ISSUE 1

CURAM

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SEXUAL AND REPRODUCTIVE HEALTH

LIFESTYLE & WELLNESS
How sexuality influences mental wellbeing and relationships

OUR BODIES
The science behind contraceptives, hormones, behaviors, and more

EXPERT INTERVIEWS
Read about conversations with professionals in sexual and maternal health

USC's undergraduate medical literacy magazine

ACKNOWLEDGMENTS

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LEADERSHIP

Aidan Scanlan – Writing Chair
Katrina Dang – Creative Director
Kenneth Phung – Outreach Director
Ryan Wisniewski – Writing Chair
Ronan Horn – Design Chair & Vice President
Thomas Manea – President

WRITERS

Alexandria LaCorte
Ariana Pomakian
Baishali Chaudhuri
Daniela Giola
Elisa Liu
Jasmeet Kaur
Malinda Madrigal
Myesha Mohiuddin
Nate Ackerman
Tiffany Rodriquez

DESIGN & UI/UX

Alexandria LaCorte
Sarah Jones
Tiffany Rodriguez

OUTREACH

Ky Duong
Selena Zhang

CITED WORKS

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PREFACE

Scientific innovation has given us countless discoveries that have led to a massive shift in medical treatments and procedures. From the synthesis of aspirin in 1838 to penicillin as the first antibiotic in 1928 to PreP as the first HIV prevention medication in 2013, science has given us the gift of longer, healthier lives. These life-altering discoveries are all backed by research and data, created by scientists who most likely did not ace their writing classes. There is a value to this kind of writing, though– these standards make studies reproducible and accurate enough to be backed by statistics. However, beyond academics, an effort should be made to translate a scientific statement into language which includes everything from the main idea to the advice we can gain from the results.

If you take a good look at a modern research article, you'll be overwhelmed by scientific jargon. Confusing language, abstract terms, and hard-to-read graphs make scientific research nearly impossible for most people to understand. Ironically, many of these scientific articles contain information that can be life-changing for the same people who can't understand it. Our goal at Curam Magazine is to provide a bridge between the scientists and the public. Our vision is to present this important information in a way that's easy to understand and engaging.

The magazine consists of three parts:

1. Current medical research: Interviews with researchers, professionals, and overviews of novel, cutting-edge research.
2. Art inspired by medicine: Personal poems, essays, and visual pieces.
3. Education: Important resources and facts.

In our very first issue, we want to focus on sexual and reproductive health. As one of the most important and pervasive issues facing each and every one of us, sexual and reproductive health education is vital. We are excited to present the many ways this concept manifests in all of our lives, communicating that information in a fresh and innovative way.

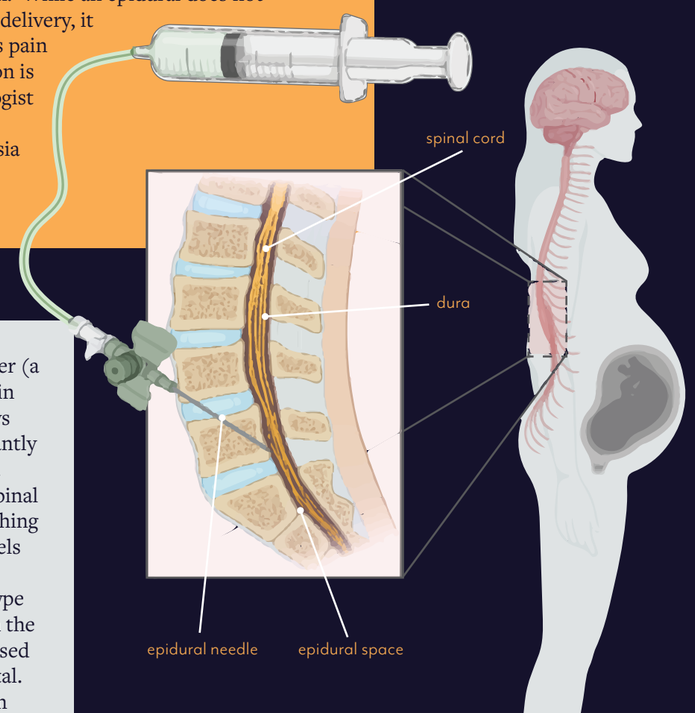
Disclaimer: CURAM Magazine is not affiliated with any particular political ideology. All information in this magazine is for educational purposes only and should not be used as a substitute for professional medical advice.

EPIDURAL ADMINISTRATION'S EFFECT ON PREGNANCY

By Myesha Mohiuddin

Reviewed by
Virgil Sanchez, MD
& Rita Barakat, PhD

When a woman experiences labor, there are not many remedies that alleviate the discomfort and pain. While an epidural does not directly facilitate the process of delivery, it improves comfort and decreases pain for the mother. Epidural injection is administered by an anesthesiologist or certified nurse registered anesthetist who inserts anesthesia into the epidural region of the patient's lower back.



During the process, a catheter (a small, sterilized tube) stays in the epidural space and allows for the medication to constantly be pumped (Holladay 2023). This ultimately blocks the spinal nerve pain signals from reaching the brain, and the patient feels no pain. The effect of the treatment depends on the type of epidural analgesia used in the hospital, which can differ based on the location of the hospital. For example, single-injection epidurals, epidurals with a catheter, and epidurals with patient-controlled analgesia are a few examples of techniques in which an anesthesiologist must be present to perform this procedure (Holladay 2023).

The main reason a mother may elect to have an epidural during delivery is to provide pain relief. Alleviating pressure off the lower body can make the process of childbirth much easier for the mother. While some people believe that this process is unnatural and birth should not be tampered, the Cleveland Clinic showcased data in which more than 50% of women giving birth in healthcare facilities chose to receive aid from an epidural (Holladay 2023).

50% of women choose to receive aid from an epidural when giving birth

80% of women experience postpartum depression which can last up to **7** months

The use of the epidural can provide many benefits in addition to pain relief. As Cesarean sections (C-sections) are sometimes inevitable in the birthing process, the numbing of pain from the previous epidural will allow the obstetrician to immediately perform a C-section, if deemed necessary. This provides peace of mind to the obstetrician in knowing that there won't be a necessity to rush to inject analgesia to the patient undergoing C-Section, as would be the case during active labor. Studies have shown that the use of an epidural may lead to a decreased risk of postpartum depression (Holladay 2023). Postpartum depression is a significant and unfortunately common side-effect of pregnancy, and Dr. Parise has found that it is observed in approximately 15% of women who give birth, and can persist for months or years after giving birth. Postpartum depression is seen at higher rates in women who experienced more pain during their pregnancy and labor - providing evidence that when epidural administration isn't prevalent, postpartum depression increases and incurs a heavier physical and emotional toll on the new mother, and ultimately her family (Parise 2021). Dr. Zakowski has observed epidural administration as a "win-win" situation for women. They don'texperience nearly as much pain, as well as reduced postpartum depression.

It is important to acknowledge that the use of an epidural has many side effects, which is a reason why many women abstain from this elective procedure. The risk of lowering one's blood pressure can have an impact on the heart rate of the fetus, due to the injected anesthetic. In a randomized blinded-study, researchers split women into two groups - one patient group received combined-spinal analgesia and the other received epidural analgesia. In the combined spinal-epidural group, results showed an abnormal heart rate for the fetus' (Patel et al. 2014). However, to reduce this complication, IV fluids can be given to the patients. Another disadvantage to the epidural administration is that women are highly prone to headaches if the needle punctures the outer layer of the spinal cord due to leakage of the spinal fluid (Holladay 2023). The feeling of numbness that results from the epidural as part of the analgesic may persist and spread within the body, resulting in lack of full bladder control and loss of bladder sensation. This usually lasts only a few days, but can still cause difficulties for the patient. The effects of the epidural can be long-lasting resulting in damage to the nerve cells in the spinal cord and other regions of the body (NHS England 2023). While these side effects are rare and some can be seen as minimal, women may choose to not have epidural administration - preferring a natural birth.

The administration of epidural is solely based on the woman's preferences. In many cases, doctors recommend it. However, women in labor should be in full control over what they would like injected into their body. The common side effects of an epidural do not affect the baby's health, which is why this procedure is so common in labor. The effects of epidural may linger after delivery, but is worth it in terms of reducing the pain during labor. This is a treatment option that the patient in labor can decide for themselves.

Finally, the presence of cultural differences can affect the access of epidural anesthesia being used, particularly in countries where this drug is not as widely available as it is in the United States. A study was conducted on postpartum Japanese women who gave birth in the United States. The authors found that based on previous stereotypes of what was heard about epidural anesthesia in Japan, it was not nearly as common for these women to undergo this procedure as it is among other ethnic populations in the United States. Overall, the evidence suggests that epidural administration is effective at decreasing the prevalence of postpartum depression in new mothers.

NUTRITION IN PREGNANCY & EFFECTS OF OBESITY

Reviewed by Kurt Hong, MD, PhD

By Ryan Wisniewski

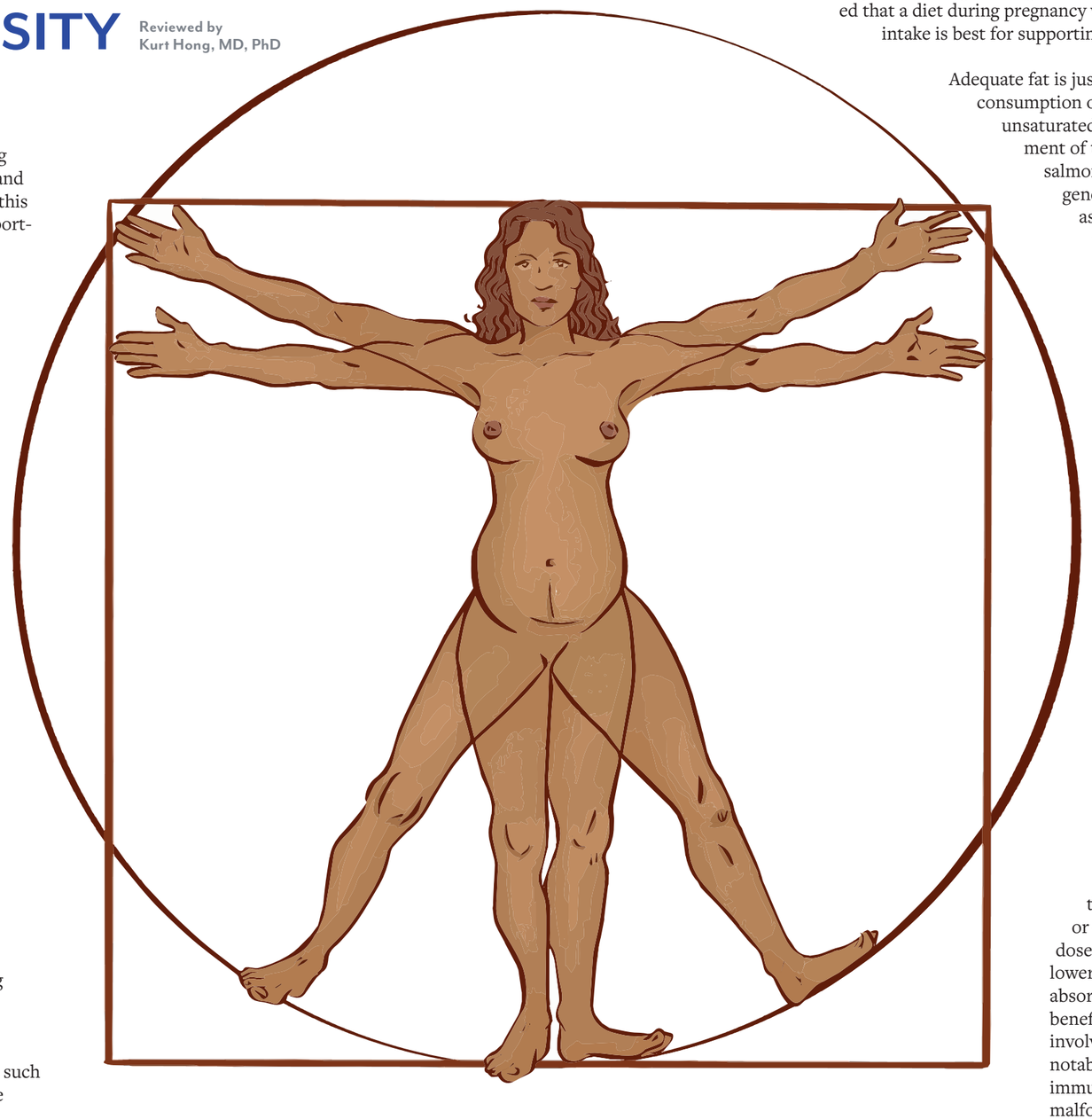
Nutrition is an important factor in one's life, especially during pregnancy. Not only does it affect a mother, but the delivery and life of a child. Maternal nutrition during pregnancy, and how this impacts placental and fetal growth and metabolism, is an important topic to women, their partners, and their health care professionals. With pregnancy, the overall nutrient needs are greater to meet the growing needs for the mother's metabolism and development of the baby.

Perhaps contrary to popular belief, energy requirements increase only modestly during pregnancy. Choosing nutrient-dense foods with adequate nutrients is more important than getting the calories without nutrients: so-called "empty" calories. Maternal undernutrition and overnutrition are both major risk factors in pregnancy, associated with negative effects. Only in the last two trimesters are energy needs increased—about 350 to 450 calories a day (Burdge et al. 2007). And while some conditions are more natural or expected—eg. nausea and vomiting during first trimester, heartburn and constipation in the third trimester—there are many ways to minimize risk and stay healthy with the power of a healthy diet.

MACRONUTRIENTS: PROTEIN, CARBS, AND FATS

When a fetus develops, during this cell replication, protein is essential in many metabolic processes. Around 0.9 to 1 grams per kilogram a day (about 0.45 grams per pound a day) over the entire pregnancy, as per the current Estimated Average Requirement (Burdge et al. 2007). Dairy products, meats, fish, poultry, eggs, and soy products are all high in protein. Or, some people may prefer an extra slice of ham or turkey, or a cup of yogurt. Regardless, proteins have structural and functional roles, important for all people and fetuses. These roles generally include metabolism-controlling enzymes, transport of materials, hormones for signaling, and muscle development (Gluckman et al. 2005).

Carbohydrates provide glucose—a primary fuel. Whole foods such as whole-grain breads, fruits, vegetables, and legumes provide glucose, as well as vitamins and fiber. Studies suggest that birth size varies by carbohydrate intake, with birth weight increasing with a greater carbohydrate intake. In a meta-analysis, researchers concluded that a diet during pregnancy with carbohydrates between 47% and 70% of daily calorie intake is best for supporting normal fetal growth patterns (Khaire et al. 2020).



Adequate fat is just as important. As a fetus forms fat in the third trimester, consumption of enough fat is a necessity. Specifically, poly- and mono-unsaturated fats contains omega-3 and EPA, needed for brain deveopment of the fetus. Omega-3 can be found in oily fish—anchovies and salmon—as well as tuna and eggs. In pregnant woman, as in the general population, trans fats should be avoided due to their association with increased risk of atherogenesis—creating plaque in blood vessels, leading to coronary artery heart disease and heart attacks—and increased inflammatory response. In contrast, EPA and omega-3 are important in maintaining healthy blood pressure, a strong immune system response, lowering inflammatory effects, and are associated with a lower risk of cardiovascular disease (Gluckman et al. 2005).

MICRONUTRIENTS:

It is estimated that up to 70% of all brain and spinal cord defects can be prevented with enough folate. Folate is a micronutrient required in fetal cell division and in creating new blood cells. A deficiency can result in low birth weight, preterm delivery, or in more severe cases, the spinal cord or skull do not form normally (Grimes and Wimalawansa 2003; Chan et al. 2013). Breads and pastas may be fortified with folic acid, while spinach, broccoli, and lentils are also great sources. Further, vitamin B12 regenerates the active form of folate; both are equally essential. Pregnancy requires a steady and slight increase of B12, with deficiencies most often observed in vegan women.

Another key micronutrient is iron. Iron needs are greater during pregnancy; it is key in the formation of red blood cells to carry oxygen throughout the body. So as a fetus develops, more tissue demands more blood, and therefore needs more iron. Iron deficiency may complicate the pregnancy, resulting in premature birth, low birth weight, or other developmental disorders (Garvey et al. 2016). Weekly doses of high-iron supplements are preferable to daily doses with lower amounts (Benyshek et al. 2006). Vitamin C enhances iron absorption and accommodates the fetus, so likewise, an increase is beneficial. Also, vitamin A in a fetus is important because of its involvement in the differentiation of rapidly dividing stem cells, notably the kidneys. Deficiencies are linked with newborn poor immune function and iron deficiency, while an excess may lead to malformations (Burdge et al. 2007).

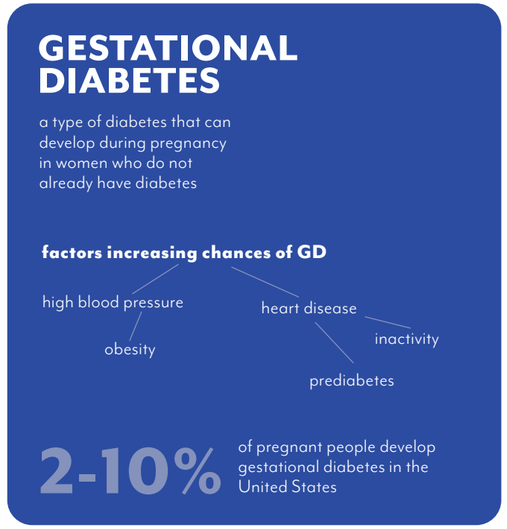
* omega-3 polyunsaturated fatty acid DHA (docosahexaenoic acid) and EPA – eicosapentaenoic acid

Along with folate and iron, iodine is also key during pregnancy due to its role in a fetus's neural development and in forming important thyroid hormones. Notably, a woman with an iodine deficiency risks her infant having cretinism, a form of retardation. In the most serious cases, a deficiency increases the risk of stillbirths while newborns may have stunted growth or deafness (Carducci et al. 2021; Burdge et al. 2007). This is rarely seen in Western society, with many salts being iodonized—having the iodine pre-mixed into the regular salt. Though zinc is an essential micronutrient—playing a role in DNA synthesis and tissue growth—recent data suggests that in pregnancy, the intake of this trace mineral may remain unchanged. Researchers have concluded that there is not enough evidence that zinc supplementation during pregnancy results in improvements in maternal or neonatal outcomes (Rimm et al. 2018). However, a deficiency may lead to malformations and other complications, including decreased iron uptake and immunity, so an increased intake may just ensure meeting the threshold.

Unlike iodine deficiency, a lack of vitamin D and its negative effects has been seen around the world (Pilz et al. 2018). It is most known to promote healthy bone growth, but its effects also extends in the short- and long-term for both the mother and child. Low levels are a risk factor for gestational diabetes, which tracks with developing type 2 diabetes later in life, as well as other pregnancy and other complications. Children whose mothers had low levels of vitamin D are associated with an increased risk of asthma, wheezing, respiratory infections, and eczema (Shen et al. 2018; Aryan et al. 2017). And because vitamin D is transfered to the baby through milk in breastfeeding—and not through the blood—the mother's intake must be much higher compared to during pregnancy to balance the new delivery and promote a healthy growth (O'Callaghan et al. 2018; Pilz et al. 2018).

NON-NUTRIENT EFFECTS ON PREGNANCY - ARTIFICIAL SWEETENERS

Artificial sweeteners are desired as a sugar substitute. Do they have long-term effects on a person or a fetus? Low-calorie sweeteners such as aspartame are regarded as safe to consume during pregnancy and lactation if recommended levels are not exceeded (Czarnecka et al. 2021; Serra-Majem et al. 2018; Ali et al. 2017; Nettleton et al. 2020; Sylvetsky et al. 2015). The acceptable daily intake of aspartame for humans is 40 mg/kg



in the United States for both adults and children (Silva and Santos 1994). That's about 20 mg/lbs—a 200 lbs mother should not exceed 4 grams (4,000 mg). Many studies find associations between aspartame and preterm delivery and allergic diseases (Englund-Ögge et al. 2012) though others do not (Marinovich et al. 2013). Though aspartame can cross into the fetus's environment, one study found that even at 200 mg/kg (90 mg/lbs) there was no proof that the aspartame had broken down into any potentially dangerous compounds, suggesting that at the much lower FDA-recommended levels, there should not be any negative effects (Ali et al. 2017; Marinovich et al. 2013). In some cases, aspartame use has also been associated with increased risk of type 2 diabetes, cardiovascular diseases, fatty liver disease and hormone-related cancers (Czarnecka et al. 2021). Studies focused on lower levels found that aspartame during lactation and gestation by pregnant/mother rats increased obesity in offspring and had a detrimental effect on glucose and insulin tolerance, specifically in males. That study show a mother's stress and diet in pregnancy having a stronger impact on males than females (Ali et al. 2017; Striegel-Moore et al. 2006). Rat models show a mother consuming aspartame led to her own weight gain, higher plasma glucose (linked with diabetes), and total cholesterol, implying a possible detriment on her child's learning (Blum et al. 2005). Mice models showed an impaired sense of satiety—"fullness"—and

an unbalanced metabolism, with more potential downstream effects (Czarnecka et al. 2021).

OBESITY AND ITS EFFECTS

Adjacent to diet, obesity plays a role in the health of a mother and newborn. Studies throughout the years have shown that there are consequences of obesity in fetal development, delivery, childhood, and adult health. Though the exact mechanisms are far from clear, recent studies and models have given some insights. Obesity before and during pregnancy is associated with an increased risk of fetal and maternal complications, including hypertension, diabetes, premature delivery, and spontaneous abortions. Notably, pregnancy and obesity risk a mother's tenfold increase in blood pressure. Also associated with obesity are certain birth defects, including cardiovascular defects, orofacial clefts, some intestinal defects, and limb reduction defects (Barker et al. 2005; Junien et al. 2007; Gluckman et al. 2021).

Obesity plays a significant role in that it deters metabolic and cardiovascular conditions, which in turn reduces and hinders parts of normal health, which influences maternal nutritional intake, placental transfer mechanisms, and uterine blood supply. Notably, obesity is associated with a chronic state of inflammation, which alters the body's use and treatment of fat. One role of adipose tissue (aka body fat) is the production of adiponectin—a pro-inflammatory cytokine, a type of protein used in cell-to-cell signaling. Part of that cell-to-cell signaling makes adiponectin important in promoting insulin sensitivity and stimulating glucose uptake. Pregnant obese women typically have low adiponectin levels, associated with increased fetal growth. More, some evidence suggests that maternal obesity influences the regulation of fetal appetite, satiety, and adipocyte (fat) development (Olson 2012). In rat experiments, the offspring of mothers fed with high-fat diets during pregnancy display postnatal hyperphagia—excessive hunger. On average, those with mothers with high-fat diets ate more food and maintained higher weights than normal (Muhlhausler and Ong 2011).

There is an overall inverse relationship between birth weight and life-long health at both ends of the birth-weight curve. Excessive maternal body weight or weight gain has significant and permanent consequences in the child's weight-regulating mechanisms, involving the hypothalamus in the brain, pancreas cells, and adipose tissue (Pirkola et al. 2010). From both experiments with mice and from meta-analyses of human populations, fetal overnutrition during pregnancy carries an increased risk of various problems later in the life such as obesity, high blood pressure, and diabetes (Ong 2006).

Though the trends may hint at an unbreakable cycle, there are many ways to improve and promote health, for oneself or for a fetus. Many environmental factors likewise have an incredible influence on the weight, health, and future of a child.

DIET THROUGH THE GENERATIONS

Perhaps most interesting is the effects of nutrition throughout generations. Nutrient deprivation in utero—as a fetus—not only leads to a newborn's low birth weight but an adaptation to a "deprived" environment with an increased metabolism—increased efficiency of nutrients (Kim et al. 2022; Elango and Ball 2016). This "predictive adaptive response" is an example of generational metabolic adaptation—a type of adaptive pre-programming. This response includes behaviors such as appetite regulation, decreased physical activity, irregular fat cell metabolism, and altered energy production (Gluckman et al. 2005). The fetus was "trained" and learned how to metabolize food in a specific context, which often does not align with the outside world. Later in a newborn's life, these conditions may result in metabolic issues, including obesity, diabetes, and cardiovascular disease (Khaire et al. 2020; Hales and Barker 2001; Freake 2000; Garg et al. 2013; Anwer et al. 2022). Studies have shown that certain dietary restrictions change gene expression in breaking down sugar and fat in their offspring and even grand-offspring, even when those offspring and grand-offspring had no dietary restrictions (Jensen et al. 2014; Bauchner et al. 2004). Some research has shown that maternal dietary restriction damages the processes of normal DNA packaging and use in the liver. Other research supports the idea that nutrient restriction during pregnancy results in certain traits such as elevated blood pressure and other vascular conditions, passed down to a second and third generation (Berlin et al. 2002).

Maternal overnutrition likewise has negative consequences. Studies with mice and rats demonstrate that grand-offspring traits of multigenerational high-fat* diets were 43% higher in a variety of traits than those of the control group—those with a balanced nutritious

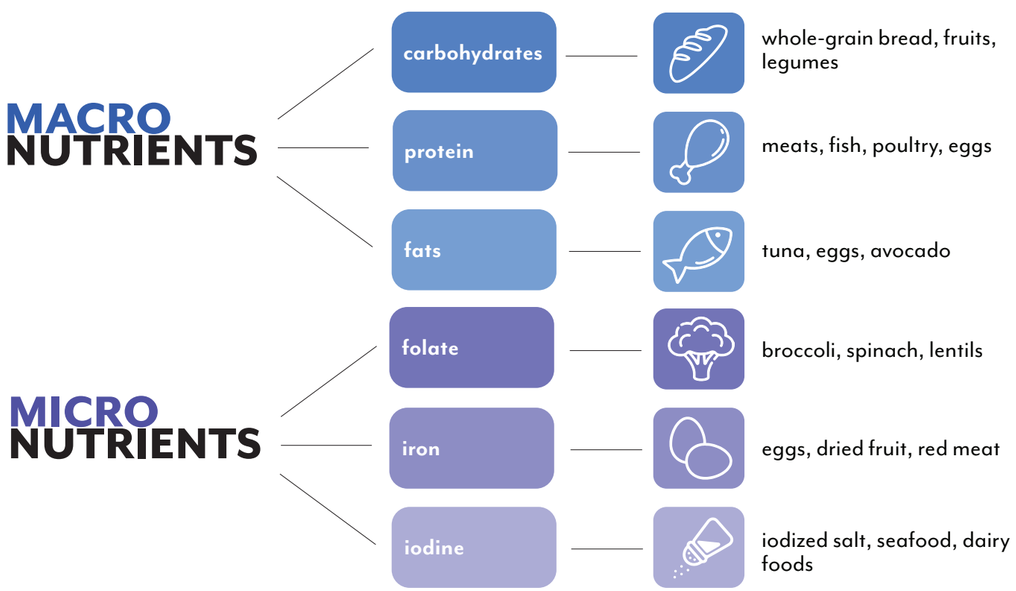
diet. Through multigenerational consumption of high-fat diets, grand-offspring had significantly higher levels of obesity (121%). Those grand-offspring also had higher levels of fasting insulin, leptin, and triglycerides. Respectively, these are associated with diabetes, hunger control, and fat storage, and all in weight gain and greater body mass. Through the one-off grandparent group—where only one grandparent had a high-fat diet—the average showed a similar but much weaker trend (Ponzio et al. 2012; Anwer et al. 2022; Nowacka-Woszuk et al. 2017; Garg et al. 2013; West et al. 2013).

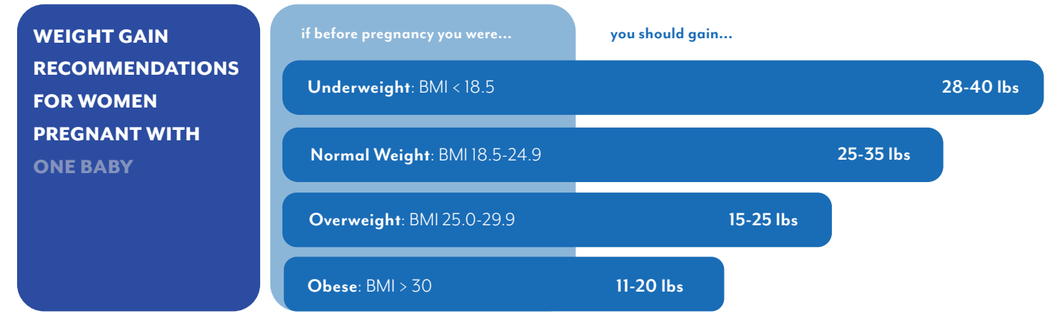
CHANGES IN THE BRAIN?

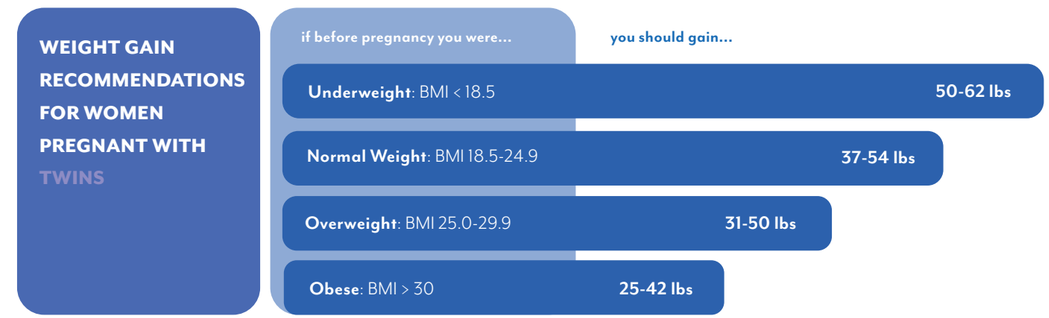
Interestingly, glucose, but not insulin, can pass into the placenta and enter the fetal environment (Oken 2003). This means the baby—not the mother—is responsible for producing the insulin, allowing the sugar to be used. However, insulin is also an important neural growth factor, meaning that since more insulin is made, there is an imbalance that may change the neural circuitry needed in regulating energy (Simerly 2008; Sullivan et al. 2014). With leptin however, the exact direct relationship between leptin and brain development is not completely explored. Some evidence suggests the amount of leptin is essential for a fetus to wire parts of the brain, and increases above the normal amount may seriously impact programming behavior and physiology. It is clear that high levels are associated with dysfunction of the placenta, so it is possible for it to impact brain development through the placenta (Challier et al. 2008; Uzelac et al. 2010; Sullivan et al. 2014).

SEROTONIN

Typically, obese pregnant women have increased levels of inflammatory cytokines, which leads to placental dysfunction (Park et al. 2009; Madan 2010). Evidence suggests that from a mother's high-fat diet, higher levels may disrupt brain development and therefore may influence and "reprogram" the brain of a newborn. The development of neurotransmitter systems that are important for behavioral regulation, such as the serotonergic and dopaminergic system, are sensitive and respond to cytokine levels (Das 2001). More, human studies show in increased association between increased inflammatory cytokines with emotional and behavioral disorders including anxiety (Toker et al. 2005; Pitsavos et al. 2006), depression (Toker et al. 2005; Dantzer 2012), ASD (Goines et al. 2011; Ashwood et al. 2011; Ashwood et al. 2011), and ADHD (Oades 2011; Oades et al. 2012; Donev 2010). Brain development involves processes of migrating neurons to their designated area, forming new







neurons, and forming circuits between neurons. This process is partly regulated by serotonin (Kannan et al. 2011; Daws and Gould 2011). Animal models find that maternal inflammation disrupts the pathway to form serotonin, which may impact immune function and placental blood flow (Munn et al. 1998; Pfaff et al. 2008). Not only does high-fat dieting reduce placental blood flow, but this effect amplified through obesity and insulin resistance. Reduction in serotonin is associted with mental health and behavioral disorders in humans, including anxiety (Kiyohara 2009), depression (Sullivan et al. 2006), ADHD (Oades et al. 2008), and autism (ASD) (Challier et al. 2008; Chugani et al. 1999), and so this suppression of the serotonergic system increases the risk of offspring developing a number of behavioral disorders (Challier et al. 2008).

Overall, there appears to be a correlation between high-fat "Western" diets and negative consequences in children and grandchildren, though the exact consequences are yet to be completely outlined.

SUMMARY / TLDR:

The power of a healthy, balanced, nutritional diet cannot be overstated. Whether pregnant or not, a person's diet is simply the fuel for life. New research is constantly unraveling unknowns and revealing information regarding the effects of individual nutrients on one's health. To have a balanced diet and an informed choice is the best course we can choose. Though there is still much to learn, the general idea is understood; a nutritious and balanced diet is best for a mother and child.

AYAHUASCA'S ROLE DURING PREGNANCY: SPIRITUAL ENHANCER OR BIRTH DEFECTOR?

By Nate Ackerman

Reviewed by Rebekah Black, PharmD

Ayahuasca is a psychoactive plant brew considered to be the primary orally-active route of administration for N,N-dimethyltryptamine, or DMT. A powerful serotonergic receptor agonist, DMT produces vivid hallucinations and out-of-body experiences that last approximately four hours (Stein et al. 2022). While DMT was first synthesized less than 100 years ago back in 1931 and its psychoactive effects were just recently described in 1956, people across the Amazon basin have ingested DMT-containing ayahuasca for thousands of years. Many shamans and midwives, trained spiritual guides who lead ayahuasca rituals, remain active despite the advancement of more modern, westernized medicine in these countries. These spiritual leaders traditionally prepare the brew by boiling the ayahuasca vine (*Banisteriopsis caapi*) and chacruna shrub (*Psychotria viridis*) in water before administering it to their patients (Barker 2018).

"Psychedelics" and "childbirth" are two words which are seldom heard in the same sentence. This is because in western cultures, mothers are strongly discouraged from and oftentimes shamed for using psychoactive substances while pregnant, often in the form of judgemental side-eyes cast at pregnant women enjoying a drink or cigarette, or perhaps an OB/GYN scolding her patient who was honest about her drug-use during a visit. Cases of fetal alcohol syndrome and cocaine-addicted babies are perhaps the most well-known examples of mother-to-fetus transmission that fuel this standard of sobriety during pregnancy, but the use of psychedelics during pregnancy is much less commonly discussed in the context of the birth experience in North America. In contrast, numerous South American religions and cultures engage in psychedelic rituals during pregnancy and childbirth, using natural entheogens like ayahuasca.

In the United States, the spirituality has been taken out of childbirth by the advancement of corporatized and heavily regulated modern medicine, as over 98% of births occur in hospital settings under the supervision of medical doctors (MacDorman et al. 2019). As a result, labor is treated primarily as a medical procedure in the U.S. as opposed to a spiritual experience; the prescription of psychedelics is virtually unheard of, as most of these substances, including ayahuasca, fall into the DEA Controlled Substances Act's Schedule I—a classification reserved for drugs with a high potential for abuse without any medical utility (DEA 2023). Instead, mothers are often numbed using powerful opiates like fentanyl, providing much-needed pain relief but also diminishing the emotional and spiritual experience of labor (Show et al. 2022). The influence of western medicine and its rejection of psychedelic medicine has spread throughout South America, prompting critics in these cultures to question the safety of ayahuasca rituals in the context of pregnancy.

Critics argue that ayahuasca poses a risk to the development and well-being of the unborn fetus, while ayahuasca users contest that access to the plant is an acceptable expression of their religious and personal freedoms. In Brazil and Peru, the public discourse became so hotly debated that each country's respective federal governments ruled upon the issue. In both countries, it was determined that the use of ayahuasca by pregnant women is a constitutionally protected right, with Brazil's National Council on Drug Policy (CONAD) stating: "with reference to pregnant women, they themselves assume the responsibility for deciding the degree of their participation [in ayahuasca ceremonies]" (Labate 2011). This decision signifies the Peruvian and Brazilian government's valuation of the cultural and religious significance of ayahuasca, but does this freedom compromise fetal health?

Despite the controversy surrounding ayahuasca, there is no definitive scientific consensus regarding its embryotoxicity in humans—scientists aren't quite sure. However, numerous studies have been conducted wherein ayahuasca or its active ingredients were injected into pregnant rats. For example, harmaline, the chemical allowing ayahuasca to be orally active, was administered to pregnant rats and found to have "only a slight, if any, deleterious effect on early pregnancy" (Riba et al. 2003). On the other hand, a study in which extremely high doses of ayahuasca, 5x and 10x the typical human dose, were injected into pregnant rats found that the drug resulted in low fetal birth weight as well as skeletal and visceral abnormalities. However, the administration of the typical human dose to rats did not cause these abnormalities (Oliveira et al. 2010). It is important to note that these studies are limited in that the rat's response may not translate to that of humans, which is supported by the testimony of Dr. Charles Grob, a professor of pediatrics at UCLA. Dr.Grob, who studied the União do Vegetal people in Brazil, reported that children exposed to ayahuasca in utero performed similarly to the control group on neuropsychological and psychiatric exams (Labate 2011).

Overall, the use of ayahuasca during pregnancy and childbirth remains a controversial topic that raises questions about personal freedom, cultural and religious practices, and fetal health. While scientific studies on the embryotoxicity of ayahuasca in humans are limited and inconclusive, the despiritualization of the birth experience in western cultures, in contrast to the spiritual significance given to childbirth in South American cultures, highlights the opportunity to provide a more spiritual child-birthing experience to mothers in the United States.

POSTPARTUM DEPRESSION AND PSYCHOSIS

By Ariana Pomakian

Reviewed by
Talia Oughourlian, PhD

INTRODUCTION

For decades, postpartum depression and psychosis have gone undiagnosed and untreated due to stigmas surrounding the illnesses, as well as discrepancies in pregnancy and postpartum medical care. Though a mystic cloud seems to exist over postpartum depression, it is simply a medical condition that deserves the same amount of recognition and treatment as any other illness. Postpartum blues, a risk factor for postpartum depression, is a common condition that affects 70-80% of women within 10 days after giving birth (*Baby Blues* 2019). Though postpartum blues usually resolve with time and don't require medical intervention, the condition has the capability to evolve into postpartum depression. Postpartum depression, or PPD, is a major depressive disorder classified by depressed mood and loss of interest in activities, maternal or otherwise, that persists for over two weeks (Pearlstein et al. 2009). Additional symptoms may include trouble sleeping and eating, loss of energy and concentration, irritability, feelings of worthlessness, feelings of detachment from their child, and even self-harm or suicidal thoughts (Pearlstein et al. 2009). Those diagnosed with PPD or Postpartum Psychosis may also have thoughts or intent of harming their child (Stewart et al. 2019).

DIAGNOSIS

Unfortunately, diagnosis of PPD can be complex as it is difficult to distinguish normal postpartum symptoms, like difficulty eating, sleeping, and concentrating, from symptoms of PPD. For this reason, several screenings exist for the diagnosis of PPD, including the Edinburgh Postnatal Depression Scale and The Postpartum Depression Screening Scale (Pearlstein et al. 2009). However, these screening exams, like other patient surveys, are self-report examinations in which the patients themselves fill out a questionnaire that is then given to a primary care physician, an obstetrician, or a psychiatrist. Self-report examinations may not provide adequate diagnostic information and often result in high rates of false diagnoses, allowing PPD and PPP to go undiagnosed. Therefore, it is important to conduct a comprehensive review of the patient's mental health history, especially during pregnancy, in order to accurately diagnose PPD. For example, those with a history of heightened anxiety and stress during pregnancy are at a higher risk of developing PPD. Health complications may also play a significant role (Pearlstein et al. 2009). Premenstrual Dysphoric Disorder, for instance, is a condition defined by severe physical and behavioral changes usually due to a hormonal imbalance and can be a large risk factor of PPD (Pearlstein et al. 2009). External factors including marital conflict, issues with income, lack of support, and pregnancy at a young age raise the likelihood of PPD. As most of the diagnostic exams for PPD rely on psychosocial factors, there is enormous room for human error and, therefore, false positive diagnoses (Thomas et al. 2020). Therefore, to best combat the false diagnosis of PPD, it is important to understand the pathophysiology of the diseases and develop better screening protocols in order to improve postpartum standard of care (Witthöft 2013).

While Postpartum Psychosis (PPP) can easily be misdiagnosed, it is much easier to recognize than postpartum depression. The onset of postpartum psychosis is usually very sudden and begins within two weeks after giving birth (Osborne 2018). The largest risk factor for PPP is a history of bipolar disorder or psychological disorder (Osborne 2018). The disease has distinct clinical features including a varied state of consciousness, confusion, disorganization, derealization, and delusions (Osborne 2018). While symptoms of psychosis are the most defining aspect of PPP, insomnia, anxiety, irritability, and mania are early symptoms of the disease. As there are a multitude of PPP characteristics, the disease can be organized into three main profiles: 1) PPP characterized by mania and/or agitation, 2) PPP characterized by depression and/or anxiety, 3) PPP with a mixed symptomatology (Osborne 2018). Unfortunately, the delusions that individuals with PPP experience largely revolve around their children (Osborne 2018). For this reason, mothers in a state of psychosis may want to bring harm to themselves and their children.

PATHOPHYSIOLOGY

Currently, the pathophysiology of postpartum depression is not well understood. However, a few genetic and hormonal biomarkers may be effective in identifying individuals at higher risk of developing the disease. Hormones that are highly active in the body during pregnancy change dramatically once an individual has entered the postpartum stage. Estrogen and progesterone are the two hormones that play the largest role in menstruation and pregnancy. Progesterone is most abundant during pregnancy but drops almost instantly after giving birth (Payne 2019). Drastic changes in hormone concentrations can have very negative effects on the human body. For this reason, a sudden drop in progesterone has the potential to cause sudden emotional and physical changes. Additionally, after birth, progesterone secretion will not resume until the first menstrual cycle begins. A sudden hormonal shift accompanied by a long or short term imbalance is one of the biochemical mechanisms driving postpartum blues and depression (Payne 2019).

Oxytocin is another essential hormone during pregnancy and postpartum that promotes maternal tasks such as labor, lactation, and bonding with one's child (Thul et al. 2020). In some instances, synthetic oxytocin is administered in order to induce labor. A study that examined the effects of naturally secreted oxytocin on postpartum individuals found that higher oxytocin concentrations during the postpartum stage was significantly associated with less depressive moods or state (Thul et al. 2020). Furthermore, inadequate levels of oxytocin after birth can be associated with difficulty lactating and feeding. Breastfeeding plays an important role in helping mother's bond with their newborn children and difficulty doing so can lead to detached feelings for one's child, subsequently raising the risk of developing postpartum depression.

PATHOPHYSIOLOGY
[path·o·phys·i·ol·o·gy] *noun*
the study of abnormal changes in body functions that are the causes, consequences, or concomitants of disease processes.

NEURO-TRANS-MITTER
[neu·ro·trans·mit·ter] *noun*
chemicals that allow neurons to communicate with each other throughout the body.

Alterations in neurotransmitter release, specifically serotonin and norepinephrine, also play a significant role in the development of PPD. Serotonin plays a large role throughout the nervous system, and is particularly important in regulating emotions and mood. Having adequate levels of serotonin is important for maintaining emotional balance; unfortunately, in high stress environments, like childbirth, the brain can have difficulty creating and releasing adequate levels of serotonin, thus triggering feelings of anxiety (Fredricks 2014). In addition, norepinephrine is a neurotransmitter involved in regulating wakefulness and alertness, as well as controlling the body's fight-or-flight response. A lack of norepinephrine not only results in a lack of energy and motivation, but can lead to sleep disturbances, anxiety, and depression (Fredricks 2014).

Similar to postpartum depression, the pathogenesis of postpartum psychosis is not completely understood. However, sleep disturbances and hormonal changes play a large role in the development of PPP (Osborne 2018). Lack of sleep is a known trigger for psychosis and, when combined with the arduous effects labor has on the body, risk of mania is heightened (Fredricks 2014). Similar to PPD, the dramatic postpartum shift in pregnancy hormones, estrogen and progesterone, can cause a large hormonal imbalance that alters the physical and emotional state of a patient. Those with a previous history of mania or psychosis are highly sensitive to dramatic hormonal changes and, therefore, are much more likely to develop postpartum psychosis. Further research must be conducted in order to investigate the relationship between hormone concentrations in the pre and postpartum period and patients outcomes.

TREATMENT

Postpartum depression, like many other psychological disorders, is highly misunderstood due to inaccurate historical interpretations and social stigmas surrounding these conditions. Furthermore, self-reporting based diagnosis is susceptible to response bias, particularly resulting in patients under-reporting their symptoms due to the social stigmas surrounding PPD. Though PPD is a major health issue, it is difficult to diagnose and equally challenging to treat. Antidepressants are commonly used to treat depression and, in theory, should have the same effect on patients with postpartum depression. However, it is dangerous to expose postpartum mothers to antidepressants, as their breast milk could be contaminated by the medication. While a handful of antidepressants have been deemed safe for breastfeeding mothers, the long-term effects of these medications have not been thoroughly tested in infants (Leight et al. 2010). Breastfeeding is highly recommended in the first six months of life due to its abundant benefits, but it is not strictly necessary and can be replaced with formula based alternatives with an obstetrician's approval.

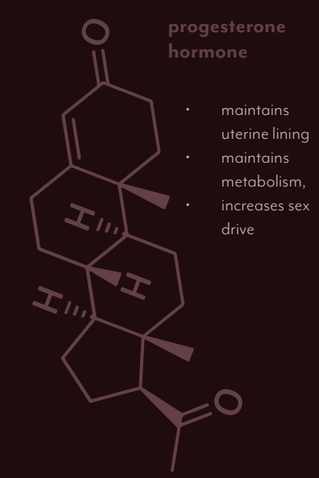
As dramatic hormonal shifts play a large role in the onset of postpartum depression, hormonal therapy is becoming an effective treatment for PPD. A study that researched the effects of estrogen hormone therapy on patients with a history of PPD, found that 10 out of 11 women who were given low doses of estrogen immediately after birth did not suffer a relapse in symptoms (Leight et al. 2010). While the findings of hormonal therapy studies are promising, most studies utilized small cohort sizes, thus further longitudinal investigations on larger, more diverse study populations are necessary to evaluate the prolonged use of hormone therapy to treat PPD. Additionally, the long term effects of hormonal therapy on breastfeeding infants have not been conclusive.

The most common treatment for PPD is psychosocial and psychological therapy as it is the safest option for nursing mothers. Interpersonal therapy (IPT) is one type of psychosocial therapy that studies the social issues that affect mental health (Leight et al. 2010). IPT was initially created to treat major depressive disorders by helping patients make real changes to their relationships. Cognitive behavioral therapy (CBT) is another form of psychosocial therapy that focuses on identifying and correcting negative thinking and mood (Leight et al. 2010). Currently, psychological therapy is the most common way to treat PPD, however this treatment may not be accessible, affordable, or effective for everyone.

The treatment of postpartum psychosis is equally difficult and is based heavily on medical intervention. Antipsychotics are commonly used to relieve manic and psychotic symptoms in those with PPD. While antipsychotics are effective in treating the major symptoms of PPP, they must be paired with mood stabilizers for the best chance at remission (Leight et al. 2010). Lithium, a mood stabilizer commonly used to treat PPP, has a high efficacy rate in treating the condition and maintaining remission (Leight et al. 2010). Electroconvulsive therapy (ECT) is a popular treatment for severe PPP that sends electric currents into the brain in order to alter brain chemistry and function. While the treatment is rather controversial, it is often effective. Unfortunately, the most common and effective ways to treat postpartum psychosis are not safe for nursing mothers, as they may affect infants through breast milk. If patients choose to breastfeed while being treated for PPP, infants must be closely examined and tested for any toxicity.

CONCLUSION

Postpartum depression and psychosis, like many other mental disorders, have, historically, been severely misunderstood. Due to this fact, the stereotypes surrounding the conditions make treatment and diagnosis difficult. Postpartum depression is a common disease that affects one in seven women (Mughal et al. 2022). The development of safer, more effective treatment is imperative for the safety of mothers with postpartum depression and psychosis and their children. Additionally, education on the prevention of PPD and PPP must be more widespread and easily understood. Reevaluating the current standard of care for postpartum conditions is imperative for accurate diagnoses and treatment of affected patients.



A COMPLETE GUIDE TO CONTRACEPTION

Interview with
Brian T. Nguyen, MD, MSCP

By Aidan Scanlan

MALE CONTRACEPTION

HORMONAL CONTRACEPTION

WHY DO WE NEED MALE HORMONAL CONTRACEPTION?

Dr. Brian T. Nguyen, principal investigator of the EMERGE (Expanding Male Engagement in Reproductive and Gender Equity) lab at the Keck School of Medicine at the University of Southern California, explained that there are many individuals whose specific contraceptive needs would make male hormonal contraception a good choice. This group includes "people who currently do not use contraception or for whom female contraception is inappropriate, unsafe, or unwanted." Male hormonal contraception is also a good way for the male partner in a heterosexual relationship to lift the psychological strain of remembering to both obtain and take the contraceptive pill off of the shoulders of their female partner. It can act as a contraceptive failsafe as well as a way to distribute the burden of contraception more evenly between partners.

HOW DOES MALE HORMONAL CONTRACEPTION WORK?

Dr. Brian T. Nguyen explained that hormonal male contraception uses external male sex hormones, primarily testosterone, to shut down sperm production while retaining the sexually-dimorphic characteristics like muscle tone and facial hair promoted by testosterone. In the human body, the testes produce both sperm and testosterone, the signals for which are controlled by the endocrine system, centralized in the brain. When there is not enough testosterone in the bloodstream, the brain sends signals to the testes, telling them to produce more. Crucially, it is low testosterone in the bloodstream, not the testes, that signals the brain to tell the testes to produce more; by administering a significant amount of testosterone into the bloodstream, the brain thinks it has enough and signals the testes to stop producing it. This creates a very low level of intratesticular testosterone (since the testes have stopped producing it) while maintaining a physiologically normal level of serum testosterone (due to external supplementation). The high level of serum testosterone ensures maintenance of sexually-dimorphic male traits, while the low level of intratesticular testosterone causes sperm production to stop completely (Wang 2010). Progestins are commonly added to testosterone to potentiate the suppression of this system, although the best combination and ratio of hormones is still being determined. There are multiple methods of administering the contraceptive, including intramuscular injection, implant, oral pill, and transdermal gel.

Men interested in hormonal male contraception are commonly worried about the impact on their future fertility. Luckily, human clinical trials show that men whose sperm counts drop to zero are able to fully recover after they stop taking the exogenous hormones. Users of longer-acting methods, notably the injection and the implant, can take a longer time to recover to their baseline sperm level, but complete recovery happens almost 100% of the time (Wang 2010). When looking at published data on injectable methods, sperm count typically returns to baseline within three and a half months of stopping the hormonal contraception, although in some cases it can take up to two years (Wang 2010). Dr. Brian T. Nguyen explained it like this: "male hormonal contraception doesn't mess with any of the machinery that produces sperm, it just flips the switch controlling sperm production from 'on' to 'off' for the duration of the treatment." This is why there are typically no long-term side effects that persist after one stops taking the hormonal contraceptive, at least in the studies that have been conducted thus far.

CONDOMS

Latex Condoms

Use latex condoms if...
- Neither your nor your partner are allergic to latex
- You want protection against pregnancy & STIs

Latex condoms are the most effective condom option for preventing pregnancy.

Non-Latex Condoms

Use non-latex condoms if...
- You or your partner are allergic to latex
- You want protection against pregnancy
- If you also want protection against STIs, use synthetic latex alternatives like polyisoprene or polyurethane

VASECTOMY

Get a vasectomy if...
- You are certain you do not want children in the future
- You want protection against pregnancy, but do not need protection against STIs

FEMALE CONTRACEPTION

When, if ever, do you want to get pregnant?

"Sometime in the next five years, just not right now"

Pill

Use the pill if...
- You can remember to take it consistently every day

Patch

The patch is placed on the skin and releases the hormones estrogen and progestin into the body in order to prevent pregnancy. It is replaced once per week. It may cause skin irritation, and if it falls off the skin (which is rare) without being reapplied successfully within 24 hours, it will not prevent pregnancy and you will need to apply a new patch.

Vaginal Ring

The ring is a flexible plastic ring that is placed inside the vagina and replaced once per month. It releases the hormones oestrogen and progestogen, which help to protect against pregnancy. It can be uncomfortable, and can increase vaginal discharge.

Side effects while on the contraceptive include weight gain, acne, mood changes, and libido changes (Abbe 2020). Most of the current research centers around trying to determine the ideal dose and combination of hormones (such as testosterone and synthetic progestins) that minimizes negative side effects while maximizing contraceptive effectiveness.

WOULD MEN ACTUALLY BE INTERESTED IN USING HORMONAL CONTRACEPTION WHEN IT BECOMES AVAILABLE?

Several population and clinical trial surveys show that a significant portion of the male population would be willing to try hormonal contraceptive methods, although willingness does vary based on socioeconomic status, race, and some other factors. Studies show that currently, between 54% and 72% of men report that they would use hormonal contraceptives once they are approved and enter the market (Heinemann et al. 2005; Nguyen et al. 2020; Nguyen and Jacobsohn 2023). A study conducted by Dr. Brian T. Nguyen (2023) found that increasing gender-equitable attitudes among young men are correlated with an increased willingness to use male hormonal contraception, which makes sense because one of the main reasons to use male hormonal contraception (although certainly not the only reason) is to distribute the burden of contraception more evenly between heterosexual partners. Women are on board as well, with a study published in 2000 finding that of the approximately 1900 women who participated in the study, more than 85% think a hormonal contraceptive for men is a "good idea," and more than 95% would trust their partners to use it reliably (A.F. Glasier et al. 2000). This contraceptive method will significantly benefit both men and women, by helping decrease rates of unintended pregnancy and allowing men to contribute to gender equity in their sexual relationships by sharing in the responsibility of family planning.

"Not in the next five years"

IUD (Intrauterine Device)

Use an IUD if...
- You want a low-maintenance form of contraception
- You can tolerate some pain during insertion (medication can minimize this)
- You want to minimize your systemic (whole-body) exposure to exogenous hormones

Injection (Depo-Provera)

Use an injection if...
- You can reliably return to the clinic/hospital to receive injections
- You understand and accept the risks of decreased bone mineral density

Implant (Nexplanon)

Use an implant if...
- You want a low-maintenance form of contraception and would not be able to take the pill reliably
- You don't want to have a period, or at least would prefer a very infrequent period or irregular spotting

PRESERVING HOPE AND NEW BEGINNINGS THROUGH ONCOFERTILITY

Interview with Lynda McGinnis, PhD

By Baishali Chaudhuri

Cancer—a disease that robs people of their health, time, and dreams. We are in the midst of an ongoing ruthless war, and anyone of any age can be drafted. Luckily, although there is no cure yet, research advancements are leading to treatments that extend life expectancy and restore one's welfare. As survival rates rise, cancer warriors can focus on a future filled with hope, and for some, this may include children. But after all the chemo and radiation, is reproduction even a possibility for them?

Oncofertility has made it so. Oncofertility is a field of medicine, intersecting oncology and reproductive endocrinology, that aims to maximize the reproductive potential of cancer patients and survivors and grant them a better chance to have their own children (UCLA Health 2023). As treatments continually improve and raise patient survivorship, the ability to conserve fertility options becomes more pertinent. For patients who wish to conceive, the prospect of losing the potential to have biological children due to their cancer treatments can be distressing, and oncofertility offers hope by providing options—such as egg or embryo banking—to preserve their fertility and maintain their future reproductive choices (UCLA Health 2023).

However, one area of research that has been under-examined in the field of oncofertility is the impacts of long-term chemotherapy drugs on reproductive health. Much is known about how the effects of immediate/short-term treatments—chemotherapy, radiation, and surgery—on the ovarian system can lead to genetically impaired oocytes, and how these treatments can lead to scarring on reproductive organs, further inhibiting fertility (Alteri et al. 2020b). Yet, the research surrounding hormone therapies—long-term drugs that prevent hormones from stimulating cancer cells —is limited (Alteri et al. 2020a). An unmet need, the reproductive effects of chemotherapeutics that cancer survivors have to take for decades has not been fully explored.

OOCYTES
[o·o·cytes] *noun*
an egg before maturation: a female gametocyte

ESTROGEN
[es·tro·gen] *noun*
a steroid hormone that maintains regulation of the female reproductive system

Helping to pioneer this exploration is Dr. Lynda McGinnis, a research scientist in Reproductive Endocrinology and Infertility. McGinnis runs a lab at the Norris Cancer Center at the University of Southern California, and currently, her team is looking into Tamoxifen, a drug that blocks estrogen receptors of breast cancer cells so estrogen cannot bind and allow the cell to multiply and grow (Conner, McCleary-Harris, and Uscher 2022). People who have had breast cancer and have finished being treated with chemotherapy, radiation, and/or surgery typically go on Tamoxifen for at least five to ten years (some even take it for twenty or thirty years). While this long-term drug has proven to significantly reduce the chance of breast cancer recurrence and the mortality rate, its effects on the reproductive health of those who wish to conceive children remains unknown (Davies et al. 2013). McGinnis and her team plan to look at how Tamoxifen's ability to inhibit estrogens has an effect on one's ability to have children after receiving the drug for several years.

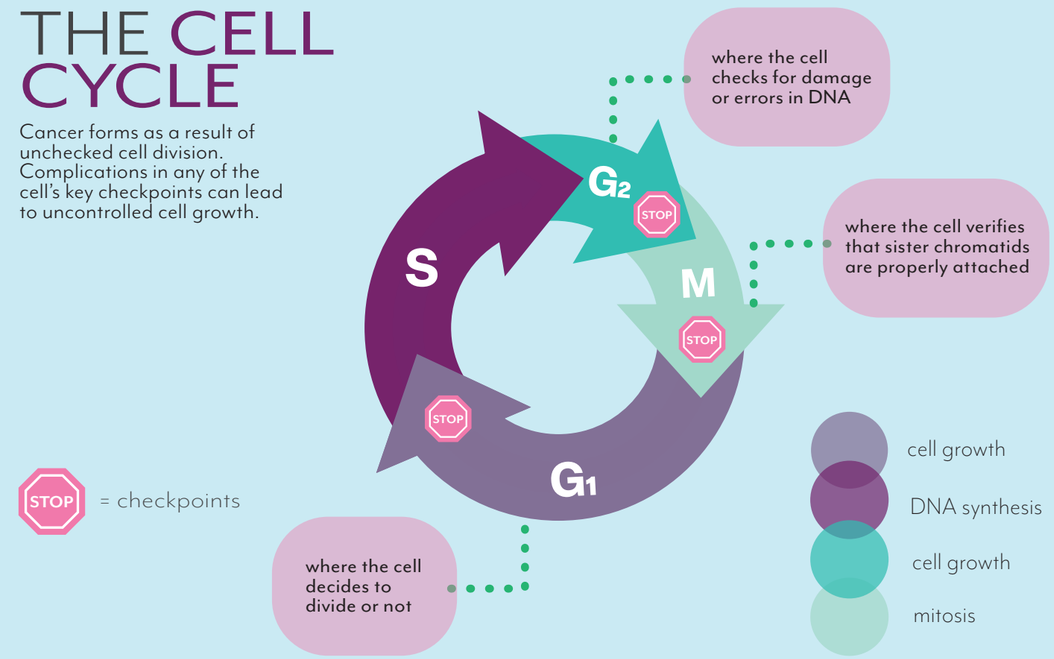
From their mouse model studies, they have found that in general, the ovaries seem to be unaffected, suggesting that the resulting eggs from oocytes would remain fine and unharmed. However, results are starting to reveal that there may be some long-term uterine effects that will impair reproductive outlook.

Tamoxifen behaves differently in different tissues. In breast tissue and in the ovaries, Tamoxifen inhibits estrogen receptors, which is why it is primarily used for women who are estrogen-sensitive and have had breast cancer. However, Tamoxifen is stimulatory in the uterus, so for women who have been taking this drug for a long period (5+ years), it can increase the chance of developing uterine cancers. It has been known that it can have a negative impact on the uterus if one takes it for a long time. McGinnis's mouse studies are confirming that there is evidence of long-term effects on the uterus, rather than the ovary. For Dr. McGinnis and her team, the next step now is to look at how the uterus can be protected during these long-term periods of taking Tamoxifen.

As more strides in developing therapeutics that produce increasingly better outcomes are made in medicine, the longevity of patients continues to rise. Cancer can be put into remission, offering survivors who are no longer facing a limited life expectancy of several years to look forward to a life of possibilities, which can include reproducing if one chooses. For Dr. McGinnis, this is the goal—sto see how long-term drugs affect one's ability to have children and look into how "we can improve the likelihood to have children." After all, as Dr. McGinnis says, "Everybody should have that option if they want it."

THE CELL CYCLE

Cancer forms as a result of unchecked cell division. Complications in any of the cell's key checkpoints can lead to uncontrolled cell growth.



EFFECTS OF MEDITATION EXPLAINED THROUGH HEART RATE VARIABILITY

Interview with Mara Mather, PhD

By Jasmeet Kaur

Prenatal maternal stress is an important yet neglected issue. Pregnancy can be one of the most daunting experiences in one's life. From significant hormone fluctuations to wondering how you are going to push a whole human out of your body, pregnancy can be a very stressful time to say the least. Despite the obvious prevalence of this occurrence, there are not a lot of actively promoted interventions for the health of mothers throughout pregnancy. While hesitation to use certain medications during pregnancy are understandable, there are other ways to alleviate some of the stress that comes with pregnancy—one being practicing mindfulness.
When we think of practicing mindfulness, we often think of a highly spiritual activity, something that allows us to connect with our souls through an out-of-body experience. However, mindfulness and all of its effects can be explained through changes in specific physiological processes present in the nervous system. So, while the experience may feel out-of-body, it is actually all controlled by the brain!

Mindfulness is a specific practice of meditation in which the participant is focused on being intensely aware of what they are feeling in the moment without trying to interpret or follow their thoughts. Participants will usually focus on their breathing to allow thoughts to pass through their brain without actually thinking further about them, and they are taught that if they do find themselves chasing a thought, to return to focusing on their breathing (Mayo Clinic 2022). Many studies have shown the effects observed through this type of meditation including feelings of peace, calm, and even euphoria. Additionally, frequent meditation has been shown to reduce stress, anxiety, and increase positive emotions (Sparks 2018). More specifically, these effects of mindfulness have been observed in women throughout pregnancy, and they promote healthy pregnancy and fetal outcomes (Newman 2016).

In a study done by a mindfulness program called Mindful Motherhood, 31 women in their second half of pregnancy participated in an eight-week mindfulness program that included breathing meditation The results showed significant reductions in anxiety, negative feelings, stress, and depression when compared to women who were awaiting entry to the program. As observed, the effects of mindfulness within pregnancy are significantly impactful, but why does this practice work? To understand why mindfulness can be effective in reducing stress levels and increasing positive emotions, we must take a look at who is in control—the brain.

The human brain is a quite complex part of the nervous system, a system composed of the sympathetic and parasympathetic nervous systems. These two systems work together to control the variability of our heart rate, a measure that can be manipulated through mindful breathing. Mara Mather, Professor of Gerontology, Psychology, and Biomedical Engineering at USC, describes the relationship between these two parts of the nervous system using the analogy of brakes on heart rate. She explains "when we breathe in, our heart rate accelerates, and when we breathe out, it slows down." This happens because the vagus nerve is chronically keeping the brakes on your heart rate while at rest. If it did not do this, the heart would beat around 100 beats per minute! When we breathe in, the brake gets lifted because the vagus nerve connection to the heart gets affected temporarily, and our heart rate slightly speeds up. This highlights how breathing is associated with heart rate. Dr. Mather goes on to explain how this process can be manipulated.

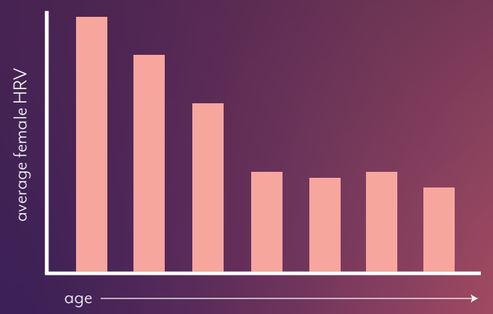
HRV (heart rate variability): the slight variation in time between heartbeats

ANS (autonomic nervous system): part of the nervous system that is responsible for this variation

She says that when we breathe normally, our heart rate oscillates in a normal pattern, a phenomenon known as heart rate variability (HRV). However, when we slow down our breathing, the oscillations become larger in amplitude. Daily sessions of practicing increasing HRV through slow-paced breathing have been shown to decrease feelings of depression and anxiety in past research, so Dr. Mather's lab set out to examine the brain mechanisms that underlie the effects of HRV biofeedback on emotional wellbeing. Her prior research showed that participants' resting HRV was associated with their brain structures and functions in circuits associated with emotion regulation. Participants were asked to engage in "resonance breathing," slowed breathing at a rate of about 1 breath per 10 seconds, which induces especially high amplitudes in heart rate oscillations, increasing HRV. It's possible that this rate of breathing can contribute to why certain meditation practices are more effective than others.

Upon manipulation of breathing, and consequently heart rate, to about 1 breath per 10 seconds, increased positive emotions and regulation of negative emotions were observed in the participants at the Mather lab. Brain circuits associated with emotion were observed to be better coordinated following resonance breathing.

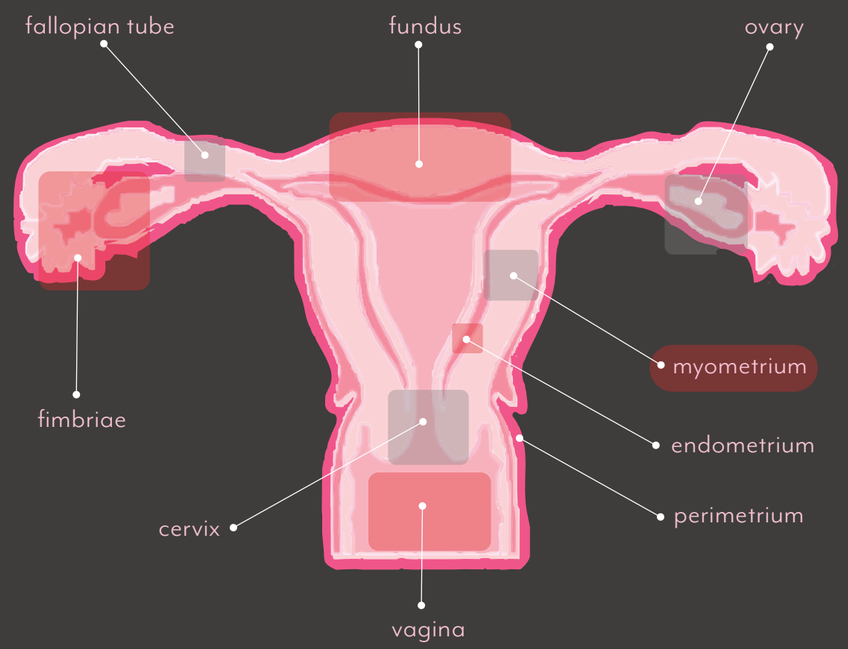
Through Dr. Mather's research, it can be seen that resonance breathing can be helpful in increasing positive emotions and regulating negative ones. Breathing is a key component of mindfulness, and the reason it works is because of its effects on key systems in our brains. So, consider options for mindfulness if you plan on having kids someday!



UNDERSTANDING THE UTERINE MYOMETRIUM THROUGH A BIOMEDICAL ENGINEERING LENSE

Interview with
Antonina Maxey, PhD candidate

By Malinda Madrigal



Complications with pregnancy and childbirth can lead to adverse outcomes for women and the children they carry. Unfortunately, there is a lack of effective model systems in which uterine contractility can be better understood within the myometrium. The myometrium is the muscle layer in the middle of the uterus that is responsible for contractions during a period and childbirth. The myometrium is made of smooth muscle cells that are aligned so that they can contract in an involuntary, yet coordinated manner. Benign tumors known as fibroids can increase tissue rigidity and impact the timing or force of contractions. Antonina Maxey, a Ph.D. candidate at the USC Laboratory of Living Systems Engineering, created a system that modifies matrix stiffness and measures changes in calcium handling. The purpose of this system is to evaluate the impacts of current and future drugs that are exposed to the uterus. Currently, she is using a method known as Traction Force Microscopy to measure the forces exerted by myometrial tissue. Traction Force Microscopy measures the displacement of beads caused by the contraction of myometrial cells. Maxey describes how "in the future, [she] plans to use a machine to apply stretch to [myometrial] cells and evaluate how that impacts both calcium handling and forces exerted on the cells."

HOW ARE CONTRACTIONS IN SMOOTH MUSCLE CELLS INITIATED?

According to Antonina Maxey, "contractions in smooth muscle cells typically start a rise in calcium within smooth muscle cells." The calcium produced in smooth muscle cells is used in a process called cross-bridge cycling, where filaments attached to the cell membrane slide against each other, ultimately pulling the cell inward and leading to a contraction (Pehlivanoglu, Bayrak, and Dogan 2013). A rise in intracellular calcium can be initiated by exposing myometrial cells to oxytocin, a neurotransmitter and hormone produced in the hypothalamus that binds to a receptor on the membrane and leads to an increase in calcium (Vannuccini et al. 2016).

WHAT ARE SOME EXAMPLES OF SAFE AND EFFECTIVE THERAPIES FOR UTERINE CONTRACTIONS THAT CURRENTLY EXIST?

Preterm labor occurs when a patient experiences uterine contractions early on in their pregnancy (Romero, Dey, and Fisher 2014). Preterm labor is when regular contractions result in the opening of your cervix after week 20 and before week 37 of pregnancy. According to Antonina Maxey, "patients who present risk factors for preterm labor are given progesterone as a preventative measure." After childbirth, it is necessary for patients to experience contractions to close the blood vessels that were exposed during the removal of the placenta (Masuzawa and Yaeko 2017). If these contractions are not strong enough or do not occur, a postpartum hemorrhage can occur (Tuckey 2005). Postpartum hemorrhage (PPH) is excessive bleeding and loss of blood after childbirth. Antonina Maxey explains how postpartum hemorrhages can be addressed using Pitocin, a synthetic form of oxytocin, which can be used to induce contractions.

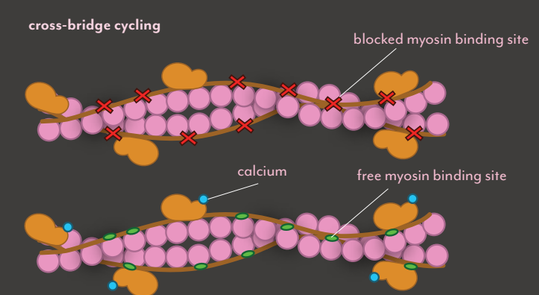
WHAT IS THE MOST EFFECTIVE METHOD TO ASSESS THE CONTRACTILITY OF SMOOTH MUSCLE CELLS?

Researchers can assess contractility using various methods of measurements. According to Maxey, researchers can indirectly measure contractility by accessing changes in intracellular calcium, specifically an increase that occurs after cross-bridge cycling. Although this indirect method does not measure the contractile force exerted by the uterine smooth muscle cells, changes in the rate of calcium influx or an increase in the amount of calcium present can predict a change in contractile forces. On the other hand, Maxey states researchers can measure contractile forces directly by quantifying displacement. A method that is commonly used requires researchers to attach a strip of patient tissue to force transducers, which induces a contraction with a hormone like oxytocin (Maxey and McCain 2021). Antonina Maxey states that "[a] method that [her] lab has used is [attaching] store-bought cells to a deformable surface, such as a thin piece of elastic, and [measuring] the displacement when the [myometrial] cells contract."

HOW MIGHT THE RESPONSE OF UTERINE SMOOTH MUSCLE CELLS TO STRETCH BE BENEFICIAL AND/OR HARMFUL DURING GESTATION?

The function of smooth muscle cells, such as myometrial cells, can be regulated by many different types of mechanical stimuli, including stretch. Stretch increases cell length and the amount of overlap between the actin and myosin filaments attached to the cell membrane. The amount of induced stress that a muscle cell can generate is optimal at an intermediate level of stretch. Maxey explains the possibility that a certain amount or level of stretch must be reached for the human body to realize that it is time to go into labor. Additionally, patients that are pregnant with twins are at higher risk of preterm labor (Biggio and Anderson 2015). Maxey states that "multiple fetuses increase the stretch that the myometrium is exposed to, impacting the signaling that leads to the coordinated contractions of the uterus."

Although uterine function is reliant on the contractility of myometrial smooth muscle cells, the response of these cells to specific stimuli, such as stretch, is currently not well understood. Therefore, labs like the USC Laboratory of Living Systems, and researchers like Antonina Maxey, are exploring ways in which the mechanobiology of the myometrium can be understood using in vitro techniques. In this case, the system that Maxey created can serve as an effective model system for drug discovery, the understanding of uterine disorders, and analyzing the effects of biomechanical stimuli on myometrial smooth muscle cells and its translation to the human tissue.



MIND AND BODY: EXPLORING THE CONNECTIONS BETWEEN SEXUAL HEALTH AND MENTAL HEALTH

Interview with Mary Andres, PsyD

By Elisa Liu

In recent years, there has been growing recognition of the importance of addressing both mental and sexual health together, as they are often interconnected and can influence one another. According to a study of 2,861 adults, individuals who reported higher levels of sexual satisfaction were more likely to report better mental health (Brody 2010). Therefore, understanding the relationship between mental health and sexual health is crucial for promoting holistic well-being and improving the overall quality of life.

WHAT IS THE RELATIONSHIP BETWEEN MENTAL HEALTH AND SEXUAL HEALTH?

Sexual health and mental health are complementary to each other. According to Dr. Andres, everyone also has a spiritual and physical part to be fulfilled simultaneously. In the case of healthy sex, recognizing one's needs and appropriately practicing sexual behaviors is essential for satisfaction. A mindful person is able to assert one's preferences and be validated for the choices, whether practicing safe sex, experimenting, being abstinent, or asexual.

WHY IS IT IMPORTANT FOR US TO HAVE A RIGHTEOUS VIEW OF SEXUALITY?

Anatomically, being sexual is similar to breathing, one of the basic functions for human beings to live in this world. For example, when individuals feel anxious, their breathing rhythms speed up, and they use shallow breaths. Therefore, therapists frequently suggest taking deep breaths slowly and calmly when individuals feel anxious, giving people's brains enough oxygen to function and ultimately allowing people to make the best decisions. It is the same for sex; people need communication and reliable relationships to slow down and be reassured. Dr. Andres explains that "If somebody's having a difficult time sexually, it is OK to start telling stories, lightening the mood, or doing something different. People don't have flexibility in thinking during fights. We need to make decisions while thinking with our frontal lobes." Sex is a healthy, normal thing that people should not fear or feel ashamed of.

Recognizing the relationship between mental health and sexual health supports people to live better lives in their own cultures. According to Dr. Andres, "Culture definitely has an impact on every aspect of our lives, like our sense of what is *ok* to talk about or not *ok* to talk about... there are certain taboos within different cultures, even from one family to another...." Based on the various standards of healthy sex or appropriate sex education, she suggests that people undergo a reflective process to validate themselves and develop communication abilities. Respecting cultural rules should not conflict with caring for one's mental health and physical needs. In addition, education from parents and schools influences an individual's sexual development. Interaction with people of a different gender, obtaining practical communication skills, adequate abilities of emotion management, etc., all support healthy sexuality. Teenagers need guidance rather than avoidance. Andres says that "Being a sexual person is a big responsibility, and we want future generations [you] to have the communication skills to navigate. We want future generations [you] to clarify their [your] own values about it."

MOVING ALONG WITH THIS PERSPECTIVE, HOW DO WE KNOW IF OUR SEXUAL LIFE IS HEALTHY OR NORMAL?

According to Dr. Andres, comprehensive sex education like the program OWL (Our Whole Lives: Lifespan Sexuality Education) promotes objective, healthy recognition of sex for teenagers, which effectively reduces social stigmas and potential emotional issues. It can be practiced both within families and at schools (Honest 2022). For parents, books and films are good sources for introducing children to the topic and providing reliable information. She particularly mentioned *Cup of Tea: the Consent*, a short animation that is helpful material in the psychoeducational field (2015). Dr. Andres

has presented the video for her classes and for both parents and couples. For educators and professionals, she recommended *Orgasms for Two: The Joy of Partnersex* and *Sex for One: Joy by Selfloving*, both written by Betty Dodson. The books address how individuals embrace their own sexuality and seek out more fulfilling and satisfying sexual experiences. In Sex for One, Dodson argues that masturbation is a healthy and natural part of human sexuality that increases self-awareness and pleasure (Dodson 1996). In Orgasms for Two, she emphasizes the importance of communication and mutual pleasure in sexual relationships, especially open discussions about their desires, boundaries, and concerns (Dodson 2002).

In order to develop a more comprehensive understanding of sexuality, Dr. Andres addresses her ideas on asexuality. She says that "It [is] a variance, a preference. It is very similar to how couples say their best time to be sexually intimate is in the morning, while the other couples prefer the night." Sexual preferences are natural choices based on one's attractions and values formulated through their development. People make diverse decisions, as they should. Likewise, there are all kinds of identities related to sex, such as times people are interested in sex, sexual habits, the frequency of sexual activities, etc. Currently, the concepts of "sexual disorders" are significantly related to social stigmas, which deprives people of the freedom to listen to their bodies and follow their instinctive wishes. This dissonance is the actual problem, but fortunately, more and more social communities spread knowledge of sexual health and support people to be different.

When people have mental disorders, it can impact sexual health. A study of 500 individuals found that individuals with anxiety disorders were more likely to experience sexual dysfunction compared to those without anxiety disorders (Altemus et al. 2014). Based on the previous discussion, sexual behavior might be a symptom of a mental condition. For example, Dr. Andres consulted with someone who had a manic episode. The person demonstrated hypersexual behaviors. She explains that the individual expressed aggressive flirting and provocative behavior with medics responding to the call. When the mental break was stabilized, the hypersexual behaviors decreased. Hence, just telling people when and how to be sexually active does not solve a problem. Instead, reaching a balance for both physical and mental well-being is the pathway to health.

WHAT ARE SOME COMMENTS AND SUGGESTIONS FROM DR. ANDRES?

Dr. Mary Andres is a professor of clinical education at the Rossier School of Education at the University of Southern California. She also works clinically with couples and individuals with a variety of identity and sexuality concerns. She shared that the field of mental health has not historically prepared clinicians well to talk about sexuality. After taking a sexual health workshop for her licensing exam, she reflected, "I would not have been any more comfortable talking about sex with clients after than I was beforehand." Currently, she is condensing her 22 years of studying and teaching into a book. She recommends lifelong and accurate sex education, such as comprehensive sex education when young and self-learning in all forms. Additionally, she recommends therapy when individuals, couples, and families want to learn more about how to communicate since this is an empirically-supported method to build connections and overcome barriers.

IN CONCLUSION...

Mental health and sexual health are two interconnected aspects of our overall well-being that should not be overlooked. It is important to enhance both our mental and sexual health by seeking professional help when needed and practicing healthy habits such as engaging in open and honest communication with our partners. Fortunately, there has been a growing recognition of the interplay between mental health and sexual health, as well as a shift towards a more holistic approach to health and wellness. This is reflected in current social trends, such as the increasing availability of resources and support for mental health and sexual health issues, as well as a greater emphasis on self-care and self-expression. Overall, by recognizing the importance of these two areas of our health, people can work towards a more holistic and inclusive approach to health and wellness, achieving a fulfilling and satisfying life.

AN OFTEN MISUNDERSTOOD LINK: **MENSTRUAL CYCLES & MENTAL HEALTH**

Interview with Marit Anne Pearlman Shapiro, MD

By Daniela Gioia

That time of the month. Mother nature's gift. Aunt Flo. A period. Almost half of the world's population has probably experienced what a period is like by the time they reach adulthood. It is an incredibly natural occurrence, but sadly continues to be a taboo topic of conversation in various cultures, and something people feel like they need to hide from the world. We have come up with hundreds of euphemisms for our periods because society still has trouble dealing with the reality that menstruation can be incredibly difficult and complex. Bloating, cramps, acne, even muscle aches are symptoms that appear for a large percent of individuals, but physical manifestations are not where the issues end.

There is a myriad of mental health issues that occur before and during the period, with symptoms that range from irritability to suicidal ideations. For example, premenstrual syndrome, also known as PMS, is a hormonal disorder that affects individuals during the luteal menstrual cycle, and often decreases in severity or completely disappears after the period is over. PMS is observed in 20-32% of premenopausal women (Biggs and Demuth 2011). This disorder is characterized by moderate to severe depression, anxiety, lack of self confidence, lack of motivation, and mood swings (Hofmeister and Bodden 2016). Most people who are diagnosed with PMS do not experience these symptoms at other times of the month—or experience them in a less extreme manner—as this disorder is related to the hormones the body releases near or during menstruation.

Premenstrual dysphoric disorder (PMDD) is another disorder that should be discussed. PMDD occurs right after ovulation and before or during the period. This is usually considered a much more extreme version of PMS , and it often requires serious medical intervention. PMDD is associated with much more severe forms of depression, which can lead to suicidal or homicidal ideations, paranoia, hot flashes, intense fatigue, and trouble focusing on simple day to day tasks (Rapkin and Lewis 2013). Although it is a more extreme version of PMS, this disorder affects a significantly smaller amount of the female population, with only 3-8% of women who report having these symptoms (Rapkin and Lewis 2013).

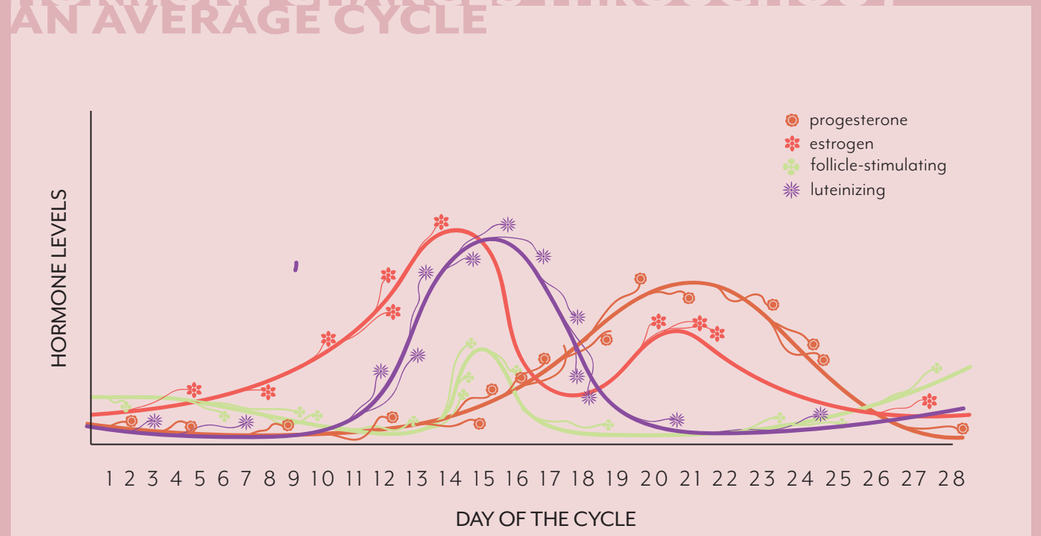
Although symptoms of PMS and PMDD may feel overwhelming at times, there are various resources in place nowadays for anyone to use. I recently conducted an interview with Dr. Pearlman Shapiro, an Assistant Professor in Obstetrics and Gynecology at the Keck School of Medicine of USC, and asked her about different methods that are being used to reduce the impact that PMS and PMDD have on people's lives. Hormonal contraceptives such as Drospirenone, have been FDA approved to treat disorders related to the menstrual cycle, as Dr. Pearlman Shapiro said, "Not having a period and not having the hormones cycling through the body can absolutely help alleviate those symptoms."

Another option would be to take a certain kind of selective serotonin reuptake inhibitor (SSRI), which should be discussed with a medical professional, during specific times of the month. According to studies, it has been found that these kinds of antidepressants only need to be taken during the second half of the menstrual cycle, when symptoms are increasingly present, to have an effect on people's wellbeing. This means that individuals can avoid many of the negative side effects that come with SSRIs, while also treating the disorder at hand (Arthur and Blake 2019).

Finally, Dr. Pearlman Shapiro recommends that everyone who suffers from any mental health disorder related to the period participates in exercise and activities that release stress and relax the mind, such as yoga or meditation. "Exercise is huge in terms of treatment," she says. If you want your body and mind to feel better, you need to make sure to stay healthy and active, which is easier said than done. Starting with just 30 minutes of light exercise or yoga a day is a great way to ease yourself into a healthier lifestyle, and I promise your body will thank you for that.

Sadly, it is still quite unclear which hormones or changes in the post ovulation female body cause disorders such as PMS and PMDD, but hopefully, as science advances and periods become less of a taboo topic, we will be able to find the best solutions to these problems. For now, everyone who has a period needs to make sure to stick together and look out for each other, because you never know what someone could be going through. If you or someone that you know is experiencing suicidal or homicidal ideations, please know that there are countless resources and people that are eager to help, such as student counseling services, and suicide hotlines.

HORMONE CHANGES THROUGHOUT AN AVERAGE CYCLE



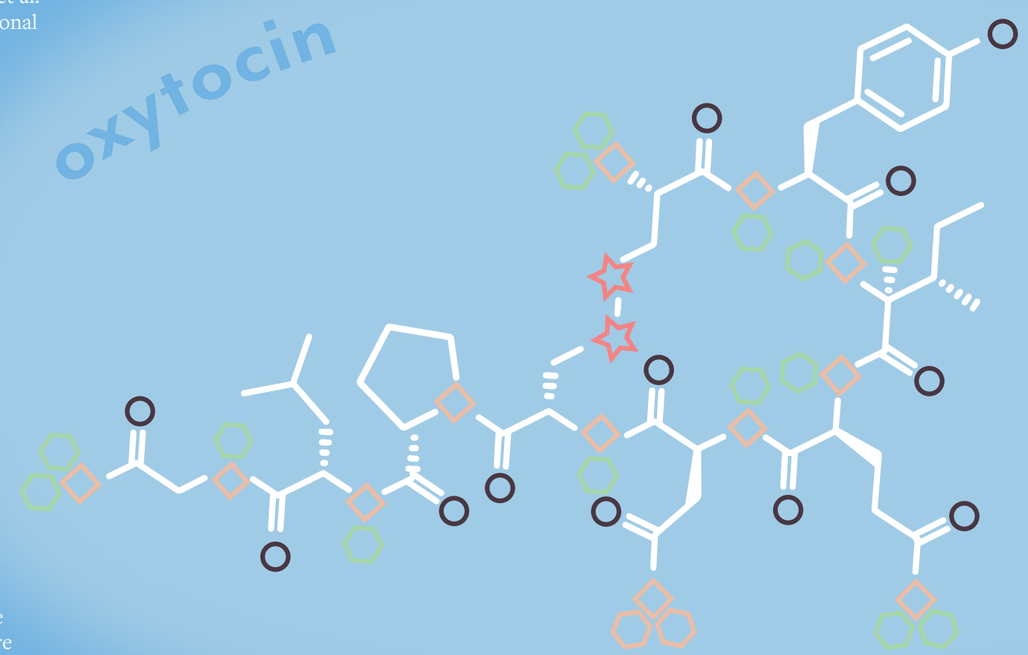
EMOTION AND STRESS REGULATION THROUGH HORMONAL CONTRACEPTION

Interview with Alexandra Ycaza Herrera, PhD

By Jasmeet Kaur

Contraceptive use is highly prevalent among females, with about 90% of females aged 18-64 having used some form of contraception in their reproductive years, and about 76% of these women having used more than one different contraceptive in their lifetime (Frederiksen et al. 2022). Among available contraceptive methods, hormonal contraception seems to be the most popular, which can be found in the form of birth control pills, patches, and vaginal rings, among others. Hormonal contraceptives work in phases referred to as the "active" phase and "inactive" phase. During the "active" phase, the contraceptive delivers synthetic versions of two female sex hormones to prevent pregnancy—an estrogen and progestin. These hormones induce effects that can prevent ovulation, make the mucus surrounding the cervix thicker to prevent sperm from entering, or make the lining of the uterus thinner to prevent a fertilized egg from attaching to the wall of the uterus. During the "inactive" phase, there are no hormones being delivered to the body. The contraceptive alternates between these phases to deliver the hormones required to prevent pregnancy during the active phase, as well as provide a temporary return to the conditions of the natural cycle during the inactive phase. However, there are also effects observed on stress levels when taking in these hormones, and these are less touched upon.

Hormonal contraceptives and their consequent effects on the nervous system are often overlooked. Dr. Alexandra Ycaza Herrera, a Research Assistant Professor of Gerontology at USC, shares her research on hormonal contraceptive phases and their effects on stress regulation. She notes how the lack of studies on the hormonal contraceptive phases drew her into this field of study. More specifically, research showed that lower cortisol levels were observed, indicating a smaller stress response, in women who used hormonal contraceptives compared to those who did not. This pushed Dr. Ycaza Herrera to explore the cortisol levels among women within different phases of the contraceptive cycle.



She had hypothesized that cortisol levels would be lower during the "active" phase, but mirror levels observed in naturally cycling women not using contraceptives during the "inactive" phase. However, her research showed otherwise. She found that throughout the cycle, regardless of phase, cortisol levels did not differ between the phases. Dr. Ycaza Herrera notes that while the overall phase effects were not significant, the specific formulation of hormonal contraceptive did appear to have effects.

Hormonal contraceptives contain different types of synthetic progesterone, or progestins. Dr. Ycaza Herrera found that some types of progestin present in hormonal contraceptives were associated with consistently lower cortisol levels across contraceptive phases, whereas other types of progestin were associated with smaller cortisol responses during the active phase and larger relative responses during the inactive phase.

Type of progestin isn't the only factor that might be at play. The process of observing stress response among varying hormonal contraceptive phases gets even more complex, given there are so many combinations of sex hormones administered through different contraceptives, and the duration of "active" and "inactive" phases can vary so greatly.

Given that this field of study is still new, conclusions are difficult to make definitively. However, Dr. Ycaza Herrera's research shows that although there wasn't significant data to support varied stress responses between contraceptive phases, there is a significant correlation between stress response and overall hormonal contraceptive use, with those utilizing hormonal contraceptives showing a less significant stress response compared to non-users. As this field progresses, Dr. Ycaza Herrera wishes to explore the effects of length of use of contraceptives and its impact on the stress response. As of now, it seems as though using hormonal contraceptives may help some women regulate stress better, all other contributing factors considered. Go contraception!

ART PREFACE

"State lawmakers have already introduced 162 bills targeting LGBTQ Americans this year," a CNN article, published in July of 2022, reads:

"Every 68 seconds an individual is sexually abused in America."

"We therefore hold that the constitution does not confer a right to abortion. Roe and Casey must be overruled."

In this world, there is a deep, systemic fear of vulnerability especially regarding the realm of sexuality and sexual health. While some of this fear can stem from parental or abusive trauma, most of this fear stems from the current state of the political sphere to which the world, and country, are engulfed.

Left and right, stories are being told about the retrogressive nature of American culture today. Stories describing how queer individuals are facing discrimination, how women in America can no longer have a say over their own body during pregnancy, how an extremist movement is doing everything in their power to return to a world of the past—a world in which is not accepting of diversity in any regard.

Thus, this creates a society where queer individuals are scared to "come out" or describe their feelings, where those seeking abortion are indulging in such experience alone, and where those who have experienced anything in between are scared to share their story out of fear of social repercussions. There is this belief that if they do share their experience, it will be met with strife, with disapproval, and that they will, therefore, be seen as "lesser" in the eyes of all they come across.

No person wants to feel like they are an outcast, to alter the equilibrium of who they are and who they present to the world. Many suppress their experiences, feelings, and pain, especially with regard to sexuality and sexual health, so as to not face ostracization.

While there are avenues to help support these individuals going through such a unique mental battle—such as therapy, sexual health/crisis centers, and hotlines—often those experiencing any sort of sexual issue form a mental block that causes them to assume that even a trained professional won't understand their situation. Consequently, many who experience sexual abuse, identity disturbance, gender dysphoria, and a lack of access to adequate sexual and reproductive care avoid these issues altogether.

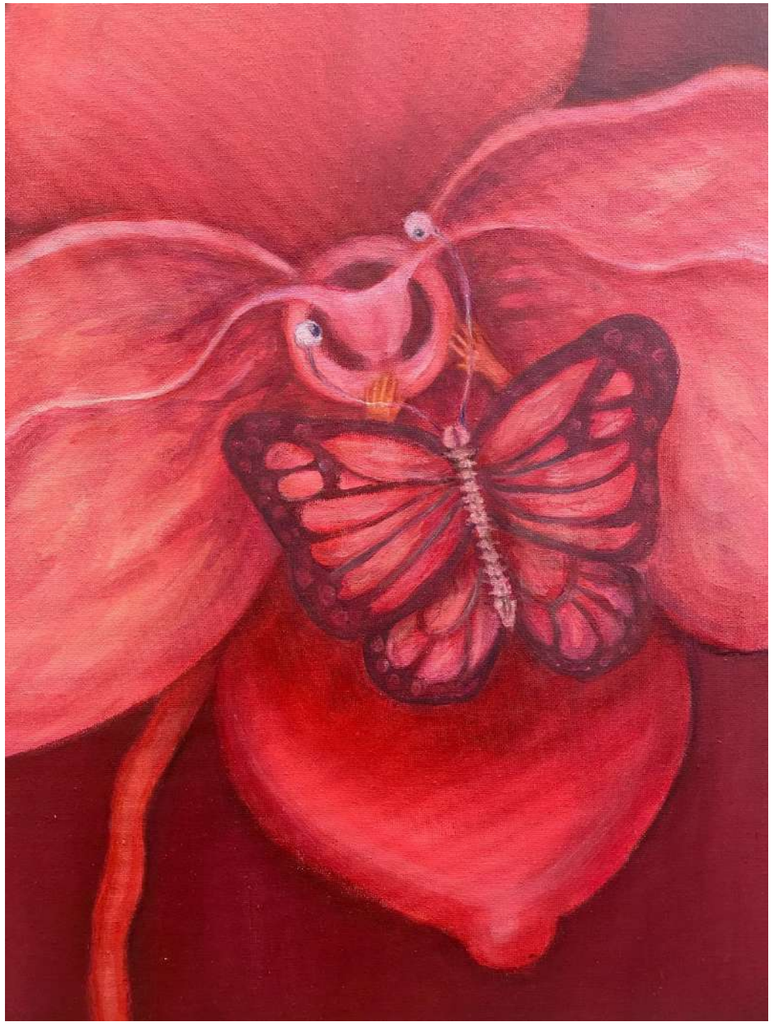
Art forms act as a "mirror" where one can finally cope with their anxiety, their issues, and everything in between. While they do not replace professional help in any capacity, often they make the transition to treatment easier as one finally understands their feelings and values. Art can act as the validation one never gets in this polarizing world—a form where one becomes confident in themselves, understands their beauty, and gains the confidence to combat the unjustifiable laws that are attempting to stop people from growing into the true version of themselves and expressing their sexuality in the way they desire.

For those reasons, while the world of medicine and art seem lightyears apart, this magazine features submissions from various USC students regarding their own sexual health journeys. In light of the regressive and oppressive legislation enacted in many states across the country, CURAM magazine hopes to show the power of art as a medium for communicating ideas and drawing attention to the cracks within our society's understanding of sex and gender identity.

Thus, there remains an issue with individuals suppressing their anxiety especially when it comes to their sexual health. However, music, dance, painting, and various forms of artistic expression have been found to act as one of the sole ways those experiencing anxiety from these issues have been able to cope with their own thoughts. Art, whether it be music, dance, writing, or beyond, can often act as the words missing in our lives to describe the feelings our minds are too scared to face. When one analyzes art and applies what they observe to their own lives, it is as if one is much more connected to the holistic human experience than we are led to believe.

Artwork by

EMITA LIN



PROCREATION

Through my artwork, I explore my fears and anxieties surrounding procreation and reproduction. As a woman, I have been granted the ability to become pregnant, yet I have no desire to do so. The concept of hosting something foreign in my body, be it sperm or a fetus, is perplexing. Is the ability to conceive a curse, a responsibility, or a blessing?

JUNK DNA

We often see DNA as carrying useful genetic information. However, the vast majority of DNA is non-coding sequences, which were once considered "junk DNA". Recent discoveries have revealed that these regions play a critical role in controlling cellular activities and regulating genes. Without these seemingly useless sequences, organisms would not be able to survive. It is fascinating to consider how the seemingly random elements of life on earth contribute to its intricate and organized forms.

Artwork by

TIFFANY RODRIGUEZ

I create art in order to ground myself and extend my perception of the world. My work often takes different forms, but a common element of surrealism adds spirit to my characters. I'm more familiar with realistic portraits, but I occasionally create cartoon-style illustrations. I often highlight themes of feminism and human connection. Both of the following pieces, made with the digital application "Procreate," convey the gut-wrenching anxieties of sexual and reproductive health, particularly for women. Science has allowed women to reinstate power in their own bodies through methods such as hormonal contraception. However, taking charge of the female anatomy, and attempting to control one's own being does not come without consequences. These effects may ooze into the neurobiology of women, creating new opportunities for research and deeper understanding. These ideas are demonstrated through the facial expressions of distress, and in the subtleties of neuroanatomy sprinkled throughout both pieces. One with more vibrant, eye-catching colors, and the other with a dark and ominous coloration. I wish for my work to stimulate deeper thinking and inspire a sentiment of togetherness.

Artwork by Tiffany Rodriguez

RESOURCES

scan the QR codes to access the resources online

PLANNED PARENTHOOD - LA

CALL 1-800-576-5544

Services: Annual health exams, STD testing, PrEP and PEP, birth control, cancer screenings, sex ed, and many more.

many locations in LA—call or use barcode

What are PrEP and PEP?

PrEP: A pill that lowers the chance of getting HIV.

Consider PrEP if you:

- Have unprotected sex with multiple partners
- Share needles
- Work / live in a high-risk environment for contracting HIV

PEP: Reduces HIV levels when HIV+

USC RESOURCES FOR STUDENTS

CALL 213-740-9355 (WELL)

Available for USC students through mySHR:

- RSVP - Relationship and Sexual Violence Support
- Gender-affirming care
- STD testing
- Reproductive and sexual healthcare consultations
- Psychiatry, immunizations, referrals

Where?

Appointments can be through Zoom, at Engemann Health Center (UPC), or Eric Cohen Student Health Center (HSC)

AFFORDABILITY AND ACCESS

LA County Healthcare Resources Info

Including resources for pregnant individuals and sexual and reproductive health

CalFresh

Resource for low-income individuals to receive additional funds for food

GETTING SUPPORT QUICKLY

- **National Suicide Hotline:** Call 988 (Eng + Esp)
- **Abuse or sexual assault hotline:** 213-626-3393 or 310-854-4621, 24-hours
- **Trevor Project (LGBTQ+ crisis / suicide service):** Text 'START' to 678-678 or Call 1-866-488-7386
- **LA County STD Hotline:** (800) 758-0880 for STD info

There's no shame in seeking help!

CURAM

Made possible by USC Arts in Action

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