure in Swedish nursing women. *Environ Int* 43: 21-28

Hando R, Abo M, and Okubo A. 2003. Determination of alkylphenols and bisphenol A in sea environment by GC/MS. *Bunseki Kagaku* 52:695-699

Hashimoto S, Horiuchi A, Yoshimoto T, Nakao M, Omura H, Kato Y, Tanaka H, Kannan K, and Giesy JP. 2005. Horizontal and vertical
distribution of estrogenic activities in sediments and waters from Tokyo Bay, Japan. *Arch Environ Cont Tox* 48:209-216

Hayashi O, Kameshiro M, Masuda M, and Satoh K. 2008. Bioaccumulation and Metabolism of C-14 Bisphenol A in the Brackish Water Bivalve Corbicula japonica. *Biosci Biotech Biochem* 72: 3219-3224

Hayashi TI and Kashiwagi N. 2011. A Bayesian approach to probabilistic ecological risk assessment: risk comparison of nine toxic substances in Tokyo surface waters. *Environ Sci Pollut R* 18: 365-375

He Y, Miao M, Wu C, Yuan W, Gao E, Zhou Z, and Li DK. 2009. Occupational exposure levels of bisphenol A among Chinese workers. *J Occup Health* 51:432-436

He YH, Miao MH, Herrington LJ, Wu CH, Yuan W, Zhou ZJ, and Li DK. 2009. Bisphenol A levels in blood and urine in a Chinese population and the personal factors affecting the levels. *Environ Res* 109:629-633

Hedlund B, Rodhe J, Arner M, Forsberg J, Taaler M, Forsgren A, and Eriksson M. 2006. Screeninguppdrag in nationell miljöovervakning. Screening av: Bisfenol A. NV Diarienr. 721-1173-03 Mn, WSP 10033045, 35 pp.

Heemken OP, Reincke H, Stachel R, and Theobald N. 2001. The occurrence of xenoestrogens in the Elbe River and the North Sea. *Chemosphere* 45:245-259

Hegemann W and Busch K. 2000. Untersuchungen zum Abbau Endokrin wirksamer Substanzen in Kläranlagen, Chemische Stressfaktoren in Aquatischen Systemen, Symposium, April 13-14, Berlin, Wasseraufvbung e.V., pp 198-208

Hegemann W, Busch K, Spengler P, and Metzger J. 2002. Einfluss der Verfahrenstechnik auf die Eliminierung ausgewählter Estrogene und Xenoestrogene in Kläranlagen—ein BMBF Verbundprojekt. *GWF Wasser Abwasser* 143:422-428

Heim S, Schwarzbauer J, and Littke R. 2004. Monitoring of waste deposit derived groundwater contamination with organic tracers. *Environ Chem Lett* 2:21-25

Heinonen J, Honkanen J, Kukkonen JVK, and Holopainen J. 2002. Bisphenol A accumulation in the freshwater clam *Pisidium amnicum* at low temperatures. *Arch Environ Contam Toxicol* 43:50-55

Heisterkamp I, Gandrass J, and Ruck W. 2004. Bioassay-directed chemical analysis utilizing LC–MS: a tool for identifying estrogenic compounds in water samples? *Anal Bioanal Chem* 378: 709-715

Hernando M, Mezcua M, Gómez M, Malato O, Agüera A, and Fernández-Alba A. 2004. Comparative study of analytical methods involving gas chromatography–mass spectrometry after derivatization and gas chromatography–tandem mass spectrometry for the determination of selected endocrine disrupting compounds in wastewaters. *J Chromatogr A* 1047:129-135

Herrero-Hernández E, Rodríguez-Gonzalo E, Andradas MS, Sánchez-González S, and Carabias-Martínez R. 2013. Occurrence of phenols and phenoxyacid herbicides in environmental waters using an imprinted polymer as a selective sorbent. *Sci Total Environ* 454: 299-306

Hiroi H, Tsutsumi O, Takeuchi T, Momoeda M, Ikezuki Y, Okamura A, Yokota H, and Taketani Y. 2004. Differences in serum Bisphenol A concentrations in premenopausal normal women and women with endometrial hyperplasia. *Endocrine J* 51: 595-600

Hoeckstra EJ and Simoneau C. 2013. Release of bisphenol A from polycarbonate: a review. *Crit Rev Food Sci Nutr* 53:386-402

Hohenblum P, Steinbichl P, Raffesberg W, Weiss S, Moche W, Volland B, Scharf S, Haluza D, Moshammer H, Kundi M, Piegl B, Wallner P, and Hutter HP. 2012. Pollution gets personal! A first population-based human biomonitoring study in Austria. *Int J Hym Environ Heal* 215:176-179

Höhne C and Püttmann W. 2008. Occurrence and temporal variations of the xenoestrogens bisphenol A, 4-tert-octylphenol, and tech. 4-nonylphenol in two German wastewater treatment plants. *Environ Sci Pollut R* 15: 405-416

Holmes M, Kumar A, Shareef A, Doan H, Stuetz R, and Kookana R. 2010. Fate of indicator endocrine disrupting chemicals in sewage during treatment and polishing for non-potable reuse. *Water Sci Technol* 62:14-16-1423

Honkanen JO and Kukkonen JVK. 2006. Environmental temperature changes uptake rate and bioconcentration factors of bisphenol A in tadpoles of Rana Temporaria. *Environ Toxicol Chem* 25: 2804-2808

Honkanen JO, Heinonen J, and Kukkonen JVK. 2001. Toxicokinetics of waterborne bisphenol a in landlocked salmon (*Salmo salar* m. Sebago) eggs at various temperatures. *Environ Toxicol Chem* 20: 2296-2302

Hormann AM, Vom Saal FS, Nagel SC, Stahlhut RW, Moyer CL, Ellersieck MR, Welshons WV, Toutain PL, and Taylor JA. 2014. Holding thermal receipt paper and eating food after using hand sanitizer results in high serum bioactive and urine total levels of bisphenol A (BPA). *PLoS One* 9: e110509

Houtman CJ, van Oostveen AM, Brouwer A, Lamoree MH, and Legler J. 2004. Identification of Estrogenic Compounds in Fish Bile Using Bioassay-Directed Fractionation. *Environ Sci Technol* 38:6415-6423

Howdeshell KL, Peterman PH, Judy BM, Taylor JA, Orazio CE, Ruhlen RL, vom Saal FS, and Welshons WV. 2003. Bisphenol A is released from used polycarbonate animal cages into water at room temperature. *Environ Health Persp* 111:1180-1187

Huang B, Li X, Sun W, Ren D, Li X, Li X, Liu Y, Li Q, and Pan X. 2014b. Occurrence, removal, and fate of progestogens, androgens, estrogens, and phenols in six sewage treatment plants around Diaochi Lake in China. *Environ Sci Pollut Res* 21:12898-12908

Huang DY, Zhao HQ, Liu CP, and Sun CX. 2014a. Characteristics, sources, and transport of tetrabromobisphenol A and bisphenol A in soils from a typical e-waste recycling area in South China. *Environ Sci Pollut R* 21:5818-5826

Huang QY, Wong CKC, Zheng JS, Bouwman H, Barra R, Wahlström B, Neretin L, and Wong MH. 2012. Bisphenol A (BPA) in China: A review of sources, environmental levels, and potential human health impacts. *Environ Int* 42:91-99

Huerta B, Jakimska A, Llorca M, Ruhi A, Margoutidis G, Acuna V, Sabater S, Rodriguez-Mozaz S, and Barcelo D. 2015. Development of an extraction and purification method for the determination of...
multi-class pharmaceuticals and endocrine disruptors in freshwater invertebrates. *Talanta* 132:373-381

Ikezuki Y, Tsutsumi O, Takai Y, Kamei Y, and Taketani Y. 2002. Determination of bisphenol A concentrations in human biological fluids reveals significant early prenatal exposure. *Hum Reprod* 17: 2839-2841

Inoue K, Kato K, Yoshimura Y, Makino T, and Nakazawa H. 2000. Determination of bisphenol A in human serum by high-performance liquid chromatography with multi-electrode electrochemical detection. *J Chromatogr B* 749:17-23

Inoue K, Yamaguchi A, Wada M, Yoshimura Y, Makino T, and Nakazawa H. 2001. Quantitative detection of bisphenol A and bisphenol A diglycidyl ether metabolites in human plasma by liquid chromatography-electrospray mass spectrometry. *J Chromatogr B* 765:121-126

Iparaguirre A, Navarro P, Prieto A, Rodil R, Olivares M, Fernández LÁ, and Zuloaga O. 2012. Membrane-assisted solvent extraction coupled to large volume injection–gas chromatography–mass spectrometry for the determination of a variety of endocrine disrupting compounds in environmental water samples. *Anal Bioanal Chem* 402:2897-2907

Ishihara K and Nakajima N. 2003. Improvement of marine environmental pollution using eco-system: decomposition and recovery of endocrine disrupting chemicals by marine phyto-and zooplanktons. *J Mol Catal B* 23: 419-424

Jackson J and Sutton R. 2008. Sources of endocrine-disrupting chemicals in urban wastewater, Oakland, CA. *Sci Total Environ* 405: 153-160

Jafari A, Abasabad RP, and Salehzadeh A. 2009. Endocrine disrupting contaminants in water resources and sewage in Hamadan City of Iran. *Iran J Environ Health Sci Eng* 73:254-269

Jakimska A, Huerta B, Barganska Z, Kot-Wasik A, Rodriguez-Mozaz S, and Barcelo D. 2013. Development of a liquid chromatography–tandem mass spectrometry procedure for determination of endocrine disrupting compounds in fish from Mediterranean rivers. *J Chromatogr A* 1306:44-58

James SV, Valenti TW, Roelke DL, Grover JP, and Brooks BW. 2011. Probabilistic ecological hazard assessment of microcystin-LR allelopathy to Prymnesium parvum. *J Plank Res* 33: 319-332

Jardim WF, Montagner CC, Pescara IC, Umbuzeiro GA, Bergamasco AMDD, Eldridge ML, and Sodré FF. 2012. An integrated approach to evaluate emerging contaminants in drinking water. *Sep Purif Technol* 84:3-8

Jeanrot R, Sabik H, Sauvart E, Dagnac T, and Dohrendorf K. 2002. Determination of endocrine-disrupting compounds in environmental samples using gas and liquid chromatography with mass spectrometry. *J Chromatogr A* 974:143-159

Ji MK, Kabra AN, Choi J, Hwang JH, Kim JR, Abou-Shanab RA, Oh YK, and Jeon BH. 2014. Biodegradation of bisphenol A by the freshwater microalgaes *Chlamydomonas mexicana* and *Chlorella vulgaris*. *Ecol Eng* 73:260-269

Jin S, Yang F, Liao T, Hui Y, and Xu Y. 2008. Seasonal variations of estrogenic compounds and their estrogenicities in influent and effluent from a municipal sewage treatment plant in China. *Environ Toxicol Chem* 27:146-153

Jin S, Yang F, Xu Y, Dai H, and Liu W. 2013. Risk assessment of xenoestrogens in a typical domestic sewage-holding lake in China. *Chemosphere* 93: 892-898

Jin X, Jiang G, Huang G, Liu J, and Zhou Q. 2004a. Determination of 4-tert-octylphenol, 4-nonylphenol and bisphenol A in surface waters from the Haihe River in Tianjin by gas chromatography–mass spectrometry with selected ion monitoring. *Chemosphere* 56: 1113-1119

Jin X, Huang G, Jiang G, Zhou Q, and Liu J. 2004b. Simultaneous determination of 4-tert-octylphenol, 4-nonylphenol and bisphenol A in Guanting Reservoir using gas chromatography-mass spectrometry with selected ion monitoring. *J Environ Sci* 16:825-828

Johnson A and Jurgens M. 2003. Endocrine active industrial chemicals: release and occurrence in the environment. *Pure Appl Chem* 75:1895-1904

Jonkers N, Kohler HPE, Dammshläuser A, andiger W. 2009. Mass flows of endocrine disruptors in the Glatt River during varying weather conditions. *Environ Pollut* 157:714-723

Jonkers N, Sousa A, Galante-Oliveira S, Barroso CM, Kohler HPE, and Giger W. 2010. Occurrence and sources of selected phenolic endocrine disruptors in Ria de Aveiro, Portugal. *Environ Sci Pollut R* 17:834-843

Joskow R, Barr DB, Barr JR, Calafat AM, Needham LL, and Rubin C. 2006. Exposure to bisphenol A from bis-glycidyl dimethacrylate-based dental sealants. *J Amer Dental Assoc* 137:353-362

Jun D, Xiang Li L, and Rui Li J. 2009. Bisphenol A pollution of surface water and its environmental factors. *J Ecol Rural Environ* 25:94-97

Kaddar N, Bendridi N, Harthe C, de Ravel MR, Bienvenu AL, Cuilleron CY, Mappus E, Pugeat M, and Dechaud H. 2009. Development of a radioimmunoassay for the measurement of Bisphenol A in biological samples. *Anal Chim Acta* 645:1-4

Kang J and Kondo F. 2006. Bisphenol A in the surface water and freshwater snail collected from rivers around a secure landfill. *B Environ Contam Tox* 76:113-118

Kang JH, Aastad A, and Katayama Y. 2007. Bisphenol A in the aquatic environment and its endocrine-disruptive effects on aquatic organisms. *CRC Cr Rev Toxicol* 37:607-625

Kang JH, Kito K, and Kondo F. 2003. Factors influencing the migration of bisphenol A from cans. *J Food Prot* 66:1444-1447

Kanga JH, Kondo F, and Katayama Y. 2006. Human exposure to bisphenol A. *Toxicology* 226:79-89

Kawaguchi M, Sakui N, Okanouchi N, Ito R, Sai T, Izumi SI, Makino T, and Nakazawa H. 2005. Stir bar sorptive extraction with in situ derivatization and thermal desorption-gas chromatography-mass spectrometry for measurement of phenolic xenoestrogens in human urine samples. *J Chromatogr B* 820:49-57

Kawahata H, Ohta H, Inoue M, and Suzuki A. 2004. Endocrine disrupter nonylphenol and bisphenol A contamination in Okinawa and Ishigaki Islands, Japan–within coral reefs and adjacent river mouths. *Chemosphere* 55:1519-1527

Kelly C, Langford K, Mellor P, and Rowland S. 2006. Preliminary investigations of bisphenol-A in marine sediments. Extract of Report to DEFRA on OSPAR Priority Substances.

Khim JS, Kannan K, Villeneuve DL, Koh CH, and Giesy JP. 1999. Characterization and distribution of trace organic contaminants in
Klecˇka GM, Gonsior SJ, West RJ, Goodwin PA, and Markham DA. 2001. Biodegradation of bisphenol a in aquatic environments: River die-away. Environ Toxicol Chem 20:2725-2735

Klecˇka GM, Staples CA, Clark KE, van der Hoeven N, Thomas DE, and Hentges SG. 2014. Exposure analysis of bisphenol A in surface water systems in North America and Europe. Environ Sci Technol 48:6145-6150

Ko EJ, Kim KW, Kang SY, Kim SD, Bang SB, Hamm SY, and Kim DW. 2007. Monitoring of environmental phenolic endocrine disrupting compounds in treatment effluents and river waters, Korea. Talanta 73:674-683

Koch HM, Kolossa-Gehring M, Schroeter-Kermani C, Angerer J, and Bruening T. 2012. Bisphenol A in 24 h urine and plasma samples of the German Environmental Specimen Bank from 1995 to 2009: A retrospective exposure evaluation. J Expo Sci Env Epidemiol 22: 610-616

Koh CH, Khim JS, Villeneuve DL, Kannan K, and Giese JP. 2006. Characterization of trace organic contaminants in marine sediment from Yeongil Bay, Korea: 1. Instrumental analyses. Environ Pollut 142:39-47

Kolpin DW, Furlong ET, Meyer MT, Thurman EM, Zaug SD, Barber LB, and Buxton HT. 2002. Pharmaceuticals, hormones, and other organic wastewater contaminants in U.S. streams, 1999-2000: A national reconnaissance. Environ Sci Technol 36:1202-1211

Körner W, Bolz U, Süßmuth W, Hiller G, Schuller W, Hanf V, and Hagenmaier H. 2000. Input/output balance of estrogenic active compounds in a major municipal sewage plant in Germany. Chemosphere 40:1131-1142

Kotowska U, Kapelew ska J, and Stur gulewska J. 2014. Determination of phenols and pharmaceuticals in municipal wastewaters from Polish treatment plants by ultrasound-assisted emulsification–microextraction followed by GC–MS. Environ Sci Pollut R 21: 660-673

Kovalova L, Knappe DR, Lehnberg K, Kazner C, and Hollender J. 2013. Removal of highly polar micropollutants from wastewater by powdered activated carbon. Environ Sci Pollut R 20: 3607-3615

Kubwabo C, Kosarac I, Stewart B, Gauthier BR, Lalonde K, and Lalonde PJ. 2009. Migration of bisphenol A from plastic baby bottles, baby bottle liners and reusable polycarbonate drinking bottles. Food Addit Contam Part A Chem Anal Control Expo Risk Assess 26:928-937

Kuch HM and Ballschmiter K. 2001. Determination of endocrine-disrupting phenolic compounds and estrogens in surface and drinking water by HRGC-(NCI)-MS in the picogram per liter range. Environ Sci Technology 35:3201-3206

Kuroda N, Kinoshita Y, Sun Y, Wada M, Kishikawa N, Nakashima K, Makino T, and Nakazawa H. 2003. Measurement of bisphenol A levels in human blood serum and ascitic fluid by HPLC using a fluorescent labeling reagent. J Pharmaceut Biomed 30:1743-1749

Kuruto-Niwa R, Tateoka Y, Usuki Y, and Nozawa R. 2007. Measurement of bisphenol A concentrations in human colostrum. Chemosphere 66:1160-1164

Lagarà A, Bacaloni A, De Leva I, Faberi A, Fago G, and Marino A. 2004. Analytical methodologies for determining the occurrence of endocrine disrupting chemicals in sewage treatment plants and natural waters. Anal Chim Acta 501:79-88

Langdon KA, Warne MSJ, Smernick RJ, Shareef A, and Kookana RS. 2012. Field dissipation of 4-nonylphenol, 4-teroctylphenol, triflosan and bisphenol A following land application of biosolids. Chemosphere 86:1050-1058

Langdon KA, Warne MSJ, Smernick RJ, Shareef A, and Kookana RS. 2011. Degradation of 4-nonylphenol, 4-terocylphenol, bisphenol A and triclosan following biosolids addition to soil under laboratory conditions. Chemosphere 84:1556-1562

Larsson DGJ, Adolfs son-Erici M, Parkkonen J, Pettersson M, Berg AH, Olsson PE, and Forlin L. 1999. Ethinyleoestradiol — an undesired fish contraceptive? Aquat Toxicol 45:91-97

Lassen TH, Frederiksen H, Jensen TK, Petersen JH, Joensen UN, Main KM, Skakkebaek NE, Juul A, Jorgensen N, and Andersson AM. 2014. Urinary Bisphenol A Levels in Young Men: Association with Reproductive Hormones and Semen Quality. Environ Health Persp 122:478-484

Latorre A, Lacorte S, and Barceló D. 2003. Presence of nonylphenol, octylphenol and bisphenol A in two aquifers close to agricultural, industrial and urban areas. Chromatographia 57:111-116
Le HH, Carlson EM, Chua JP, and Belcher SM. 2008. Bisphenol A is released from polycarbonate drinking bottles and mimics the neurotoxic actions of estrogen in developing cerebellar neurons. *Toxicol Lett* 176:149-156
Lee S, Liao C, Song GJ, Ra K, Kannan K, and Moon HB. 2015a. Emission of bisphenol analogues including bisphenol A and bisphenol F from wastewater treatment plants in Korea. *Chemosphere* 119:1000-1006
Lee CC, Jiang LY, Kuo YL, Chen CY, Hsieh CY, Hung CF, and Tien CJ. 2015b. Characteristics of nonylphenol and bisphenol A accumulation by fish and implications for ecological and human health. *Sci Total Environ* 502:417-425
Lee CC, Jiang LY, Kuo YL, Hsieh CY, Chen CS, and Tien CJ. 2013. The potential role of water quality parameters on occurrence of nonylphenol and bisphenol A and identification of their discharge sources in the river ecosystems. *Chemosphere* 91:904-911
Lee JH, Cho C, Kim HY, and Cho HS. 2010. Characteristics of biocconversion and deourination of endocrine disruption chemicals in the flounder, *Paralichthys olivaceus*, under flow-through system. *Toxicol Environ Health Sci* 2:221-230
Lee YJ, Ryu HY, Kim HY, Min CS, Lee JH, Kim E, Nam BH, Park JH, Jung JY, Jang DD, Park EY, Lee KH, Ma JY, Won HS, Im MW, Leem JH, Hong YC, and Yoon HS. 2008. Maternal and fetal exposure to bisphenol A in Korea. *Reprod Toxicol* 25:413-419
Lee HB, Peart TE, and Svoboda ML. 2005a. Determination of endocrine-disrupting phenols, acidic pharmaceuticals, and personal-care products in sewage by solid-phase extraction and gas chromatography–mass spectrometry. *J Chromatogr A* 1094:122-129
Lee KE, Sanocki CA, and Montz GR. 2005b. Physical, Chemical, and Biological Characteristics of Sturgeon Lake, Goodhue County, Minnesota, 2003-2004. Scientific Investigations Report 2005-5182. US Department of the Interior and US Geological Survey.
Lee CJ, Mau DP, and Rasmussen TJ. 2005c. Effects of nonpoint and selected point contaminant sources on stream-water quality and relation to land use in Johnson County, Northeastern Kansas, October 2002 through June 2004. Scientific Investigations Report 2005-5144. US Department of the Interior and US Geological Survey.
Lee HB, Peart TE, Chan J, and Gris G. 2004a. Occurrence of endocrine-disrupting chemicals in sewage and sludge samples in Toronto, Canada. *Water Qual Res J Canada* 39:57-63
Lee HC, Soyoano K, Ishimatsu A, Nagae M, Kohra S, Ishibashi Y, Arizono K, and Takao Y. 2004b. Bisphenol A and nonylphenol biocconversion in spotted halibut, *Vraspar variegates*. *Fisheries Sci* 70:192-194
Lee HB and Peart TE. 2002. Organic contaminants in Canadian municipal sewage sludge. Part I. Toxic or endocrine-disrupting phenolic compounds. *Water Qual Res J Canada* 37:681-696
Lee HB and Peart TE. 2000a. Bisphenol A contamination in Canadian municipal and industrial wastewater and sludge samples. *Water Qual Res J Canada* 35:283-298
Lee HB and Peart TE. 2000b. Determination of Bisphenol A in sewage effluent and sludge by solid-phase and supercritical fluid extraction and gas chromatography/mass spectrometry. *J AOAC Int* 83:290-297
Lei BL, Luo JP, Zha JM, Huang SB, Liu C, and Wang ZJ. 2008. Distribution of nonylphenols and bisphenol-A in the sediments of Wenyuhe River. *Environ Chem* 27:314-317
Leusch FD, Chapman HF, van den Heuvel MR, Tan BL, Gooneratne SR, and Tremblay LA. 2006. Bioassay-derived androgenic and estrogenic activity in municipal sewage in Australia and New Zealand. *Ecotox Environ Safe* 65:403-411
Li J, Fu J, Zhang H, Li Z, Ma Y, Wu M, and Liu X. 2013a. Spatial and seasonal variations of occurrences and concentrations of endocrine disrupting chemicals in unconfined and confined aquifers recharged by reclaimed water: A field study along the Chaobai River, Beijing. *Sci Total Environ* 450:162-168
Li Z, Gibson M, Liu C, and Hu H. 2013b. Seasonal variation of nonylphenol concentrations and fluxes with influence of flooding in the Daliao River Estuary, China. *Environ Monitor Assess* 185:5221-5230
Li DK, Zhou Z, Miao M, He Y, Wang J, Ferber J, Herrinton LJ, Gao E, and Yuan W. 2011. Urine bisphenol-A (BPA) level in relation to semen quality. *Fertil Steril* 95:625-630 e621-624
Li R, Chen GZ, Tam NFY, Luan TG, Shin PKS, Cheung SG, and Liu Y. 2009. Toxicity of bisphenol A and its bioaccumulation and removal by a marine microalga Stephanodiscus hantzschii. *Ecotox Environ Safe* 72:321-328
Li T, Li X, Chen J, Zhang G, and Wang H. 2007. Treatment of landfill leachate by electrochemical oxidation and anaerobic process. *Water Environ Res* 79:514-520
Li D, Dong M, Shim WJ, Hong SH, Oh JR, Yim UH, and Cho SR. 2005. Seasonal and spatial distribution of nonylphenol and IBP in Saemangeum Bay, Korea. *Mar Pollut Bull* 51:966-974
Li Z, Li D, Oh JR, and Je JG. 2004. Seasonal and spatial distribution of nonylphenol in Shihwa Lake, Korea. *Chemosphere* 56:611-618
Liang L, Zhang J, Feng P, Li C, Huang Y, Dong B, ... Guan X. 2014. Occurrence of bisphenol A in surface and drinking waters and its physicochemical removal technologies. *FESE* 9:16-38
Liao C and Kannan K. 2011. Widespread occurrence of bisphenol A in paper and paper products: implications for human exposure. *Environ Sci Technol* 45:9372-9379
Liao C and Kannan K. 2012. Determination of Free and Conjugated Forms of Bisphenol A in Human Urine and Serum by Liquid Chromatography-Tandem Mass Spectrometry. *Environ Sci Technol* 46:5003-5009
Liedtke A, Schoenenberger R, Eggen RIL, and Suter MJF. 2009. Internal exposure of whitefish (Coregonus lavaretus) to estrogens. *Aquat Toxicol* 93:158-165
Limam I, Guenne A, Driss MR, and Mazéas L. 2010. Simultaneous determination of phenol, methylphenols, chlorophenols and bisphenol-A by headspace solid-phase microextraction-gas chromatography-mass spectrometry in water samples and industrial effluents. *Int J Environ An Ch* 90:230-244
Lin PH. 2001. Study on the estrogenic active substances in the environment. Study report (EPA-90-E3S5-02-01) submitted to the Taiwan Environmental Protection Administration, Taipei, Taiwan.
Lindholm C, Pedersen KL, and Pedersen SN. 2000. Estrogenic response of bisphenol A in rainbow trout (Oncorhynchus mykiss). *Aquat Toxicol* 48:87-94
Lindholm C, Pedersen SN, and Bjerregaard P. 2001. Uptake, metabolism and excretion of bisphenol A in the rainbow trout (*Oncorhynchus mykiss*). *Aquat Toxicol* 55: 75-84

Lindholm C, Wynne P, Marriott P, Pedersen S, and Bjerregaard P. 2003. Metabolism of bisphenol A in zebrafish (*Danio rerio*) and rainbow trout (*Oncorhynchus mykiss*) in relation to estrogenic response. *Comp Biochem Phys C* 135:169-177

Liu HH, Xu YJ, Deng XX, Gong XH, Song XK, Zhang HJ, Tian XH, and Zhang XZ. 2013. Survey of Bisphenol A contamination in Laizhou Bay. *Prog Fishery Sci* 34:16-20

Liu J, Wang R, Huang B, Lin C, Wang Y, and Pan X. 2011. Distribution and bioaccumulation of steroidal and phenolic endocrine disrupting chemicals in wild fish species from Dianchi Lake, China. *Environ Pollut* 159:2815-2822

Liu Y, Guan Y, Gao Q, Tam NFY, and Zhu W. 2010. Cellular responses, biodegradation and bioaccumulation of endocrine disrupting chemicals in marine diatom *Navicula incerta*. *Chemosphere* 80:592-599

Liu M, Hashi Y, Pan F, Yao J, Song G, and Lin JM. 2006. Automated on-line liquid chromatography–photodiode array–mass spectrometer method with dilution line for the determination of bisphenol A and 4-octylphenol in serum. *J Chromatogr A* 1133:142-148

Liu ZS, Wolff MS, and Moline J. 2005. Analysis of environmental biomarkers in urine using an electrochemical detector. *J Chromatogr B* 819:155-159

Liu R, Zhou JL, and Wilding A. 2004. Microwave-assisted extraction followed by gas chromatography–mass spectrometry for the determination of endocrine disrupting chemicals in river sediments. *J Chromatogr A* 1038:19-26

Loganathan SN and Kannan K. 2011. Occurrence of bisphenol A in indoor dust from two locations in the eastern United States and implications for human exposures. *Arch Environ Contam Toxicol* 61:68-73

Loos R, Hanke G, and Eisenreich SJ. 2003. Multi-component analysis of polar water pollutants using sequential solid-phase extraction followed by LC-ESI-MS. *J Environ Monitor* 5:384-394

Loos R, Hanke G, Umlauf G, and Eisenreich SJ. 2007. LC–MS–MS analysis and occurrence of octyl- and nonylphenol, their ethoxylates and their carboxylates in Belgian and Italian textile industry, waste water treatment plant effluents and surface waters. *Chemosphere* 66:690-699

Lv M, Sun Q, Hu A, Hou L, Li J, Cai X, and Yu CP. 2014. Pharmaceuticals and personal care products in a mesoscale subtropical watershed and their application as sewage markers. *J Hazard Mater* 280:696-705

Mahalingaiah S, Meeker JD, Pearson KR, Calafat AM, Ye X, Petrozza J, and Hauser R. 2008. Temporal variability and predictors of urinary bisphenol A concentrations in men and women. *Environ Health Persp* 116:173-178

Makris K and Snyder S. 2010. Screening of pharmaceuticals and endocrine disrupting compounds in water supplies of Cyprus. *Water Sci Technol* 62:2720-2728

Mao LH, Sun CJ, Zhang H, Li YX, and Wu DS. 2004. Determination of environmental estrogens in human urine by high performance liquid chromatography after fluorescent derivatization with p-nitrobenzoyl chloride. *Anal Chim Acta* 522:241-246

Markman S, Guschina IA, Barnsley S, Buchanan KL, Pascoe D, and Müller CT. 2007. Endocrine disrupting chemicals accumulate in earthworms exposed to sewage effluent. *Chemosphere* 70:119-125

Markham DA, McNett DA, Birk JH, Klecka GM, Bartels MJ, and Staples CA. 1998. Quantitative determination of bisphenol-A in river water by cool on-column injection-gas chromatography–mass spectrometry. *Int J Environ An Ch* 69:83-98

Martin J, Camacho-Muñoz D, Santos JL, Aparicio I, and Alonso E. 2014. Determination of emerging and priority industrial pollutants in surface water and wastewater by liquid chromatography–nega-tive electrospray ionization tandem mass spectrometry. *Anal Bioanal Chem* 406:3709-3716

Martin M, Bajet D, Woods J, Dills R, and Poulsen E. 2005. Detection of dental composite and sealant resin components in urine. *Oral Surg Oral Med O* 99:429

Martínez C, Ramírez N, Gómez V, Pocurull E, and Borrell F. 2013. Simultaneous determination of 76 micropollutants in water samples by headspace solid phase microextraction and gas chromatography–mass spectrometry. *Talanta* 116:937-945

Matsumoto H, Adachi S, and Suzuki Y. 2005. Bisphenol A in ambient air particulates responsible for the proliferation of MCF-7 human breast cancer cells and its concentration changes over 6 months. *Arch Environ Con Tox* 48:459-466

Mauricio R, Diniz M, Petrovic M, Amaral L, Peres I, Barcelo D, and Santana F. 2006. A characterization of selected endocrine disruptor compounds in a Portuguese wastewater treatment plant. *Environ Monitor Assess* 118:75-87

Meeker JD, Calafat AM, and Hauser R. 2010. Urinary Bisphenol A Concentrations in Relation to Serum Thyroid and Reproductive Hormone Levels in Men from an Infertility Clinic. *Environ Sci Technol* 44:1458-1463

Meesters RJW and Schroder HF. 2002. Simultaneous determination of 4-nonylphenol and bisphenol A in sewage sludge. 74: 3566-3574

Melo SM and Brito NM. 2014. Analysis and occurrence of endocrine disruptors in Brazilian water by HPLC-fluorescence detection. *Water Air Soil Poll* 225:1-7

Melzer D, Gates P, Osborn NJ, Henley WE, Cipelli R, Young A, Money C, McCormack P, Schofield P, Mosedale D, Grainger D, and Galloway TS. 2012a. Urinary Bisphenol A Concentration and Angiography-Defined Coronary Artery Stenosis. *PloS ONE* 7(8): e43378. doi:10.1371/journal.pone.0043378

Melzer D, Osborne NJ, Henley WE, Cipelli R, Young A, Money C, McCormack P, Ruben R, Khaw KT, Wareham NJ, and Galloway TS. 2012b. Urinary bisphenol A concentration and risk of future coronary artery disease in apparently healthy men and women. *Circulation* 125:1482-1490

Meylan WM, Howard PH, Boethling RS, Aronson D, Printup H, and Melzer D. 2011. Urinary bisphenol A concentration and risk of future coronary artery disease in apparently healthy men and women. *Circulation* 125:1482-1490

Meylan WM, Howard PH, Boethling RS, Aronson D, Printup H, and Gouchie S. 1999. Improved method for estimating bioconcentration/bioaccumulation factor from octanol/water partition coefficient. *Environ Toxicol Chem* 18:664-672

Michalowicz J. 2014. Bisphenol A–sources, toxicity and biotransformation. *Environ Toxicol Pharmacol* 37:738-758

Miege C, Peretti A, Labadie P, Budzinski H, Le Bizec B, Vorkamp K, Tronczynski J, Persat H, Coquery M, and Babut M. 2012. Occurrence of priority and emerging organic compounds in fishes from the Rhone River (France). *Anal Bioanal Chem* 404:2721-2735
Miege, C.; Budzinski, H.; Jacquet, R.; Soulier, C.; Pelte, T.; and Coquery, M. 2011. L’échantillonnage intégratif par Pocis-Application pour la surveillance des micropolluants organiques dans les eaux résiduaires traitées et les eaux de surface. *Tech Sci Meth* 1:280-94

Migeot, V.; Dupuis, A.; Cariot, A.; Albouy-Llaty, M.; Pierre, F.; and Rabouan, S. 2013. Bisphenol A and Its Chlorinated Derivatives in Human Colostrum. *Environ Sci Technol* 47:13791-13797

Milic, N.; Spanik, I.; Radonic, J.; Sekulic, MT.; Grujc, N.; Vvyiurksa, O.; . . . Miloradov, MV. 2014. Screening analyses of wastewater and Danube surface water in Novi Sad locality, Serbia. *Fresen Environ Bull* 23:372-377

Minarik, TA.; Vick, JA.; Schultz, MM.; Bartell, SE.; Martinovic-Weigelt, D.; Rearick, DC.; and Schoenfuss, HL. 2014. On-Site Exposure to Treated Wastewater Effluent Has Subtle Effects on Male Fathead Minnows and Pronounced Effects on Carp. *JAWRA* 50:358-375

Mita, L.; Bianco, M.; Viggiano, E.; Zollo, F.; Bencivenga, U.; Sica, V.; Monaco, G.; Portaccio, M.; Diano, N.; Colonna, A.; Lepore, M.; Canciglia, P.; and Mita, DG. 2011. Bisphenol A content in fish caught in two different sites of the Tyrrhenian Sea (Italy). *Chemosphere* 82: 405-410

Möder, M.; Braun, P.; Lange, F.; Schrader, S.; and Lorenz, W. 2007. Determination of Endocrine Disrupting Compounds and Acidic Drugs in Water by Coupling of Derivatization, Gas Chromatography and Negative-Chemical Ionization Mass Spectrometry. *CLEAN–Soil, Air, Water* 35:444-451

Mohapatra, DP.; Brar, SK.; Tyagi, RD.; and Surampalli, RY. 2011. Occurrence of bisphenol A in wastewater and wastewater sludge of CUQ treatment plant. *J Xenobiotics* 1:9-16

Montagner, CC.; and Jardim, WF. 2011. Spatial and seasonal variations of pharmaceuticals and endocrine disruptors in the Atibaia River, São Paulo State (Brazil). *J Brazilian Chem Soc* 22:1452-1462

Moors, S.; Blaszkewicz, M.; Bolt, HM.; and Degen, GH. 2007. Simultaneous determination of dайдzein, equol, genistein and bisphenol A in human urine by a fast and simple method using SPE and GC-MS. *Mol Nutr Food Res* 51:787-798

Moos, RK.; Anger, J.; Wittsiepe, J.; Wilhelm, M.; Bruening, T.; and Koch, HM. 2014. Rapid determination of nine parabens and seven other environmental phenols in urine samples of German children and adults. *Int J Hyg Environ 217*:845-853

Moral, A.; Sicilia, MD.; Rubio, S.; and Pérez-Bendito, D. 2005. Determination of bisphenol in sewage based on supramolecular solid-phase extraction/liquid chromatography/fluorimetry. *J Chromatogr A* 1100:8-14

Moraes-Munoz, S.; Luque-Garcia, JL.; Ramos, MJ.; Fernandez-Alba, A.; and Luque de Castro, MD. 2005. Sequential superheated liquid extraction of pesticides, pharmaceutical and personal care products with different polarity from marine sediments followed by gas chromatography mass spectrometry detection. *Anal Chim Acta* 552:50-59

Moreira, M.; Aquino, S.; Coutrim, M.; Silva, J.; and Afonso, R. 2011. Determination of endocrine-disrupting compounds in waters from Rio das Velhas, Brazil, by liquid chromatography/high resolution mass spectrometry (ESI-LC-IT-TOF/MS). *Environ Technol* 32: 1409-1417

Mortazavi, S.; Bakhtiari, A.; Sari, A.; Bahramifar, N.; and Rahbarizadeh, F. 2013. Occurrence of endocrine disruption chemicals (bisphenol A, 4-nonylphenol, and octylphenol) in muscle and liver of *Cyprinus carpio* common, from Anzali wetland, Iran. *B Environ Contam Tox* 90:578-584

Mortensen, ME.; Calafat, AM.; Ye, X.; Wong, LY.; Wright, DJ.; Pirkle, JL.; Merrill, LS.; and Moye, J. 2014. Urinary concentrations of environmental phenols in pregnant women in a pilot study of the National Children’s Study. *Environ Res* 129:32-38

Mössmer, S.; Kuch, B.; Spengler, P.; Willems, M.; Metzger, JW.; and Janke, HD. 2004. Untersuchungen zum Restgehalt an estrogene Wirksamen Substanzen im gereinigten Ablauf von zwei funktionell unterschiedlichen kommunalen Belebungsanlagen. Gas-und Wasserfach. *Wasser Abwasser* 145:251-262

Mulsolf, A.; Leschik, S.; Reinstorff, F.; Strauch, G.; and Schirmer, M. 2010. Micropollutant loads in the urban water cycle. *Environ Sci Technol* 44:4877-4883

Mulsolf, A.; Leschik, S.; Reinstorff, F.; Strauch, G.; Schirmer, M.; and Moder, M. 2007. Xenobiotika im Grundwasser und Oberflächenwasser der Stadt Leipzig. *Grundwasser* 12:217-231

Nahar, MS.; Liao, C.; Kannan, K.; and Dolinoy, DC. 2013. Fetal Liver Bisphenol A Concentrations and Biotransformation Gene Expression Reveal Variable Exposure and Altered Capacity for Metabolism in Humans. *J Biochem Mol Toxic* 27:116-123

Nakada, N.; Tanishita, T.; Shinohara, H.; Kiri, K.; and Takada, H. 2006. Pharmaceutical chemicals and endocrine disrupters in municipal wastewater in Tokyo and their removal during activated sludge treatment. *Water Res* 40:3297-3303

Nakada, N.; Nynouya, H.; Nakamura, M.; Hara, A.; Ichugi, T.; and Takada, H. 2004. Identification of estrogenic compounds in wastewater effluent. *Environ Toxicol Chem* 23:2807-2815

Nam, SW.; Jo, BI.; Yoon, Y.; and Zoh, KD. 2014. Occurrence and removal of selected micropollutants in a water treatment plant. *Chemosphere* 95:156-165

Neng, NR.; and Nogueira, JM. 2014. Determination of Phenol Compounds In Surface Water Matrices by Bar Adsorptive Microextraction-High Performance Liquid Chromatography-Diode Array Detection. *Molecules* 19:9369-9379

Nepomnaschy, PA.; Baird, DD.; Weinberg, CR.; Hoppin, JA.; Longnecker, MP.; and Wilcox, AJ. 2009. Within-person variability in urinary bisphenol A concentrations: Measurements from specimens after long-term frozen storage. *Environ Res* 109:734-737

Nichols, JW.; Du, B.; Berninger, JP.; Connors, KA.; Chambless, CK.; Erickson, R.; Hoffman, A.; and Brooks, BW. 2015. Observed and modeled effects of pH on bioconcentration of diphenhydramine, a weakly basic pharmaceutical, in fathead minnows. *Environ Toxicol Chem* 34: 1425-1435.

Nicolucci, C.; Rossi, S.; Menale, C.; del Giudice, EM.; Perrone, L.; Gallo, P.; Mita, DG.; and Diano, N. 2013. A high selective and sensitive liquid chromatography-tandem mass spectrometry method for quantification of BPA urinary levels in children. *Anal Bioanal Chem* 405:9139-9148

Nie, Y.; Qiang, Z.; Zhang, H.; and Ben, W. 2012. Fate and seasonal variation of endocrine-disrupting chemicals in a sewage treatment plant with A/A/O process. *Sep Purif Technol* 84:9-15

Ning, G.; Bi, Y.; Wang, T.; Xu, M.; Xu, Y.; Huang, Y.; Li, M.; Li, X.; Wang, W.; Chen, Y.; Wu, Y.; Hou, J.; Song, A.; Liu, Y.; and Lai, S. 2011. Relationship of Urinary Bisphenol A Concentration to Risk for Prevalent
Pongsuyoen SA, Lung WS, and Colosi LM. 2010. Determination of bisphenol-A and 4-nonylphenol in human milk using alkaline digestion and cleanup by solid-phase extraction. Anal Sci 16:1463-1466

Ouchi K and Watanabe S. 2002. Measurement of bisphenol A in human urine using liquid chromatography with multi-channel coulometric electrochemical detection. J Chromatogr B 780:365-370

Owens CV, Lambright C, Bobseine K, Ryan B, Earl Gray L Jr, Gullet BK, and Wilson VS. 2007. Identification of estrogenic compounds emitted from the combustion of computer printed circuit boards in electronic waste. Environ Sci Technol 41:8506-8511

Pacheco Ferreira A. 2013. Endocrine disruptors in sludge wastewater treatment plants: environmental complications. Acta Sci-Technol 35(2)

Padmanabhan V, Siefert K, Ransom S, Johnson T, Pinkerton J, Anderson L, Tao L, and Kannan K. 2008. Maternal bisphenol-A levels at birth. Environ Health Persp 116:1225-1231

Pettersson M, Hahlbek E, Katsiaiaki I, Asplund L, and Bengtsson BE. 2007. Survey of estrogenic and androgenic disruption in Swedish coastal waters by the analysis of bile fluid from perch and biomarkers in the three-spined stickleback. Mar Pollut Bull 54: 1868-1880

Pettersson M, Adolfsson-Erici M, Parkkonen J, Forlin L, and Asplund L. 2006. Fish bile used to detect estrogenic substances in treated sewage water. Sci Total Environ 366:174-186

Philippat C, Wolff MS, Calafat AM, Ye X, Bausell R, Meadows M, Stone J, Slama R, and Engel SM. 2013. Prenatal Exposure to Environmental Phenols: Concentrations in Amniotic Fluid and Variability in Urinary Concentrations during Pregnancy. Environ Health Persp 121:1225-1231

Philippat C, Mortamais M, Chevrier C, Petit C, Calafat AM, Ye X, Silva MI, Brambilla C, Pin I, and Charles M. 2012. Exposure to phthalates and phenols during pregnancy and offspring size at birth. Environ Health Persp 120:464-470

Pirard C, Sagot C, Deville M, Dubois N, and Charlier C. 2012. Urinary levels of bisphenol A, triclosan and 4-nonylphenol in a general Belgian population. Environ Int 48:78-83

Pojana G, Gomiero A, Jonkers N, and Marcomini A. 2007. Natural and synthetic endocrine disrupting compounds (EDCs) in water, sediment and biota of a coastal lagoon. Environ Int 33:929-936

Pojana G, Bonfà A, Busetti F, Collarin A, and Marcomini A. 2004. Estrogenic potential of the Venice, Italy, lagoon waters. Environ Toxicol Chem 23:1874-1880

Porras SP, Heimala M, and Santonen T. 2014. Bisphenol A exposure via thermal paper receipts. Toxicol Lett 230:413-420

Peltonen K and Pukkila J. 1988. Determination of bisphenol A in air by high-performance liquid-chromatography with electrochemical detection. J Chromatogr A 439:375-380

Peng X, Ou W, Wang C, Wang Z, Huang Q, Jin J, and Tan J. 2014. Occurrence and ecological potential of pharmaceuticals and personal care products in groundwater and reservoirs in the vicinity of municipal landfills in China. Sci Total Environ 490: 889-898

Peng X, Wang Z, Mai B, Chen F, Chen S, Tan J, Yu Y, Tang C, Li K, Zhang G, and Yang C. 2007. Temporal trends of nonylphenol and bisphenol A contamination in the Pearl River Estuary and the adjacent South China Sea recorded by dated sedimentary cores. Sci Total Environ 384:393-400

Peng X, Wang Z, Yang C, Chen F, and Mai B. 2006. Simultaneous determination of endocrine-disrupting phenols and steroid estrogens in sediment by gas chromatography-mass spectrometry. J Chromatogr A 1116:51-56

Petrovic M and Barcelo D. 2000. Determination of anionic and nonionic surfactants, their degradation products, and endocrine-disrupting compounds in sewage sludge by liquid chromatography/mass spectrometry. Anal Chem 72:4560-4567

Petrovic M and Barcelo D. 2001. Determination of phenolic xenobiotics in environmental samples by liquid chromatography with mass spectrometric detection. J AOAC Int 84:1074-1085

Pettersen A and Fjeld E. 2005. Miljøgifter i Drammensvassdraget 2005. Contaminants in the Drammen waterway 2005. Norges Geotekniske Institutt (NGI) and Norsk institutt for vannforskning (NIVA).

Pettersson M, Adolfsson-Erici M, Parkkonen J, Förlin L, and Asplund L. 2006. Fish bile used to detect estrogenic substances in treated sewage water. Sci Total Environ 366:174-186

Philippat C, Wolff MS, Calafat AM, Ye X, Bausell R, Meadows M, Stone J, Slama R, and Engel SM. 2013. Prenatal Exposure to Environmental Phenols: Concentrations in Amniotic Fluid and Variability in Urinary Concentrations during Pregnancy. Environ Health Persp 121:1225-1231

Philippat C, Mortamais M, Chevrier C, Petit C, Calafat AM, Ye X, Silva MI, Brambilla C, Pin I, and Charles M. 2012. Exposure to phthalates and phenols during pregnancy and offspring size at birth. Environ Health Persp 120:464-470

Pirard C, Sagot C, Deville M, Dubois N, and Charlier C. 2012. Urinary levels of bisphenol A, triclosan and 4-nonylphenol in a general Belgian population. Environ Int 48:78-83

Pojana G, Gomiero A, Jonkers N, and Marcomini A. 2007. Natural and synthetic endocrine disrupting compounds (EDCs) in water, sediment and biota of a coastal lagoon. Environ Int 33:929-936

Pojana G, Bonfà A, Busetti F, Collarin A, and Marcomini A. 2004. Estrogenic potential of the Venice, Italy, lagoon waters. Environ Toxicol Chem 23:1874-1880

Porras SP, Heimala M, and Santonen T. 2014. Bisphenol A exposure via thermal paper receipts. Toxicol Lett 230:413-420
Pothitou P and Voutsas D. 2008. Endocrine disrupting compounds in municipal and industrial wastewater treatment plants in Northern Greece. *Chemosphere* 73:1716-1723

Provencher G, Berube R, Dumais P, Bienvenu JF, Gaudreau E, Belanger P, and Ayotte P. 2014. Determination of bisphenol A, triclosan and their metabolites in human urine using isothe-lution liquid chromatography-tandem mass spectrometry. *J Chromatogr A* 1348:97-104

Qiang Z, Dong H, Zhu B, Qu J, and Nie Y. 2013. A comparison of various rural wastewater treatment processes for the removal of endocrine-disrupting chemicals (EDCs). *Chemosphere* 92:986-992

Qednow K and Pittmann W. 2008. Endocrine disruptors in freshwater streams of Hesse, Germany: changes in concentration levels in the time span from 2003 to 2005. *Environ Poll* 152:476-483

Queiroz F, Brandt E, Aquino S, Chernicharo C, and Afonso R. 2012. Occurrence of pharmaceuticals and endocrine disruptors in raw sewage and their behavior in UASB reactors operated at different hydraulic retention times. *Water Sci Technol* 66:2562-2569

Quirós-Alcala L, Eskenazi B, Bradman A, Ye X, Calafat AM, and Harley K. 2013. Determinants of urinary bisphenol A concentrations in Mexican/Mexican-American pregnant women. *Environ Int* 59:152-160

Ra JS, Lee SH, Lee J, Kim HY, Lim BJ, Kim SH, and Kim SD. 2011. Occurrence of estrogenic chemicals in South Korean surface waters and municipal wastewaters. *J Environ Monitor* 13:101-109

Rather JA and De Wael K. 2013. Fullerene-C 60 sensor for ultra-high sensitive detection of bisphenol-A and its treatment by green technology. *Sensor Actuat B Chem* 176:110-117

Renz L, Volz C, Michanowicz D, Ferrar K, Christian C, Lenzenz D, and El-Hefnawy T. 2013. A study of parabens and bisphenol A in surface water and fish brain tissue from the Greater Pittsburgh Area. *Ecotoxicology* 22:632-641

Rhie YJ, Nam HK, Oh YJ, Kim HS, and Lee KH. 2014. Influence of Bottle-Feeding on Serum Bisphenol A Levels in Infants. *J Korean Medical Sci* 29:261-264

Ribeiro C, Tiritan ME, Rocha E, and Rocha MJ. 2007. Development and Validation of a HPLC-DAD Method for Determination of Several Endocrine Disrupting Compounds in Estuarine Water. *J Liq Chromatogr R T* 30:2729-2746

Rigol A, Latorre A, Lacorte S, and Barceló D. 2004. Bioluminescence inhibition assays for toxicity screening of wood extractives and biocides in paper mill process waters. *Environ Toxicol Chem* 23:339-347

Rocha MJ, Cruzeiro C, and Rocha E. 2013. Quantification of 17 endocrine disruptor compounds and their spatial and seasonal distribution in the Iberian Ave River and its coastline. *Toxicol Environ Chem* 95:386-399

Rocha MJ, Ribeiro C, and Ribeiro M. 2011. Development and optimisation of a GC-MS method for the evaluation of oestrogens and persistent pollutants in river and seawater samples. *Int J Environ An Ch* 91:1191-1205

Rochester JR. 2013. Bisphenol A and human health: a review of the literature. *Reprod Toxicol* 42:132-155

Rodríguez-Mozaz S, de Alda MJL, and Barceló D. 2004. Monitoring of estrogens, pesticides and bisphenol A in natural waters and drinking water treatment plants by solid-phase extraction–liquid chromatography–mass spectrometry. *J Chromatogr A* 1045:85-92

Rubin BS. 2011. Bisphenol A: an endocrine disruptor with widespread exposure and multiple effects. *J Steroid Biochem Mol Biol* 127:27-34

Rudel RA, Gray JM, Engle CL, Rawsthorne TW, Dodson RE, Ackerman JM, Rizzo J, Nudelman JL, and Brody JG. 2011. Food packaging and bisphenol A and bis(2-ethylhexyl) phthalate exposure: findings from a dietary intervention. *Environ Health Perspect* 119:914-920

Rudel RA, Camann DE, Spengler JD, Korn LR, and Brody JG. 2003. Phthalates, alkylphenols, pesticides, polybrominated diphenyl ethers, and other endocrine-disrupting compounds in indoor air and dust. *Environ Sci Technol* 37:4543-4553

Rudel RA, Brody JG, Spengler JD, Vallarino J, Geno PW, Sun G, and Yau A. 2001. Identification of selected hormonally active agents and animal mammary carcinogens in commercial and residential air and dust samples. *J Air Waste Manage Assoc* 51:499-513

Sahar E, Ernst M, Godehardt M, Hein A, Herr J, Kazner C, and Messlemann R. 2011. Comparison of two treatments for the removal of selected organic micropolllutants and bulk organic matter: conventional activated sludge followed by ultrafiltration versus membrane bioreactor. *Water Sci Technol* 63:733

Sajiki J, Takahashi K, and Yonekubo J. 1999. Sensitive method for the determination of bisphenol-A in serum using two systems of high-performance liquid chromatography. *J Chromatography B* 736:255-261

Sánchez-Avila J, Vicente J, Echavarri-Erasun B, Porte C, Tauler R, and Lacorte S. 2013. Sources, fluxes and risk of organic micropolllutants to the Cantabrian Sea (Spain). *Mar Pollut Bulletin* 72:119-132

Sánchez-Avila J, Tauler R, and Lacorte S. 2012. Organic micropolllutants in coastal waters from NW Mediterranean Sea: Sources distribution and potential risk. *Environ Int* 46:50-62

Sánchez-Avila J, Fernandez-Sanjuan M, Vicente J, and Lacorte S. 2011. Development of a multi-residue method for the determination of organic micropolllutants in water, sediment and mussels using gas chromatography–tandem mass spectrometry. *J Chromatogr A* 1218:6799-6811

Sánchez-Avila J, Bonet J, Velasco G, and Lacorte S. 2009. Determination and occurrence of phthalates, alkylphenols, bisphenol A, PBDEs, PCBs and PAHs in an industrial sewer grid discharging to a Municipal Wastewater Treatment Plant. *Sci Total Environ* 407:4157-4167

Sanchez-Brunate C, Miguel E, and Tadeo JL. 2009. Determination of tetrabromobisphenol-A, tetrachlorobisphenol-A and bisphenol-A in soil by ultrasonic assisted extraction and gas chromatography-mass spectrometry. *J Chromatogr A* 1216:5497-5503

Santhi VA and Mustafa AM. 2013. Assessment of organochlorine pesticides and plasticisers in the Selangor River basin and possible pollution sources. *Environ Monitor Assess* 185:1541-1554

Santhi VA, Sakai N, Ahmad ED, and Mustafa AM. 2012. Occurrence of bisphenol A in surface water, drinking water and plasma from Malaysia with exposure assessment from consumption of drinking water. *Sci Total Environ* 427:332-338
Schonfelder G, Wittfoht W, Hopp H, Talsnes CE, Paul M, and Chahoud I. 2002. Parent bisphenol A accumulation in the human maternal-fetal-placental unit. *Environ Health Persp* 110: A703-A707

Schorringhumer K and Cichna-Markl M. 2007. Sample clean-up with sol-gel enzyme and immunoaffinity columns for the determination of bisphenol A in human urine. *J Chromatogr B* 850:361-369

Schwartz AW and Landrigan PJ. 2012. Bisphenol A in thermal paper receipts: an opportunity for evidence-based prevention. *Environ Health Perspect* 120: A14-15

SciFinder. 2015. https://scifinder.cas.org (accessed 9th February 2015)

Sebök A, Vasanits-Zsigrai A, Helenkár A, Záray G, and Molnár-Perl I. 2009. Multiresidue analysis of pollutants as their trimethylsilyl derivatives, by gas chromatography–mass spectrometry. *J Chromatogr A* 1216:2288-2301

Shala L and Foster GD. 2010. Surface water concentrations and loading budgets of pharmaceuticals and other domestic-use chemicals in an urban watershed (Washington, DC, USA). *Arch Environ Contam Toxicol* 58:551-561

Shao J, Shi G, Jin X, Song M, Shi J, and Jiang G. 2005. Preliminary survey of estrogenic activity in part of waters in Haihe River, Tianjin. *Chinese Sci Bull* 50:2565-2570

Shao X, Ma J, and Wen G. 2008. [Investigation of endocrine disrupting chemicals in a drinking water work located in Songhua River basin]. Huan jing ke xuexiao [bjian ji, Zhongguo ke xue yuan huan jing ke xue wei yuan hui]. 29:2723-2728

Sharma VK, Anquandah GA, Yngard RA, Kim H, Fekete J, Bouzek K, . . . Golovko D. 2009. Nonylphenol, octylphenol, and bisphenol-A in the aquatic environment: a review on occurrence, fate, and treatment. *J Environ Sci Heal A* 44:423-442

Shi J, Liu X, Chen Q, and Zhang H. 2014. Spatial and seasonal distributions of bisphenols and bisphenol A in the Yangtze River Estuary and the adjacent East China Sea. *Chemosphere* 111:336-343

Shi W, Hu G, Chen S, Wei S, Cai X, Chen B, and Yu H. 2013. Occurrence of estrogenic activities in second-grade surface water and ground water in the Yangtze River Delta, China. *Environ Pollut* 181:31-37

Sodré FF, Locatelli MAF, and Jardim WF. 2010. Occurrence of emerging contaminants in Brazilian drinking waters: a sewage-to-tap issue. *Water Air Soil Poll* 206:57-67

Sodré FF, Pescara IC, Montagner CC, and Jardim WF. 2010. Assessing selected estrogens and xenoestrogens in Brazilian surface waters by liquid chromatography–tandem mass spectrometry. *Microchem J* 96:92-98

Song W, Wang Z, and Lian C. 2013. Assessment of In Vivo Estrogenic Response and Identification of Environmental Estrogens in Influent and Effluent from a Sewage Treatment Plant. *B Environ Contam Tox* 91:324-329

Song W, Li Z, and Ding F. 2011. Determination of bisphenol A in effluent water of analogue MBR wastewater treatment system using high-performance liquid chromatography. *Res J Chem Environ* 15:8-12

Sousa A, Schönengerber R, Jonkers N, Suter MJF, Tanabe S, and Barroso CM. 2010. Chemical and biological characterization of estrogenicity in effluents from WWTPs in Ria de Aveiro (NW Portugal). *Arch Environ Contam Tox* 58:1-8

Spengler P, Körner W, and Metzger JW. 2001. Substances with estrogenic activity in effluents of sewage treatment plants in southwestern Germany. 1. Chemical analysis. *Environ Toxicol Chem* 20: 2133-2141

Spring A, Bagley DM, Andrews RC, Lemanik S, and Yang P. 2007. Removal of endocrine disrupting compounds using a membrane bioreactor and disinfection. *J Environ Eng Sci* 6:131-137

Stachel B, Jantzen E, Knoth W, Kruger F, Lepom P, Oetken M, Reincke H, Sawal G, Schwartz R, and Uhlig S. 2005. The Elbe Flood in August 2002-organic contaminants in sediment samples taken after the flood event. *J Environ Sci Health A* 40:265-287

Stachel B, Ehrhorn U, Heemken OP, Lepom P, Reincke H, Sawal G, and Theobald N. 2003. Xenoestrogens in the River Elbe and its tributaries. *Environ Pollut* 124:497-507

Stahlhut RW, Welshons WV, and Swan SH. 2009. Bisphenol A data in NHANES suggest longer than expected half-life, substantial non-food exposure, or both. *Environ Health Perspect* 117:784-789

Stalter D, Magdeburg A, Queudnom K, Botzat A, and Oehlmann J. 2013. Do contaminants originating from state-of-the-art treated wastewater impact the ecological quality of surface waters? *PloS One* 8: e60616

Staniszewska M, Falkowska L, Grabowski P, Kwasnik J, Mudrak-Cegiolk B, Reindl AR, Sokolowski A, Szumilo E, and Zgrundo A. 2014a. Bisphenol A, 4-tert-octylphenol, and 4-nonylphenol in the gulf of Gdansk (Southern Baltic). *Arch Environ Contam Toxicol* 67:335-347

Staniszewska M, Kaniecki L, Falkowska L, and Krzymek Y. 2014b. Occurrence and distribution of bisphenol A and alkylphenols in the water of the gulf of Gdansk (Southern Baltic). *Mar Pollut Bull* http://dx.doi.org/10.1016/j.marpolbul.2014.11.027

Staples C, Friederich U, Hall T, Klecca G, Miachix E, Ortego L, Caspers N, and Hentges S. 2010. Estimating potential risks to terrestrial invertebrates and plants exposed to bisphenol A in soil amended with activated sludge biosolids. *Environ Toxicol Chem* 29: 467-475

Staples CA, Dorn PB, Klecca GM, Sondra T, Branson DR, and Harris LR. 2000. Bisphenol A concentrations in receiving waters near US manufacturing and processing facilities. *Chemosphere* 40:521-525

Staples CA, Dome PB, Klecca GM, Oblock ST, and Harris LR. 1998. A review of the environmental fate, effects, and exposures of bisphenol A. *Chemosphere* 36:2149-2173

Stasinakis AS, Mermigka S, Samaras VG, Farmaki E, and Thomaides NS. 2012. Occurrence of endocrine disrupters and selected pharmaceuticals in Aisonas River (Greece) and environmental risk assessment using hazard indexes. *Environ Sci Pollut R* 19: 1574-1583

Stasinakis AS, Gatidou G, Mamais D, Thomaides NS, and Lekkas T.D. 2008. Occurrence and fate of endocrine disrupters in Greek sewage treatment plants. *Water Res* 42:1796-1804

Stavrakakis C, Colin R, Hequet V, Faur C, and Le Cloirec P. 2008. Analysis of endocrine disrupting compounds in wastewater and drinking water treatment plants at the nanogram per litre level. *Environ Technol* 29:279-286
Stiles R, Yang I, Lippincott RL, Murphy E, and Buckley B. 2008. Measurement of drinking water contaminants by solid phase microextraction initially quantified in source water samples by the USGS. Environ Sci Technol 42:2976-2981

Strauch G, Möder M, Wennrich R, Osenbrück K, Gläser HR, Schladitz T, ... Schirmer M. 2008. Indicators for assessing anthropogenic impact on urban surface and groundwater. J Soils Sediments 8:23-33

Stuart JD, Capulong CP, Launer KD, and Pan X. 2005. Analyses of phenolic endocrine disrupting chemicals in marine samples by both gas and liquid chromatography-mass spectrometry. J Chromatogr A 1079:136-145

Sugiura-Ogasawara M, Ozaki Y, Sonta SI, Makino T, and Suzumori K. 2005. Exposure to bisphenol A is associated with recurrent miscarriage. Hum Reprod 20:2325-2329

Sun K, Jin J, Gao B, Zhang Z, Wang Z, Pan Z, Xu D, and Zhao Y. 2012. Sorption of 17α-ethinyl estradiol, bisphenol A and phenanthrene to different size fractions of soil and sediment. Chemosphere 88:577-583

Sun Q, Deng S, Huang J, Shen G, and Yu G. 2008. Contributors to estrogenic activity in wastewater from a large wastewater treatment plant in Beijing, China. Environ Toxicology Pharmacol 25:20-26

Sun Y, Huang H, Sun Y, Wang C, Shi X, Hu H, and Fujie K. 2014. Occurrence of estrogenic endocrine disrupting chemicals concern in sewage plant effluent. FESE 8:18-26

Sun Y, Irie M, Kishikawa N, Wada M, Kuroda N, and Nakashima K. 2004. Determination of bisphenol A in human breast milk by HPLC with column-switching and fluorescence detection. Biomed Chromatogr 18:501-507

Suzuki T, Nakagawa Y, Takano I, Yaguchi K, and Yasuda K. 2004. Environmental fate of bisphenol A and its biological metabolites in river water and their xeno-estrogenic activity. Environ Sci Technol 38:2389-2396

Takahashi A, Higashitani T, Yakou Y, Saitou M, Tamamoto H, and Tanaka H. 2003. Evaluating bioaccumulation of suspected endocrine disruptors into periphytons and benthos in the Tama River. Water Sci Technol 47:71-76

Takao Y, Oishi M, Nagae M, Kohra S, and Arizono K. 2008. Bisphenol a incorporated into eggs from parent fish persists for several days. J Health Sci 54:235-239

Takase M, Shinto H, Takao Y, and Iguchi T. 2012. Accumulation and pharmacokinetics of estrogenic chemicals in the pre-and post-hatch embryos of the frog Rana rugosa. In Vivo 26:913-920

Takeuchi T and Tsutsumi O. 2002. Serum bisphenol A concentrations showed gender differences, possibly linked to androgen levels. Biochem Biophy Res Co 291:76-78

Takeuchi T, Tsutsumi O, Ikezuki Y, Takai Y, and Taketani Y. 2004. Positive relationship between androgen and the endocrine disruptor, bisphenol A, in normal women and women with ovarian dysfunction. Endocrine J 51:165-169

Tan BL, Hawker DW, Müller JF, Leusch FD, Tremblay LA, and Chapman HF. 2007a. Comprehensive study of endocrine disrupting compounds using grab and passive sampling at selected wastewater treatment plants in South East Queensland, Australia. Environ Int 33:654-669

Tan BL, Hawker DW, Müller JF, Leusch FD, Tremblay LA, and Chapman HF. 2007b. Modelling of the fate of selected endocrine disruptors in a municipal wastewater treatment plant in South East Queensland, Australia. Chemosphere 69:644-654

Tan BLL and Mohd MA. 2003. Analysis of selected pesticides and alklyphenols in human cord blood by gas chromatograph-mass spectrometer. Talanta 61:385-391

Tang C, Chen J, and Zhang Y. 2012. characteristics, behavior and potential assessment of endocrine-disrupting chemicals (EDCs) in surface water and suspended solid of the pearl river delta, China. Fresen Environ Bull 21:3911-3919

Tavazzi S, Benfenati E, and Barcelo D. 2002. Accelerated solvent extraction then liquid chromatography coupled with mass Spectrometry for determination of 4-t-octyl phenol, 4-nonylphenols, and bisphenol a in fish liver. Chromatographia 56:463-467

Teitelbaum SL, Britton JA, Calafat AM, Ye X, Silva MJ, Reidy JA, Galvez MP, Brenner BL, and Wolff MS. 2008. Temporal variability in urinary concentrations of phthalate metabolites, phytosterogens and phenols among minority children in the United States. Environ Res 106:257-269

Terasaki M, Shiraishi F, Fukazawa H, and Makino M. 2007. Occurrence and estrogenic activity of phenolics in paper-recycling process water: pollutants originating from thermal paper in waste paper. Environ Toxicol Chem 26:2356-2366

Teuten EL, Saquing JM, Knappe DRU, Barlaz MA, Jonsson S, Björn Rowland SI, Thompson RC, Galloway TS, Yamashita R, Ochi D, Watanuki Y, Moore C, Viet PH, Tana TS, Prudente M, Boonyatumonond R, Zakaria MP, Akkhavong K, Ogata Y, Hirai H, Iwasa S, Mizukawa K, Hagino Y, Imamura A, Saha M, and Takada H. 2009. Transport and release of chemicals from plastics to the environment and to wildlife. Phil Trans R Soc B 364:2027-2045

Tian C, et al. 2009. Sediment-water interactions of bisphenol A under simulated marine conditions. Water Air Soil Pollut 199:301-310

Tiehm A, Schmidt N, Lipp P, Zawadsky C, Marei A, Seder N, … Wolf L. 2013. Consideration of emerging pollutants in groundwater-based reuse concepts. Integrated Water Resources Management in a Changing World: Lessons Learnt and Innovative Perspectives, 67

Todd E and Mori C. 2002. Necessity to establish new risk assessment and risk communication for human fetal exposure to multiple endocrine disruptors in Japan. Congenital Anomalies 42:87-93

Tran BC, Teil MJ, Blanchard M, Alliot F, and Chevreuil M. 2015. BPA and phthalate fate in a sewage network and an elementary river of France. Influence of hydroclimatic conditions. Chemosphere 119:43-51

Trenholm RA, Vanderford BJ, Drewes JE, and Snyder SA. 2008. Determination of household chemicals using gas chromatography and liquid chromatography with tandem mass spectrometry. J Chromatogr A 1190:253-262

Troisi J, Mikelson C, Richards S, Symes S, Adair D, Zullo F, and Guida M. 2014. Placental concentrations of bisphenol A and birth weight from births in the Southeastern US. Placenta 35:947-952

Tsai WT. 2006. Human Health Risk on Environmental Exposure to Bisphenol-A: A Review. J Environ Sci Health C 24:225-255

Tsuda T, Suga K, Kaneda E, and Ohgusa M. 2000. Determination of 4-nonylphenol, nonylphenol monoethoxylate, nonylphenol...
diethoxylate and other alkylphenols in fish and shellfish by high-performance liquid chromatography with fluorescence detection. J Chromatogr B 746:305-309

Tsukioka T, Brock J, Graiser S, Nguyen J, Nakazawa H, and Makino T. 2003. Determination of trace amounts of bisphenol A in urine by negative-ion chemical-ionization-gas chromatography/mass spectrometry. Anal Sci 19:151-153

U.S. Environmental Protection Agency. 2010. Bisphenol A Action Plan.

U.S. Environmental Protection Agency. 2014. Bisphenol A alternatives in thermal paper. Final Report.

U.S. National Toxicology Program. 2008. NTP-CERHR Monograph on the potential human reproductive and developmental effects of bisphenol A. NIH Publication No. 08 – 5994

Umweltbundesamt. 1999, 2000. Anhang 2 - 1999& 2000. Monitoring Data of Bisphenol A (BPA) and Metabolite 4-Hydroxycacetophenon (HAP). Umweltbundesamt IV 2.2, Berlin.

Unal ER, Lynn T, Neidich J, Salazar D, Goetzl L, Baatz JE, Hulsey TC, Van Dolah R, Guillette LJ Jr, and Newman R. 2012. Racial disparity in maternal and fetal-cord bisphenol A concentrations. J Perinatol 32:844-850

Upson K, Sathyanarayana S, De Roos AJ, Koch HM, Scholes D, and Holt VL. 2014. A population-based case-control study of urinary bisphenol A concentrations and risk of endometriosis. Hum Reprod 29: 2457-2464

Vajda AM, Barber LB, Gray JL, Lopez EM, Bolden AM, Schoenfuss HL, and Norris DO. 2011. Demasculinization of male fish by wastewater treatment plant effluent. Aquat Toxicol 103:213-221

Vajda AM, Barber LB, Gray JL, Lopez EM, Woodling JD, and Norris DO. 2008. Reproductive disruption in fish downstream from an estrogenic wastewater effluent. Environ Sci Technol 42:3407-3414

Valenti TV, Gould GG, Berninger JP, Connors KA, Keele NB, Prosser KN, and Brooks BW. 2012. Human therapeutic plasma levels of the selective serotonin reuptake inhibitor (SSRI) sertraline decrease serotonin reuptake transporter binding and shelter seeking behavior in adult male fathead minnows. Environ Sci Technol 46: 2427-2435.

Van Landuyt KL, Nawrot T, Geebelen B, De Munck J, Snauwaert J, Valenti TV, Gould GG, Berninger JP, Connors KA, Keele NB, Prosser KN, and Vom Saal FS. 2010. Human exposure to bisphenol A and bisphenol A glucuronide in biological samples by high performance liquid chromatography-tandem mass spectrometry. Drug Metab Dispos 33:1748-1757

Vandenberg LN, Hunt PA, Myers JP, and Vom Saal FS. 2013. Human exposures to bisphenol A: mismatches between data and assumptions. Rev Environ Health 28:37-58

Vandenberg LN, Chahoud I, Heindel JJ, Padmanabhan B, Paumgarten FJ, and Schoenfelder G. 2010. Urinary, circulating, and tissue biomonitoring studies indicate widespread exposure to bisphenol A. Environ Health Perspect 118:1055-1070

Vandenberg LN, Hauser R, Marcus M, Olea N, and Welschons WV. 2007. Human exposure to bisphenol A (BPA). Reprod Toxicol 24: 139-177

Vega-Morales T, Sosa-Ferrera Z, and Santana-Rodriguez J. 2010. Determination of alkylphenol polyethoxylates, bisphenol-A, 17α-ethynylestradiol and its metabolites in sewage samples by SPE and LC/MS/MS. J Hazard Mater 183: 701-711

Veith GD, DeFoe DL, and Bergstedt BV. 1979. Measuring and estimating the bioconcentration factor of chemicals in fish. J Fish Res Board Canad 36:1040-1048

Vela-Soria F, Ballesteros O, Camino-Sanchez FJ, Zafra-Gomez A, Ballesteros L, and Navalon A. 2015. Matrix solid phase dispersion for the extraction of selected endocrine disrupting chemicals from human placental tissue prior to UHPLC-MS/MS analysis. Microchem J 118:32-39

Vethaak AD, Lahr J, Schrap SM, Belfroid AC, Rijs GBJ, Gerritsen A, de Boer J, Bulder A, Grinwis GCM, Kuiper RV, Legler J, Murk TAJ, Peijnenburg W, Verhaar HJM, and de Voogt P. 2005. An integrated assessment of estrogenic contamination and biological effects in the aquatic environment of the Netherlands. Chemosphere 59:511-524

Vidal CB, Feitosa AV, Pessoa GP, Raulino GS, Oliveira AG, dos Santos AB, and Nascimento RF. 2014. Polymeric and silica sorbents on endocrine disruptors determination. Desalination Water Treat DOI: 10.1080/19443994.2014.880377

Vigano L, Mandich A, Benfenati E, Bertolotti R, Bottero S, Porazzi E, and Agradi E. 2006. Investigating the estrogenic risk along the River Po and its intermediate section. Arch Environ Con Tox 51: 641-651

Volberg V, Harley K, Calafat AM, Dave V, McFadden J, Eskenazi B, and Holland N. 2013. Maternal Bisphenol A Exposure During Pregnancy and Its Association With Adipokines in Mexican-American Children. Environ Mol Mutagen 54:621-628

Volkel W, Kiranoglu M, and Fromme H. 2008. Determination of free and total bisphenol A in human urine to assess daily uptake as a basis for a valid risk assessment. Toxicol Lett 179:155-162

Volkel W, Bittner N, and Dekant W. 2005. Quantitation of bisphenol A and bisphenol A glucuronide in biological samples by high performance liquid chromatography-tandem mass spectrometry. Drug Metab Dispos 33:1748-1757

Volkel W, Colnot T, Csanady GA, Filser JG, and Dekant W. 2002. Metabolism and kinetics of bisphenol a in humans at low doses following oral administration. Chem Res Toxicol 15:1281-1287

Vom Saal FS. 2003. Determination of trace amounts of bisphenol-A (BPA) can be accurately measured without contamination in human serum and urine, and that BPA causes numerous hazards from multiple routes of exposure. Mol Cell Endocrinol 398: 101-113

Vom Saal FS and Hughes C. 2005. An extensive new literature concerning low-dose effects of bisphenol A shows the need for a new risk assessment. Environ Health Pers 113:962-933

Von Goetz N, Wormuth M, Scheringer M, and Hungerbühler K. 2010. Bisphenol A: How the most relevant exposure sources contribute to total consumer exposure. Risk Anal 30:473-487

Voutsas T, Hartmann P, Schaffner C, and Giger W. 2006. Benzotriazoles, alkylphenols and bisphenol A in municipal wastewaters and in the Glatt River, Switzerland. Environ Sci Poll R 13: 333-341

Wan HT, Leung PY, Zhao YG, Wei X, Wong MH, and Wong CKC. 2013. Blood plasma concentrations of endocrine disrupting chemicals in Hong Kong populations. J Hazard Mater 261:763-769
Wang HX, Zou Y, Wang X, Qu WD, and Jiang QW. 2012a. Screening and assessing the phenols in water environment of Shanghai city [J]. Fudan University J Medical Sci 3:004
Wang L, Ying GG, Chen F, Zhang LJ, Zhao JL, Lai HJ, Chen ZF, and Tao R. 2012b. Monitoring of selected estrogenic compounds and estrogenic activity in surface water and sediments of the Yellow River in China using combined chemical and biological tools. Environ Pollut 165:241-249
Wang G, Ma P, Zhang Q, Lewis J, Lacey M, Furukawa Y, and Zhang S. 2012c. Endocrine disrupting chemicals in New Orleans surface waters and Mississippi Sound sediments. J Environ Monitor 14: 1353-1364
Wang B, Wan X, Zhao S, Wang Y, Yu F, and Pan X. 2011a. Analysis of six phenolic endocrine disrupting chemicals in surface water and sediment. Chromatographia 74:297-306
Wang L, Ying GG, Zhao JL, Liu S, Yang B, Zhou LJ, Tao R, and Su HC. 2011b. Assessing estrogenic activity in surface water and sediment of the Liao River system in northeast China using combined chemical and biological tools. Environ Pollut 159:148-156
Wang S, Oakes KD, Bragg LM, Pawliszyn J, Dixon G, and Servos MR. 2011c. Validation and use of in vivo solid phase micro-extraction (SPME) for the detection of emerging contaminants in fish. Chemosphere 85:1472-1480
Wang L, Zhang X, and Tam N. 2010. Analysis and occurrence of typical endocrine-disrupting chemicals in three sewage treatment plants. Water Sci Technol 62:2501-2509
Wang T, Lu J, Xu M, Xu Y, Li M, Liu Y, Tian X, Chen Y, Dai M, Wang W, Lai S, Bi Y, and Ning G. 2013. Urinary Bisphenol A Concentration and Thyroid Function in Chinese Adults. Epidemiology 24: 295-302
Weltin D, Gehring M, Tennhardt L, Vogel D, Busch K, Hegemann W, and Bilitewski B. 2003. Vorkommen und Eliminierung von Bisphenol A in ausgewählten deutschen Kläranlagen. Wasser und Boden 55:29-35
Wilson NK, Chuang JC, Morgan MK, Lordo RA, and Sheldon LS. 2007. An observational study of the potential exposures of preschool children to pentachlorophenol, bisphenol-A, and nonylphenol at home and daycare. Environ Res 103:9-20
Wintgens T, Gallenkemper M, and Melin T. 2003. Occurrence and removal of endocrine disrupters in landfill leachate treatment plants. Water Sci Technol 48:127-134
Wolff MS, Engel SM, Berkowitz GS, Ye X, Silva MJ, Zhu C, Wemtur J, and Calafat AM. 2008. Prenatal phenol and phthalate exposures and birth outcomes. Environ Health Persp 116:1092-1097
Wolff MS, Teitelbaum SL, Windham G, Pinney SM, Britton JA, Chelimo C, Godbold J, Biro F, Kushi LH, Pfeiffer CM, and Calafat AM. 2007. Pilot study of urinary biomarkers of phytostrogens, phthalates, and phenols in girls. Environ Health Persp 115: 116-121
Wright-Walters M, Volz C, Talbott E, and Davis D. 2011. An updated weight of evidence approach to the aquatic hazard assessment of bisphenol A and the derivation a new predicted no effect concentration (PNEC) using a non-parametric methodology. Sci Total Environ 409:676-685
Wu M, Wang L, Xu G, Liu N, Tang L, Zheng J, Bu T, and Lei B. 2013. Seasonal and spatial distribution of 4-tert-octylphenol, 4-nonylphenol and bisphenol A in the Huangpu River and its tributaries, Shanghai, China. Environ Monit Assess 185: 3149-3161
Wu Q, Shao Y, Wang C, Sun Y, and Hu H. 2014. [Health risk induced by estrogens during unplanned indirect potable reuse of reclaimed water from domestic wastewater]. Huan jing ke xue=x= Huanjing kexue/[bian ji, Zhongguo ke xue yuan hui jing ke xue wei yuan hui= Huan jing ke xue] bian ji wei yuan hui, 35:1041-1050
Wu T, Wang YW, Jiang LM, Chu QC, Delaire J, and Ye JN. 2008. Determination of natural and synthetic endocrine-disrupting chemicals (EDCs) in sewage based on SPE and MEKC with amperometric detection. Chromatographia 68:339-344
Xiong J, An T, Zhang C, and Li G. 2014. Pollution profiles and risk assessment of PBDEs and phenolic brominated flame retardants in water environments within a typical electronic waste dismantling region. Environ Geochem Health DOI 10.1007/s10653-014-9658-8
Xu EG, Liu S, Ying GG, Zheng GJ, Lee JH, and Leung KM. 2014. The occurrence and ecological risks of endocrine disrupting chemicals in sewage effluents from three different sewage treatment plants, and in natural seawater from a marine reserve of Hong Kong. Mar Pollut Bull 85:352-362
Xu J, Wu L, Chen W, Jiang P, and Chang ACS. 2009. Pharmaceuticals and personal care products (PPCPs), and endocrine disrupting compounds (EDCs) in runoff from a potato field irrigated with treated wastewater in southern California. J Health Sci 55:306-310
Xu W, Yan W, Huang W, Miao L., and Zhong L. 2014. Endocrine-disrupting chemicals in the Pearl River Delta and coastal environmental sources, transfer, and implications. Environ Geochem Health 36:1095-1104
Xu X, Wang Y, and Li X. Sorption behavior of bisphenol A on marine sediments. J Environ Sci Health A 43:239-246
Xu Y, Luo F, Pal A, Gin KYH, and Reinhard M. 2011. Occurrence of emerging organic contaminants in a tropical urban catchment in Singapore. Chemosphere 83:963-969
Yamada H, Furuta I, Kato EH, Kataoka S, Usuki Y, Kobashi G, Sata F, Kishi R, and Fujimoto S. 2002. Maternal serum and amniotic fluid bisphenol A concentrations in the early second trimester. Reprod Toxicol 16:735-739
Yamamoto T, Yasuhara A, Shiraishi H, and Nakasugi O. 2001. Bisphenol A in hazardous waste landfill leachates. Chemosphere 42:415-418
Yamashita Y, Okumura T, and Yamada H. 2001. Intersexuality in Acanthomysis mitsukurii (Mysidacea) in Sendai Bay, northeastern Japan. Plankton Biol Ecol 48:128-132
Yang FX, Xu Y, Pfister G, Henkelmann B, and Schramm KW. 2005. Nonylphenol, bisphenol-A and DDTs in Lake Donghu, China. Fresen Environ Bull 14:173-180
Yang J, Li H, Ran Y, and Chan K. 2014. Distribution and biocorrelation of endocrine disrupting chemicals in surface water and fish bile of the Pearl River Delta, South China. Chemosphere 107:439-446
Yang M, Kim SY, Chang SS, Lee IS, and Kawamoto T. 2006. Urinary concentrations of bisphenol a in relation to biomarkers of sensitivity and effect and endocrine-related health effects. Environ Mol Mutagen 47:571-578
Yang YJ, Hong YC, Oh SY, Park MS, Kim H, Leem JH, and Ha EH. 2009. Bisphenol A exposure is associated with oxidative stress and inflammation in postmenopausal women. *Environ Res* 109: 797-801

Ye X, Guo X, Cui X, Zhang X, Zhang H, Wang MK, Qiu L, and Chen S. 2012. Occurrence and removal of endocrine-disrupting chemicals in wastewater treatment plants in the Three Gorges Reservoir area, Chongqing, China. *J Environ Monitor* 14: 2204-2211

Ye XB, Pierik FH, Hauser R, Duty S, Angerer J, Park MM, Burdorf A, Hofman A, Jadde VVW, Mackenbach JP, Steegers EAP, Tiemeyer H, and Longnecker MP. 2008. Urinary metabolite concentrations of organophosphorous pesticides, bisphenol A, and phthalates among pregnant women in Rotterdam, the Netherlands: The Generation R study. *Environ Res* 108:260-267

Ye XY, Kuklenyik Z, Needham LL, and Calafat AM. 2005a. Automated on-line column-switching HPLC-MS/MS method with peak focusing for the determination of nine environmental phenols in urine. *Anal Chem* 77:5407-5413

Ye XY, Kuklenyik Z, Needham LL, and Calafat AM. 2006. Measuring environmental phenols and chlorinated organic chemicals in breast milk using automated on-line column-switching-high performance liquid chromatography-isotope dilution tandem mass spectrometry. *J Chromatogr B* 831: 110-115

Ye XY, Wong LY, Jia LT, Needham LL, and Calafat AM. 2009. Stability of the conjugated species of environmental phenols and parabens in human serum. *Environ Int* 35:1160-1163

Ye XY, Zsuzsanna K, Needham LL, and Calafat AM. 2005b. Quantification of urinary conjugates of bisphenol A, 2,5-dichlorophenol, and 2-hydroxy-4-methoxybenzophenone in humans by online solid phase extraction-high performance liquid chromatography-tandem mass spectrometry. *Anal Bioanal Chem* 383:638-644

Ying GG, Kookana RS, and Kumar A. 2008. Fate of estrogens and xenoestrogens in four sewage treatment plants with different technologies. *Environ Toxicol Chem* 27:87-94

Ying GG, Kookana RS, Kumar A, and Mortimer M. 2009. Occurrence and implications of estrogens and xenoestrogens in sewage effluents and receiving waters from South East Queensland. *Sci Total Environ* 407:5147-5155

Yokota H, Miyashita N, and Yuasa A. 2002. High glucuronidation activity of environmental estrogens in the carp (*Cyprinus carpio*) intestine. *Life Sciences* 71: 887-898

Yoshimura Y, Brock JW, Makino T, and Nakazawa H. 2002. Measurement of bisphenol A in human serum by gas chromatography/mass spectrometry. *Anal Chim Acta* 458:331-336

Yu CP and Chu KH. 2009. Occurrence of pharmaceuticals and personal care products along the West Prong Little Pigeon River in east Tennessee, USA. *Chemosphere* 75:1281-1286

Yu F, Pan X, and Wang B. 2012. Determination of four phenolic endocrine disrupting chemicals in Dianchi Lake, China. *Int J Environ An Ch* 92: 1532-1545

Yu Y, Huang Q, Cui J, Zhang K, Tang C, and Peng X. 2011. Determination of pharmaceuticals, steroid hormones, and endocrine-disrupting personal care products in sewage sludge by ultra-high performance liquid chromatography-tandem mass spectrometry. *Anal Bioanal Chem* 399:891-902

Zeng G, Zhang C, Huang G, Yu J, Wang Q, Li J, Xi B, and Liu H. 2006. Adsorption behavior of bisphenol A on sediments in Xiangjiang River, Central-south China. *Chemosphere* 65:1490-1499

Zhang J, Cooke GM, Curran IHA, Goodyer CG, and Cao XL. 2011a. GC-MS analysis of bisphenol A in human placental and fetal liver samples. *J Chromatogr B* 879:209-214

Zhang S, Jinmiao Y, Song C, Chen G, and Suo Y. 2012b. Purification and determination of bisphenol A and alkylphenol in river sediments by high performance liquid chromatography with fluorescence detection. *Anal Methods* 4:4030-4036

Zhang T, Sun H, and Kannan K. 2013. Blood and urinary bisphenol A concentrations in children, adults, and pregnant women from China: Partitioning between blood and urine and maternal and fetal cord blood. *Environ Sci Technol* 47:4686-4694

Zhang X, Gao Y, Li Q, Li G, Guo Q, and Yan C. 2011c. Estrogenic compounds and estrogenicity in surface water, sediments, and organisms from Yundang Lagoon in Xiamen, China. *Arch Environ Cont Toxical* 61:93-100

Zhang X, Zhang D, Zhang H, Luo Z, and Yan C. 2012a. Occurrence, distribution, and seasonal variation of estrogenic compounds and antibiotic residues in Jiujiang River, South China. *Environ Sci Pollut R* 19:1392-1404

Zhang YZ, Meng W, and Zhang Y. 2014a. Occurrence and partitioning of phenolic endocrine-disrupting chemicals (EDCs) between surface water and suspended particulate matter in the North Tai Lake Basin, Eastern China. *B Environ Contam Tax* 92:148-153

Zhang YZ, Song XF, Kondoh A, Xia J, and Tang CY. 2011b. Behavior, mass inventories and modeling evaluation of xenobiotic endocrine-disrupting chemicals along an urban receiving wastewater river in Henan Province, China. *Water Res* 45:292-302

Zhang Z, Alomirah H, Cho HS, Li YF, Liao C, Tu Binh M, Mohd MA, Nakata H, Ren N, and Kannan K. 2011d. Urinary isphenol A concentrations and their implications for human exposure in several Asian countries. *Environ Sci Technology* 45:7044-7050

Zhang Z, Feng Y, Gao P, Wang C, and Ren N. 2011a. Occurrence and removal efficiencies of eight EDCs and estrogenicity in a STP. *J Environ Monitor* 13:1366-1373

Zhang Z, Hibberd A, and Zhou J. 2006. Optimisation of derivatisation for the analysis of estrogenic compounds in water by solid-phase extraction gas chromatography–mass spectrometry. *Anal Chim Acta* 577:52-61

Zhang Z, Hibberd A, and Zhou JL. 2008. Analysis of emerging contaminants in sewage effluent and river water: comparison between spot and passive sampling. *Anal Chim Acta* 607:37-44

Zhang Z, Ren N, Kannan K, Nan J, Liu L, Ma W, Qi H, and Li Y. 2014b. Occurrence of endocrine-disrupting phenols and estrogens in water and sediment of the Songhua River, Northeastern China. *Arch Environ Con Tox* 66:361-369

Zhao JL, Ying GG, Chen F, Liu YS, Wang L, Yang B, Liu S, and Tao R. 2011. Estrogenic activity profiles and risks in surface waters and sediments of the Pearl River system in South China assessed by chemical analysis and in vitro bioassay. *J Environ Monit* 13: 813-821

Zhao JL, Ying GG, Wang L, Yang JF, Yang XB, Yang LH, and Li X. 2009. Determination of phenolic endocrine disrupting chemicals and acidic pharmaceuticals in surface water of the Pearl Rivers in...
South China by gas chromatography–negative chemical ionization–mass spectrometry. *Sci Total Environ* 407:962-974
Zheng J, Zhao S, Xu X, and Zhang K. 2011. Detection of bisphenol A in water samples using ELISA determination method. *Water Sci Technol* 11:55-60
Zhou F, Zhang L, Liu A, Shen Y, Yuan J, Yu X, Feng X, Xu Q, and Cheng C. 2013a. Measurement of phenolic environmental estrogens in human urine samples by HPLC-MS/MS and primary discussion the possible linkage with uterine leiomyoma. *J Chromatogr B* 938:80-85
Zhou H, Huang X, Wang X, Zhi X, Yang C, Wen X, Wang Q, Tsuno H, and Tanaka H. 2010. Behaviour of selected endocrine-disrupting chemicals in three sewage treatment plants of Beijing, China. *Environ Monitor Assess* 61:107-121
Zhou H, Zhou Y, Li H, and Wang F. 2012. Fate and removal of selected endocrine-disrupting compounds in sewage using activated sludge treatment. *Water Environ J* 26:435-444
Zhou Q, Miao M, Ran M, Ding L, Bai L, Wu T, Yuan W, Gao E, Wang J, Li G, and Li DK. 2013b. Serum bisphenol-A concentration and sex hormone levels in men. *Fertil Steril* 100:478-482
Zhou X, Kramer JP, Calafat AM, and Ye X. 2014. Automated on-line column-switching high performance liquid chromatography isotope dilution tandem mass spectrometry method for the quantification of bisphenol A, bisphenol F, bisphenol S, and 11 other phenols in urine. *J Chromatogr B* 944:152-156
Zhu FD, Choo KH, Chang HS, and Lee B. 2012. Interaction of bisphenol A with dissolved organic matter in extractive and adsorptive removal processes. *Chemosphere* 87:857-864
Zhu L, Duan Z, Zhu L, Zhang B, and Yao K. 2007. Bioaccumulation and toxicity of bisphenol A in zebrafish (*Danio rerio*) embryo. International Symposium on Environmental Science and Technology, 2007/11/13-2007/11/16, pp 115-120, Beijing, China.
Zou Y, Zhang Z, Shao X, Chen Y, Wu X, Yang L, Zhu J, and Zhang D. 2014. Hollow-fiber-supported liquid-phase microextraction using an ionic liquid as the extractant for the pre-concentration of bisphenol A, 17-β-estradiol, estrone and diethylstilbestrol from water samples with HPLC detection. *Water Sci Technol* 69:1028-1035