

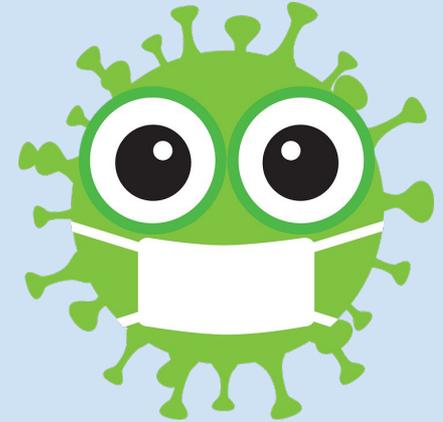
# 1. Biological Influence

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This review discusses the details of the biology of non-canonical inflammasome activation. Inflammasomes are large cytosolic multiprotein complexes which are activated during infections or high stress levels. These organelles are important to activate the inflammatory caspases which play a role in releasing proinflammatory mediators. Previous research has been done to suggest that parabens disrupt this pathway and understanding the protein complexes involved in this pathway is essential to understand how parabens affect human health systems.

Click below for more information:

<https://doi.org/10.1016/j.mam.2020.100924>



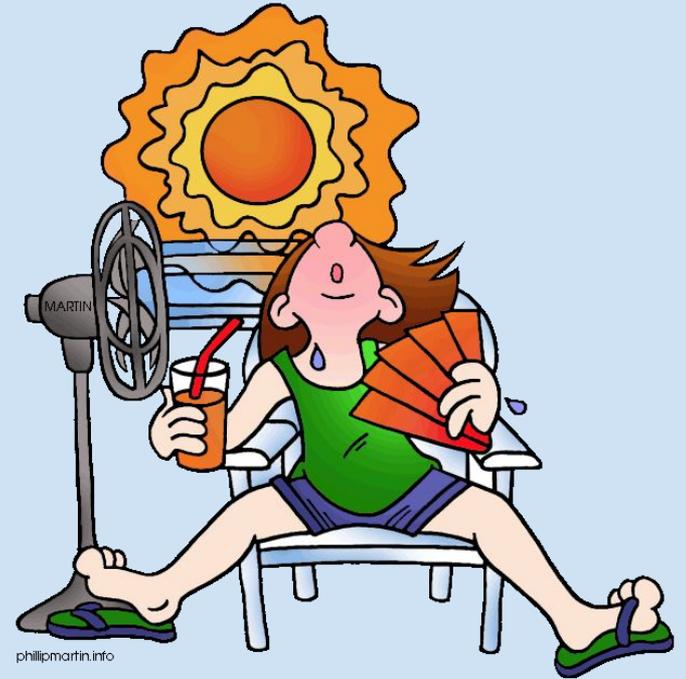
## 2. Biological Influence

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Pad usage practices depend on culture, economics, and menstrual physiology. Humid conditions may cause small changes in the temperature and surface moisture of the vulva. When hot, humid conditions increase skin temperature and skin surface moisture, this may contribute to sensory discomfort in some individuals. On the other hand, clinical data support the conclusion that the vulva is less affected by cold dry conditions.

Click below for more information:

<https://doi.org/10.1007/s00404-006-0273-5>



# 3. Biological Influence

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Phthalates are a group of chemicals used to make plastics more durable. They are often called plasticizers. Phthalates enter the bloodstream and disrupt sex hormone production, interfering with sexual development in infants and sexual behaviour in adults. Research have found a high concentration of phthalates infant exposure from dermal absorption through cotton clothing, which poses cumulative health risks and carcinogenic risks. Since organic cotton sanitary pads as alternatives to common period products that may contain EDCs, it poses question whether organic period products were indeed safe. Furthermore, this study focused on cotton clothing, which may have a larger contacted surface area and longer exposure duration than period products. We couldn't find specific research on dermal exposure to phthalates in period products.

Click below for more information:

<https://doi.org/10.1016/j.scitotenv.2019.05.132>



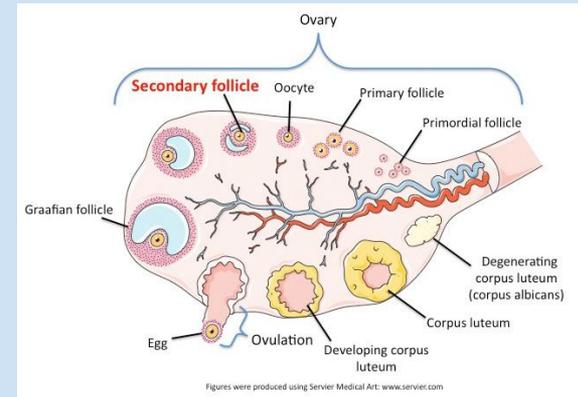
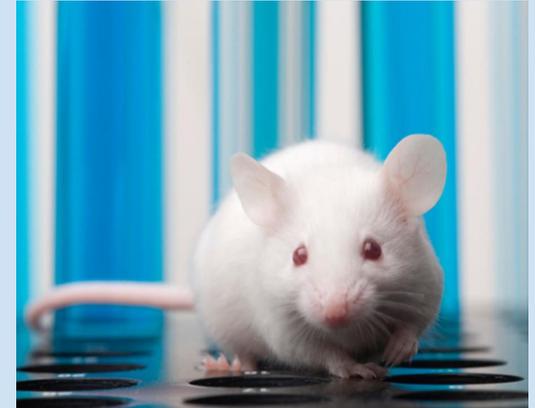
# 4. Biological Influence

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This research article examined how short-term exposure to DEHP or DiNP during adulthood affects ovarian follicles and hormones using mice models 3, 6, and 9 months after exposure. They found that 10 days of exposure could change the distribution of ovarian follicle populations and sex hormones in a time-dependent and dose-dependent manners. However, as some studies suggested the difficulty to translate animal research results to human studies, it is unclear how exposure to DEHP or DiNP affects human ovarian follicles.

Click below for more information:

<https://doi.org/10.1016/j.taap.2020.114952>



Figures were produced using Servier Medical Art: [www.servier.com](http://www.servier.com)

# 5. Biological Influence

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Pregnancy is a sensitive window for toxicant exposure. EDCs may disrupt the maternal immune system, which may lead to poor pregnancy outcomes. However, despite research on EDCs exposure in pregnancy using both clinical and animal models, we still lack information about the risk assessment for vaginal absorption, as well as long-term effects.

Click below for more information:

[https://www.nature.com/articles/s41598-019-41134-z#:~:text=Endocrine%20disrupting%20chemicals%20\(EDCs\)%20are,do%20not%20occur%20in%20isolation.](https://www.nature.com/articles/s41598-019-41134-z#:~:text=Endocrine%20disrupting%20chemicals%20(EDCs)%20are,do%20not%20occur%20in%20isolation.)



# 6. Biological Influence

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This paper utilized epidemiological evidence with urinary biomarkers of exposure among the black populations and non-black populations in the US. This research article discuss how the black populations are disproportionately exposed to EDCs such as phthalates and parabens through feminine hygiene products, hair care products and other personal care products. Most risk assessment studies oftentime focus on one EDC product through one exposure route, which leads us to question how to appraise the health risks when people are constantly exposed to multiple EDCs sources.



Click below for more information:

<https://www.sciencedirect.com/science/article/pii/S2213219821005705?via%3Dihub>

# 7. Biological Influence

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There is still knowledge gaps about how exposure to EDCs in period products affect health. One of the common roadblocks is the difference between mouse and human models and how to test for the impacts of those EDCs on the female body. In addition, there lacks longitudinal research about long-term and transgenerational impacts. When our group was conducting research on the biological effects of EDC exposure through period products, we were very surprised by the lack of concrete research.

Click below for more information:

<https://doi.org/10.1016/j.coi.2012.05.006>





# 9. Biological Influence

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Xenoestrogens are “foreign” estrogens, substances that are close enough in molecular structure to estrogen that they can bind to estrogen receptor sites with potentially hazardous outcomes. On exposure to EDCs, the gut microbiota undergoes a series of changes including microbial dysbiosis and the induction of xenobiotic pathways and associated genes, enzymes, and metabolites that cause biotransformation of EDCs. The microbial products and byproducts of metabolism of EDCs are taken up by the host and affect glucose homeostasis, primarily by influencing hepatic gluconeogenesis.

Click below for more information:

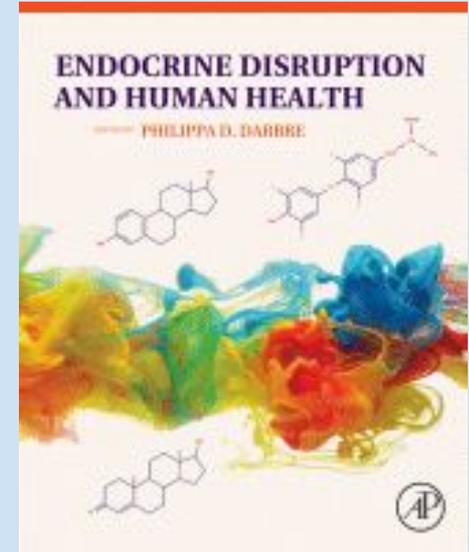
<https://www.sciencedirect.com/science/article/pii/B9780128219850000153>



# 10. Biological Influence

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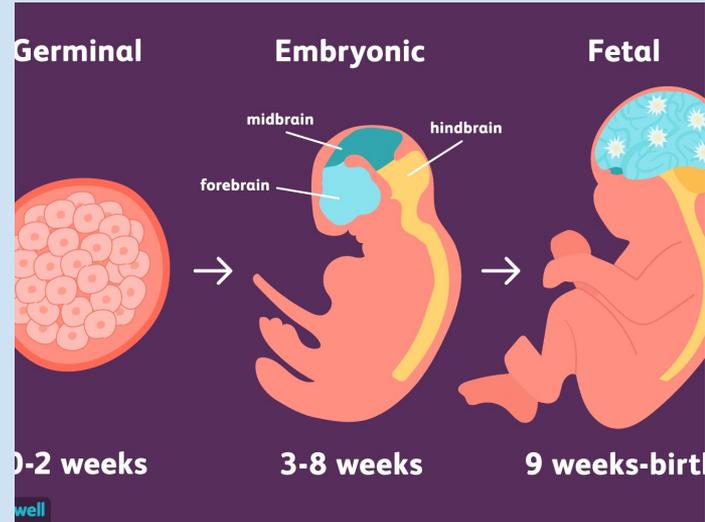
Endocrine Disruption and Human Health by Philippa D. Darbre is an insightful book on how EDCs affect health. This textbook provides a comprehensive analysis of the endocrine disruption chemicals and health impacts from a diverse range of perspectives, including the historical context, socioeconomic influences, chemical analysis of commonly found EDCs, biological explanations on the absorption and metabolism of EDCs, the dose-response and exposure timing. This textbook summarized the relevant research studies from a wide range of animal models, including rodents, non-human primates, and other mammal models, in addition to the use of in situ cell cultures and miniature organ models. In addition to the effects of EDCs on the human endocrine/ reproductive system, the textbook also elucidates the health impacts of EDCs on the immune systems, growth and development, risks for diabetes, and other cardiovascular diseases. Moreover, the information regarding public policy and regulatory considerations provides a lens into the directions for improving current legal systems and managing risks for EDCs.



# 11. Biological Influence

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The presence of a foreign chemical in the womb could interfere simultaneously with the developing brain and thyroid system. Comorbidities suggests these developmental overlays, for example, the relationship between autism and hypospadias at 7–8 weeks when sexual differentiation commences at the same time as the development of the urogenital system and the hippocampus. For instance, PCB, once widely deployed as dielectric and coolant fluids in electrical apparatus, carbonless copy paper and in heat transfer fluids, could can interfering with thyroid receptors and affect brain development. Several studies have shown correlations between prenatal EDC exposure and neurodevelopmental disorders such as ADHD and ASD.



Click below for more information:

<https://ehp.niehs.nih.gov/doi/full/10.1289/ehp.6601>

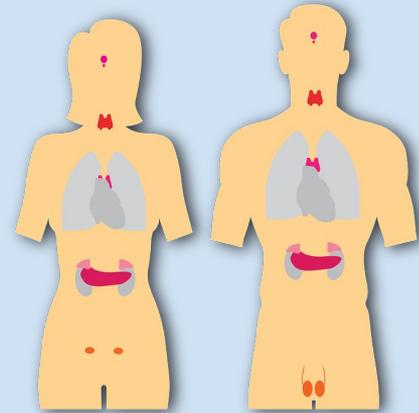
# 12. Biological Influence

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This review discusses the details of how paraben exposure disrupts the biological system of the hypothalamo-pituitary-gonadal axis. With exposure to parabens, these chemicals act to block or destabilize normal hormonal action. This can have a negative effect for endogenous hormone action that is involved with metabolism and transport of these compounds which can also affect normal functioning in other homeostatically regulated systems like the immune system, thyroid function, and glucose levels. This system is important for maintaining hormonal balance and the understanding is important because of how it can lead to negative health effects on reproductive function from an endocrinology point of view .

Click below for more information:

<http://dx.doi.org/10.3390/app11052307>



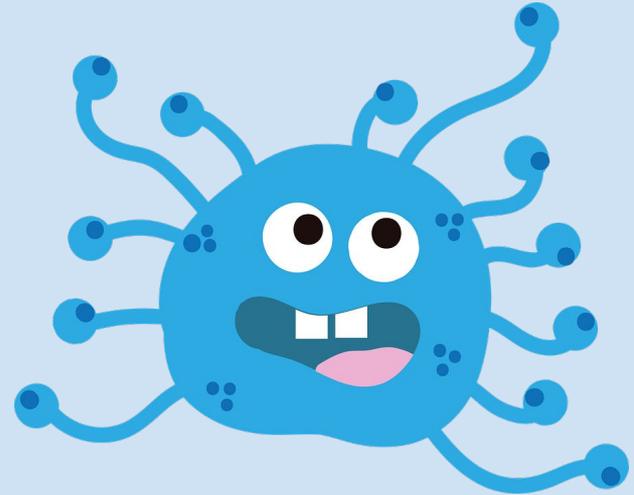
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Click below for more information:

<https://doi.org/10.1016/j.mam.2020.100924>



# 14. Biological Influence

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This research investigates the specific paraben standards present in different period products and the percent composition of each. In this study it was found that 24 endocrine-disrupting chemicals (EDCs), comprising nine phthalates, six parabens, eight bisphenols, and triclocarban (TCC) were measured in seven categories of feminine hygiene products (i.e., pads, panty liners, tampons, wipes, bactericidal creams and solutions, and deodorant sprays and powders). This research will add to a better understanding about the presence of parabens in feminine hygiene products and will demonstrate how different products have different levels of exposure. It is important to keep these different exposures into consideration when choosing period products.

Click below for more information:

<https://doi.org/10.1016/j.envint.2020.105465>



# 15. Biological Influence

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This research investigates how paraben exposure affects body weight and obesity associated metabolic biomarkers. It has been found that parabens can promote adipogenesis in vitro which can increase body weight. This has also been correlated to obesity associated metabolic biomarkers in females. This research provides another lens of analysis in the biological effects that paraben exposure can have on human health, which is important to our discussion of parabens in period products.

Click below for more information:

<https://doi.org/10.1007/s11356-016-7452-0>



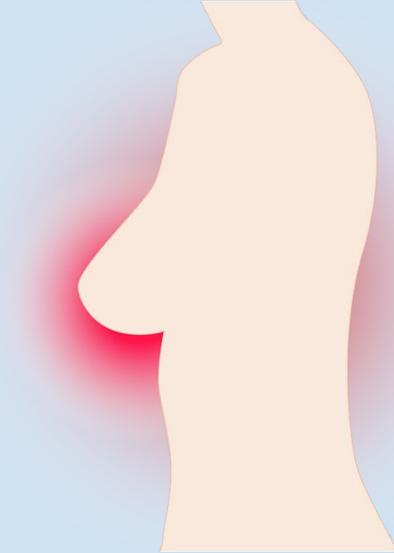
# 16. Biological Influence

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Parabens are estrogen agonists, and their exposure was linked to breast cancer in this study. Parabens are a kind of xenoestrogen and xenoestrogens have been found to feed breast cancer. Period products have been linked to parabens and so it is likely that if these chemical compounds bear in period products which are commonly used by women, then these compounds can translate into the dermal layers of breast tissue, thus leading to increased risk of breast cancer.

Click below for more information:

<https://rdcu.be/cHyIR>



# 17. Biological Influence

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This research investigates the specific paraben standards present in different period products and the percent composition of each. In this study it was found that 24 endocrine-disrupting chemicals (EDCs), comprising nine phthalates, six parabens, eight bisphenols, and triclocarban (TCC) were measured in seven categories of feminine hygiene products (i.e., pads, panty liners, tampons, wipes, bactericidal creams and solutions, and deodorant sprays and powders). This research adds to a better understanding about the presence of parabens in feminine hygiene products and will demonstrate how different products have different levels of exposure. It is important to keep these different exposures into consideration when choosing period products.

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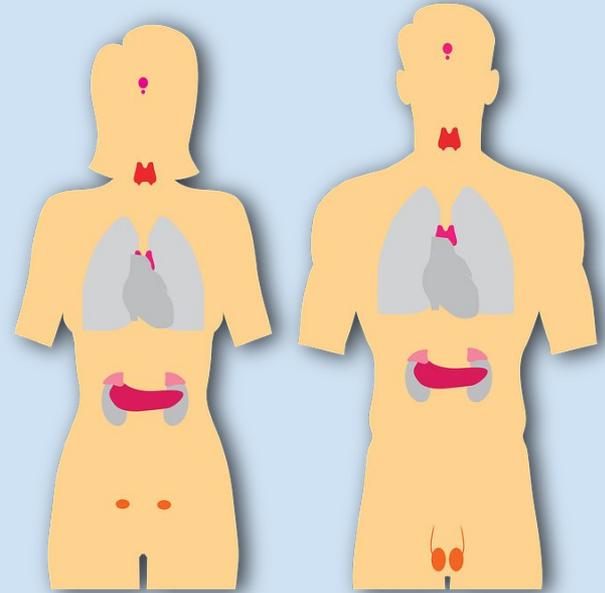
# 18. Biological Influence

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This review discusses the details of how paraben exposure disrupts the biological system of the hypothalamo-pituitary-gonadal axis. With exposure to parabens, these chemicals act to block or destabilize normal hormonal action. This can have a negative effect for endogenous hormone action that is involved with metabolism and transport of these compounds which can also affect normal functioning in other homeostatically regulated systems like the immune system, thyroid function, and glucose levels. This system is important for maintaining hormonal balance and the understanding is important because of how it can lead to negative health effects on reproductive function from an endocrinology point of view.

Click below for more information:

<http://dx.doi.org/10.3390/app11052307>



# 19. Biological Influence

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Endocrine systems are largely affected by parabens. This information is necessary because it explains how there are negative biological influences that parabens have on the human body. In particular there has been abundant of research on the link between EDC's and reproductive abnormalities. The way in which absorption of EDC's in personal care products have been investigated in the research study linked below. However, there are still gaps in knowledge of the specific mechanism by which there is absorption of parabens in the vaginal area. What is known though is that reproductive health problems and endocrine cancers continue due to frequent exposure

Click below for more information:

<https://doi.org/10.1016/B978-0-12-801139-3.00019-3>



# 20. Biological Influence

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As period product companies are trying to market themselves as organic, it is also important to test the safety and efficacy of these products to ensure that they are safe to use and that they have no harmful side effects. Contrasting views on organic vs inorganic products continue to be a conversation for debate as different media platforms try to spread awareness of the potential harms. See below for an article that discusses whether or not organic period products are worth it. This is interesting to think about because of how the views of the efficacy of organic products can be so polarized

Click below for more information:

<https://www.blume.com/blogs/blume-university/organic-vs-synthetic-pads>



# 21. Biological Influence

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The process of making most inorganic period products includes a lot of additives such as fragrances, parabens and bisphenols. This list includes endocrine disrupting chemicals that can cause damage to the body. Possible health concerns caused by this exposure includes bacterial vaginosis, yeast infections, and toxic shock syndrome. Some states are working towards disclosure laws that make it a requirement for manufacturers to disclose what is in the products they are selling. The links below include information on what some menstrual products are made of as well as a link to view an example of the aforementioned disclosure laws.

Click the link below for more information:

<https://www.wen.org.uk/2020/11/24/the-harmful-chemicals-that-might-be-present-in-your-menstrual-products/>

<https://www.millionmarker.com/blog/are-there-toxic-chemicals-in-your-feminine-hygiene-products>

<https://www.arnoldporter.com/en/perspectives/publications/2020/10/california-enacts-ingredient-disclosure-laws>



## 22. Biological Influence

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This review discusses the efficacy of menstrual cup usage and includes user experiences with the product. The article reviews international studies that details the availability of menstrual cups, the efficacy of the cups, and how its use is influenced by the local cultures. We will use this article in our discussion of how this PCP works in the female body (i.e. insertion, where it sits within the vaginal canal, how much blood it collects, etc.). Additionally the paper discusses the possible health concerns that come with using menstrual cups such as vaginal abrasions and effects on vaginal microflora.

Click the link below for more information:

[https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667\(19\)30111-2/fulltext](https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(19)30111-2/fulltext)



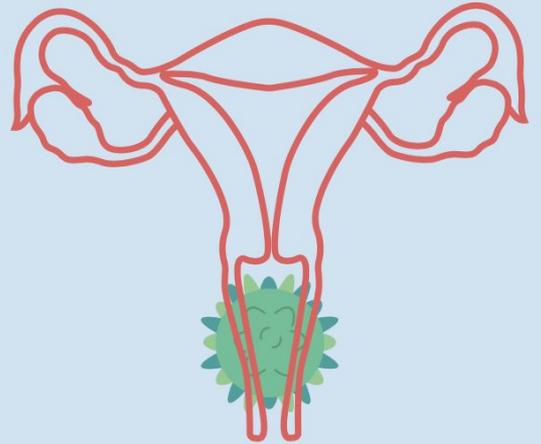
# 23. Biological Influence

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Phthalates are a common endocrine disrupting chemical found in many period products due to their ability to make plastics more durable and flexible. They can cause conditions ranging from bacterial vaginosis (a bacterial infection in the vaginal canal causing inflammation and disruption to the natural pH) to cervical or uterine cancer. The link below includes more information on phthalates in period products.

Click the link below for more information:

<https://www.publichealthpost.org/research/whats-in-my-tampon/>



# 24. Biological Influence

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Understanding the symptoms of menopause and what early menopause can look like is an important part of managing your menstrual cycle. Menopause is a point in time 12 months after a woman's last period. The years leading up to that point (when women may have changes in their monthly cycles, hot flashes, or other symptoms) are called the menopausal transition or perimenopause. Menopause typically starts between the ages of 40-50 but can begin as early as 35.

Click the link below for more information:

<https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/pre-mature-and-early-menopause>



# 25. Biological Influence

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Many inorganic period products undergo a bleaching process in their production to make them the stark white color that most are familiar with. The bleaching process (as well as the addition of other chemicals) can cause health problems for those who use these products such as chemical burns, bacterial vaginosis, and toxic shock syndrome. This process as well as the chemical additives should be disclosed to consumers upon purchase so they can make an educated decision on whether or not they want these material in contact with their bodies. More information about what chemicals are in these products and the process of making most inorganic products can be found by clicking the links below.

Click the link below for more information:

<https://www.madesafe.org/period-products-whats-in-them/>

<https://time.com/4422774/tampons-toxic-cancer/>



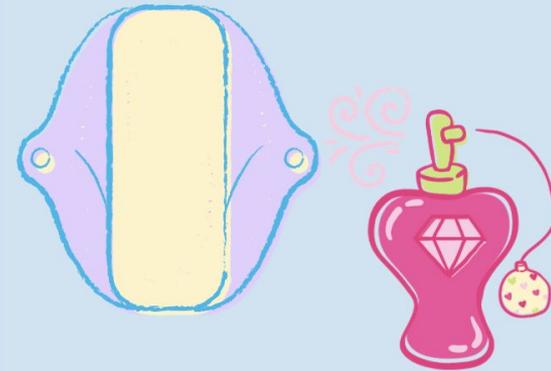
# 26. Biological Influence

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Knowing what is in menstrual products is incredibly important to managing your health. Some common materials in menstrual products are as follows: Rayon (synthetic fiber that can increase risk of TSS), Dioxin (result of chlorine bleaching process that is linked to hormone imbalance), “Fragrance” (which doesn’t disclose what chemicals are used to produce this fragrance and can be disruptive to the flora of the vagina causing bacterial vaginosis), and BPA (a known EDC linked to cancer). Click the links below to better understand and find more information on how to choose safer products.

Click the link below for more information:

<https://www.publichealthpost.org/research/whats-in-my-tampon/>



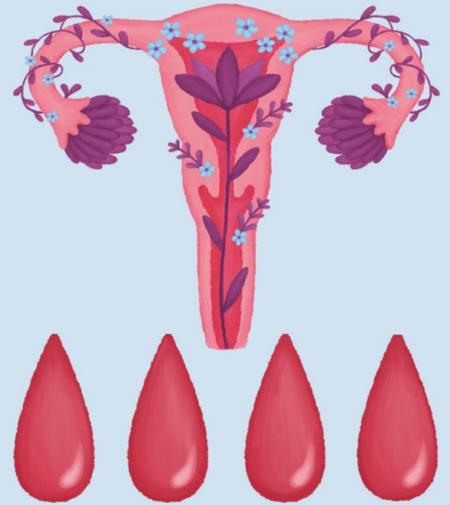
# 27. Biological Influence

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The vaginal canal is highly absorbent and very delicate. This means that exposure to endocrine disrupting chemicals can be even more damaging when it occurs in this area. A study looked into the levels of a drug (Estradiol) within the blood as well as the endometrium (lining of the uterus) when administered vaginally versus orally to determine which would be most effective. This research found that drugs administered vaginally could be found at levels 10-80 times higher in both the endometrium and the blood than when they were administered orally. This demonstrates the absorbency of the vaginal canal and gives reason to be cautious with what comes in contact with the vagina. The link below details these findings.

Click the link below for more information:

[https://www.ajog.org/article/S0002-9378\(99\)70042-6/fulltext](https://www.ajog.org/article/S0002-9378(99)70042-6/fulltext)



# 28. Biological Influence

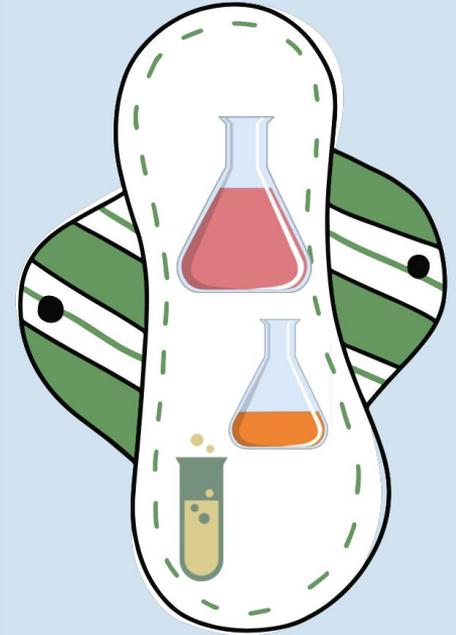
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Dioxins, furans, and fragrances are chemical additives that are often found in menstrual products and are linked to cancer, reproductive harm, and hormone disruption. Dioxins and furans are found in menstrual products because they are a byproduct of the chemical bleaching process that gives the products their stark-white look. Fragrances are in menstrual products to address the supposed odor that is associated with periods. These products do not readily break down in the environment (they are persistent) and accumulate within our bodies (bioaccumulate) making them all the more dangerous with each exposure.

Click the link below for more information:

<https://www.madesafe.org/chemical-profiles/dioxins-and-furans/>

<https://www.who.int/news-room/fact-sheets/detail/dioxins-and-their-effects-on-human-health>



# 29. Biological Influence

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EDCs in period products have been linked to various cancers such as uterine and breast cancer. This review discusses the role that endocrine disrupting chemicals (EDCs) play in women contracting uterine and breast cancer. For instance, the study details how EDCs, like BPA, binds to estrogen receptors and acts as an agonist which increases the presence of estrogen in the body. This then leads to the formation of cancer due to the overproduction of this hormone. It also includes the importance of disclosing to consumers the existence of these chemicals in personal care products (PCPs), how harmful they are, and how to reduce exposure.

Click the link below for more information:

<https://link.springer.com/article/10.1007/s11154-016-9332-9>



# 30. Biological Influence

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Menstrual Cups can be a great alternative but require proper sizing to be effective. Factors that can influence your proper cup size include if you've had a vaginal birth, the strength of your pelvic floor and vaginal muscles, the width of your vaginal canal, the depth of your cervix, and more. However, menstrual cups are not an accessible option for all even though they can reduce your EDC exposure from tampons and pads. This inaccessibility is due to their high price range and the minimal range of sizes available that will fit a wide range of cervix height and vaginal canals. See the information below to best help choose the appropriate cup for you!

Click the link below for more information:

<https://www.theperiod.co/blogs/news/how-to-choose-your-first-menstrual-cup>



# 31. Biological Influence

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Most menstrual cups are made out of rubber, silicon, and latex. An allergy to latex is quite common and as a result of that, people who use menstrual cups without knowing about their allergy can have detrimental effects. While there are some options that are latex-free, using one that has latex can cause irritation at the vagina since the tissues in the area are quite fragile. This makes exposure even more dangerous because the effects are compounded for those who are allergic. In comparison to pads and tampons, however, menstrual cups contain fewer EDCs because there are no chemicals in the products that are needed to absorb blood and make it an ideal environment for bacterial growth.

Source:

Factiva Global Menstrual Cup Market Analysis



# 32. Biological Influence

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Typically, birth control prevent pregnancy by releasing hormones that prevent an egg from being released from the ovaries, releasing hormones that prevent ovulation, or stopping the sperm from joining with the egg. As a result of this, some women can lose their period because the circulation of hormones that cause the shedding of the uterine lining, which is what menstruation is caused by, are no longer causing a biological effect. Some women may still experience some spotting because of there is a natural level of the hormones that are still present and may not have impacted by the birth control. Birth control pills contain these synthetic hormones that would make them, by definition, endocrine disrupting chemicals. The does not assume that birth control pills are inherently bad for health but rather that the negative side of it is that the long terms effects are unknown.

Click the link below for more information:

<https://www.acog.org/womens-health/experts-and-stories/the-latest/what-you-should-know-about-breakthrough-bleeding-with-birth-control>



# 33. Biological Influence

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The cocktail effect explains how interactions between a number of different chemicals can have compounded negative effects in a way that is really difficult to test and control for. For women that are taking a variety of medications for other conditions, there is a possibility that there can be negative effects due to these interactions, but a lot of them occur randomly and have severe impacts if they do happen. As a result, there are a number of experimental treatments that may be able to intervene, but their success is also up to chance.

Source:

Natural Science Collection EDCs article



# 34. Biological Influence

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Cigarette smoke has been tested for its effects on the endocrine system, specifically in the manner of secondhand exposure. A specific study conducted focused on the effects of cigarette smoke on that HPT axis which is in charge of maintaining thyroid levels in the body as a part of the endocrine system. The results found that cigarette smoke acts on the thyroid gland by affecting the products of TSH which is meant to stimulate the thyroid gland to produce thyroxine, an important metabolic hormone. For someone who has regular exposure to secondhand cigarette smoke, there are negative effects on the thyroid, as outlined above, that can affect the rest of the tissues of the body.

Source:

The Endocrine Effects of Nicotine and Cigarette Smoke



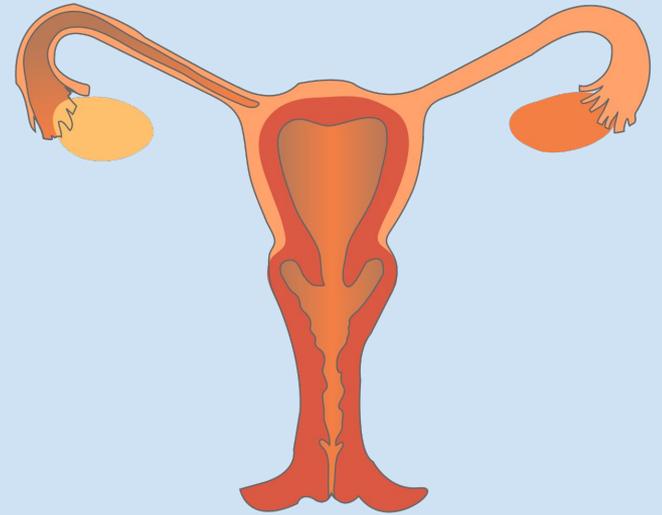
# 35. Biological Influence

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There are a number of factors that impact a woman's reproductive system. The link below provides more information on some of the biological, social, and environmental factors that may caused a woman to miss her period even though she is not on her period or pregnant. Physicians specializing in fertility and menstruation are best equipped to be able to diagnose hormone imbalances and their possible impacts on the body's natural processes. A key component of these diagnoses is how quickly they are able to occur and intervened upon because the sooner it is done, the more effectively the imbalance can be corrected and the more effective the treatment will be to returning to a baseline.

Click the link below for more information:

<https://www.uofmhealth.org/health-library/mispd/>



# 36. Biological Influence

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The body is normally in a state of homeostasis where it devotes a certain amount of energy to a variety of different processes, with reproduction and energy production through digestion being two important ones. When a woman is struggling with an eating disorder, the body's homeostatic level is disrupted because it is now in a stressed state to save energy and harness it from other sources when it is not receiving all the nutrients that it should because of limited food intake. Under this survival instinct, reproduction is no longer considered to be an important place to spend the limited energy, so the body shuts down the process. This can cause a lot of women to lose their period while suffering from an eating disorder.

Click the link below for more information:

<https://helloclue.com/articles/cycle-a-z/anorexia-and-the-menstrual-cycle>



# 37. Biological Influence

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A sudden increase in exercise without an appropriate increase in calorie intake can result in amenorrhea where there is an energy deprivation and a slowdown of metabolism. This ultimately leads to the body stopping the process of ovulation, and therefore menstruation, to conserve energy. As a result, fewer pads and tampons need to be used, which means less exposure to EDCs. The other part of this card discusses the negative impact that exercising near a factory has. The chemicals that are released through the fumes in the air near a factory added to the high levels of air intake that occurs while training means that the body will be exposed to a large amount of chemicals, many of which are seen to be endocrine disrupting.

Click the link below for more information:

<https://health.clevelandclinic.org/is-it-normal-to-lose-your-period-because-of-exercise/>



# 38. Biological Influence

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The threads that make up pads and tampons are formed in a complex structure and usually by products that are really good at soaking up the blood expelled by the body. As a result, the bacteria that is present can grow quickly and become trapped in the period product. If the tampon, pad, or other period product is left to be in contact with the body or inside the body for too long, the bacteria present can cause yeast infections at the vaginal tissue.

Click the link below for more information:

<https://www.the-scientist.com/news-opinion/threads-embedded-in-pads-and-tampons-can-diagnose-yeast-infection-68893#:~:text=A%20thread%20laced%20into%20a,in%20ACS%20mega%20in%20May.>



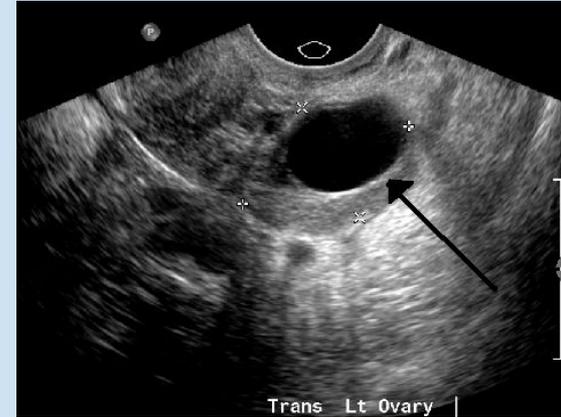
# 39. Biological Influence

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Ovarian cysts (pointed to with the arrow on the image below) are common in women who have endometriosis, a condition where the tissue that lines the inside of the uterus starts to grow outside of the uterus. These cysts, also known as endometriomas, are usually diagnosed using ultrasound and can typically be removed through surgery without needing to remove the complete ovary or uterus. There is usually a presentation of symptoms for women who have ovarian cysts, and the loss of a period is very common as a result.

Click the link below for more information:

<https://www.brighamandwomens.org/obgyn/infertility-reproductive-surgery/endometriosis/deep-ovarian-endometriosis>



# 40. Biological Influence

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Serious injuries like this can result in an individual having a temporary disability because of which they cannot change their pads or tampons. Free bleeding is often characterized as a movement to destigmatize menstruation, but people who are physically unable to use period products, because of an injury in this case, are also forced to free bleed.

Click the link below for more information:

<https://www.healthline.com/health/free-bleeding#controversy>



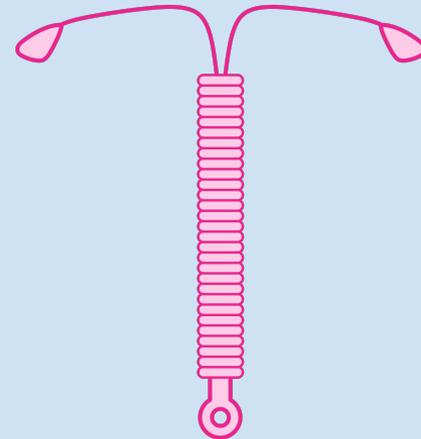
# 41. Biological Influence

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This research study focused on the frequency of intrauterine device (IUD) expulsion and its relationship with the user's age and parity (the number of times an individual has given birth). With over 5,400 female participants, the study found that on average, those using the hormonal (levonorgestrel) IUD compared to those using the copper IUD had similar expulsion rates around 10.2 expulsions per 100 IUD users. However, the rate of expulsion was higher in women who had given birth in the past compared to those who had never given birth. Additionally, IUD expulsion rates were higher in women aged 14 to 19 than women above the given age range.

Click below for more information:

<https://pubmed.ncbi.nlm.nih.gov/25198262/>



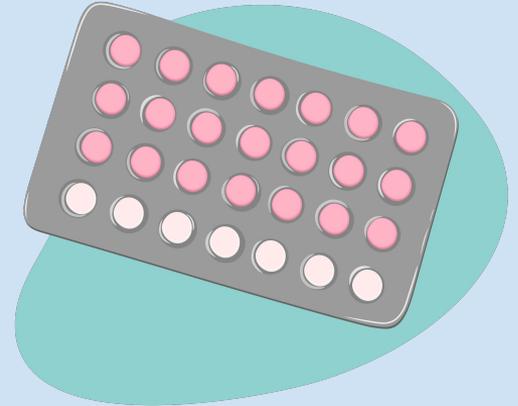
## 42. Biological Influence

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Birth control pills are often prescribed to help with irregular menstrual cycles or menstrual pain management. Birth control pills can also be used to skip periods, and some will decide to use the medication so they only have their period-like bleeding every three months. Regarding menstrual pain management, menstrual cramps occur due to prostaglandins produced in the uterus that cause the uterus to contract by constricting the blood vessels. However, this constriction may also cause pain, and birth control pills can reduce the amount of prostaglandins produced in the uterus to weaken the contractions that take place.

Click below for more information:

<https://flo.health/menstrual-cycle/health/period/using-the-pill-to-regulate-periods>



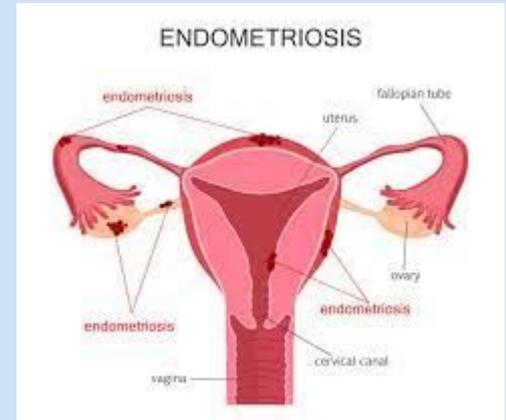
# 43. Biological Influence

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The disease endometriosis is when the tissue that lines the uterus (called the endometrium) is present outside of the uterus. Endometriosis typically occurs in the lower abdomen or pelvic area, and is characterized by symptoms such as pain in the lower abdominal or pelvic area, particularly during menstruation, intercourse, or bowel movements and difficulty getting pregnant. The exact cause of endometriosis is unknown. Some believe it is due to the movement of tissue from the uterus to alternate sites during menstruation, while others believe cells in the body can undergo changes making them become similar to uterus-lining cells. The most common, non-invasive treatment option is through hormone therapy using certain forms of birth control pills, but ultimately, the removal of scar tissue through surgery is the most effective treatment option.

Click below for more information:

<https://www.uclahealth.org/obgyn/endometriosis>



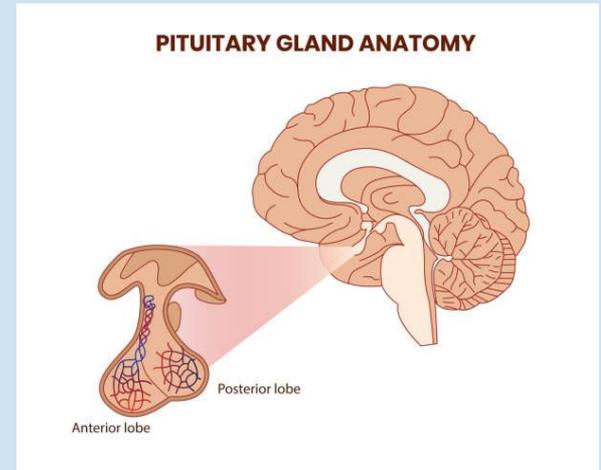
# 44. Biological Influence

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Amenorrhea is the absence of a menstrual cycle by the age of 15 (primary amenorrhea) or the absence of a menstrual cycle for 3 or more months after having normal menstrual cycles (secondary amenorrhea). While primary amenorrhea is typically caused by ovary failure or central nervous system or pituitary gland issues, some reasons secondary amenorrhea can develop include (but are not limited to) pregnancy or breastfeeding, certain types of birth control, stress, poor nutrition, over-exercising, or obesity.

Click below for more information:

<https://www.webmd.com/infertility-and-reproduction/guide/absence-periods>



# 45. Biological Influence

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In this literature review, eleven EDCs were found to have harmful effects on female reproduction and fertility: pesticides, heavy metals, diethylstilbestrol, DEHP and BPA alternatives, TCDD, nonylphenol, polychlorinated bisphenols, triclosan, and parabens. Although the research evidence is backed by studies with limitations such as small sample sizes, there are large amounts of epidemiological data supporting the connection between exposure to the aforementioned EDCs with adverse fertility outcomes such as reduced gestational age, increased risk for miscarriage, pregnancy weight gain, and time to pregnancy (the number of menstrual cycles required to get pregnant). On the other hand, experimental data has shown that EDC exposure in adulthood can cause menstrual cycle abnormalities, “decreased pregnancy rates, decreased pup survival, and increased onset of reproductive aging,” (Rattan, et al, p. 18).

Click below for more information:

<https://pubmed.ncbi.nlm.nih.gov/28356401/>



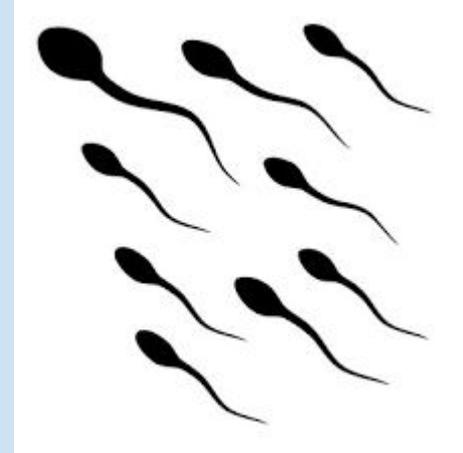
# 46. Biological Influence

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It has been proposed that in-utero exposure to EDCs, particularly during fetal testicular development, can lead to the development of male reproductive disorder later in life. The meta-analysis looked at the impact of EDC exposure and decreased semen quality. Regarding the EDCs polychlorinated biphenyls (PCBs) and dioxins, there is mixed evidence, with some studies finding correlations with EDCs and abnormal sperm morphology and motility, while others found in-utero PCB exposure levels did not correlate with semen quality of the baby. On the other hand, many studies have found phthalates to be associated with lower testicular volume in adulthood, lower semen volume, and reduced sperm motility.

Click below for more information:

<https://www.frontiersin.org/articles/10.3389/fendo.2021.706532/full>



# 47. Biological Influence

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Numerous studies have found a strong relationship between estradiol and progesterone hormone exposure with the development of breast cancer in animal models. The goal of this study was to better understand whether chemicals that increased estradiol and progesterone levels also showed evidence of carcinogenicity (a the ability of producing cancer) or developmental toxicity. The researchers found that the majority of the chemical that increased both hormones were more likely to be either carcinogens or developmental or reproductive toxins, whereas fewer than 6% of the 296 chemicals tested were not carcinogenic or toxic.

Click below for more information:

<https://ehp.niehs.nih.gov/doi/pdf/10.1289/EHP8608>



# 48. Biological Influence

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This study aimed to see how gestational exposure to specific EDCs would impact normal brain development and possibly lead to later dysfunctions in mice. The researchers administered a various concentrations of a mixture of phthalates, pesticides, and bisphenol A (BPA) that was associated with a language delay, as found in a previous study from Sweden of over 2,300 women known as the SELMA cohort. In rodents exposed in-utero to the EDC mixture, traits such as hyperactivity as well as social phobia and withdrawal were noted, which are traits associated with attention-deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) respectively. The researchers also examined specific specific genes associated with neurodevelopmental disorders such as *Grin2b* and found there were epigenetic modifications to the gene following exposure to BPA.

Click below for more information:

<https://www.nature.com/articles/s41598-020-66379-x>



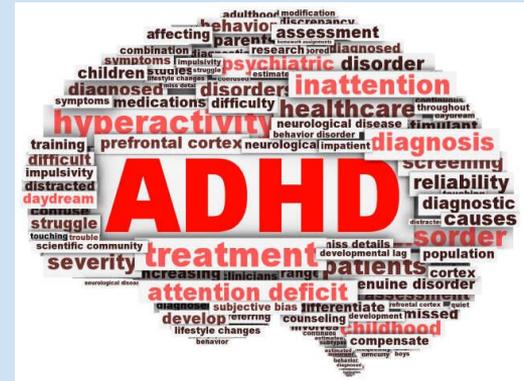
# 49. Biological Influence

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This research study focused on determining if there was a correlational relationship between prenatal exposure to the endocrine disrupting chemical (EDC) methylparaben and risk of maternal thyroid dysfunction, adverse birth outcomes, and the child's future development of attention-deficit hyperactivity disorder (ADHD). Using maternal urine samples and meconium (the first feces of the newborn) samples, the research team was able to detect the presence of methylparaben from both the mother and the newborn child. Overall, the research concluded that prenatal methylparaben exposure was positively “associated with preterm birth, decreased birth weight, dysregulated maternal thyroid hormones, and child ADHD,” (Baker, et al, p. 6).

Click below for more information:

<https://reader.elsevier.com/reader/sd/pii/S0160412020303159?token=DOE4065B845BE43C2F4BB3A3F81B3FB8A2BCF2DE15EE8CB3E2B026685A8BF002E55EDFEBD740167FB32486F91C92AD4F&originRegion=us-east-1&originCreation=20220225081832>



# 50. Biological Influence

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In the United States, the rate of toxic shock syndrome (TSS) is estimated to be 0.8 to 3.4 out of every 100,000. It is most commonly caused by the bacterium *Streptococcus pyogenes*, but it can also be caused by other strains of *Staphylococcus aureus*. Symptoms of TSS can include fever, rashes, hypotension, and organ damage. TSS is most often associated with the high absorbency tampons that were common around the 1980s, and their high absorbency led users to leave the tampons in for an extended period of time. This, along with micro tears that tampons can create, can allow the bacterium to enter the bloodstream, causing TSS.

Click below for more information:

<https://www.ncbi.nlm.nih.gov/books/NBK459345/#:~:text=The%20incidence%20of%20TSS%20is,100%2C000%20in%20the%20United%20States.>

