Science AMA Series: Hi Reddit! I'm Dr. Teresa Woodruff from Northwestern University here to answer any questions you may have about ovarian biology, oncofertility, and the importance of sex and gender inclusion in the biomedical sciences.

Teresa$_{W}oodruff^{1}and r/ScienceAMAs^{1}$

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April 17, 2023

Abstract

Hi Reddit! I'm Dr. Teresa Woodruff from Northwestern University here to answer any questions you may have about ovarian biology, oncofertility, and the importance of sex and gender inclusion in the biomedical sciences. In 2006, I coined the term "oncofertility" to describe the merging of two fields: oncology and fertility. When we started this work, young men were able to bank sperm before a potentially sterilizing cancer treatment but women, with the same hope for survival, were not provide options. Now we have options and babies born to men and women who have survived their disease. This work was fostered by my interest in ovarian biology. Men make sperm constantly – about 1,500 sperm with every heartbeat. By contrast, women are born with all the oocytes that we will ever have – about 1 million in our ovaries. My lab is interested in how the ovarian reserve, this million follicle pool (a follicle is a single egg surrounded by cells that produce hormones like estrogen and support egg maturation) is metered out from birth until menopause – 6 decades to wait for activation. We began growing individual ovarian follicles in our lab to unravel some of this fundamental biology and developed strategies that are helping cancer patients who want to protect their fertility. Finally, I'm interested in educating scientists about the value of including both males and females in their studies. For a lot of good reasons, many labs study only one sex. But the outcomes from single sex experiments cannot always be translated to the opposite sex. So we have been working to ensure that we all think about sex as a biological variable from bench to bedside. I will be back at 2 pm ET to answer your questions, ask me anything! Here are some resources for more information: Women's Health Research Institute Oncofertility Consortium Repropedia Introduction to Reproduction on Coursera EDIT: Thank you for all of your questions! I will be heading out now but may check back in if there are any follow up questions!

the WINNOWER

REDDIT

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TERESA_WOODUFF R/SCIENCE

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In 2006, I coined the term "oncofertility" to describe the merging of two fields: oncology and fertility. When we started this work, young men were able to bank sperm before a potentially sterilizing cancer treatment but women, with the same hope for survival, were not provide options. Now we have options and babies born to men and women who have survived their disease. This work was fostered by my interest in ovarian biology. Men make sperm constantly – about 1,500 sperm with every heartbeat. By contrast, women are born with all the oocytes that we will ever have – about 1 million in our ovaries. My lab is interested in how the ovarian reserve, this million follicle pool (a follicle is a single egg surrounded by cells that produce hormones like estrogen and support egg maturation) is metered out from birth until menopause – 6 decades to wait for activation. We began growing individual ovarian follicles in our lab to unravel some of this fundamental biology and developed strategies that are helping cancer patients who want to protect their fertility.
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READ REVIEWS

WRITE A REVIEW

CORRESPONDENCE:

DATE RECEIVED:
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Dr. Woodruff,

Thank you so much for doing this AMA. My question is in regards to human infertility.

The last I checked, human infertility rates (as defined loosely by the number of couples attempting to achieve conception and failing over a one year period), is increasing, and most recent reports list some 10% of the female population as being "subfertile," or generally displaying reduced fertility. At the heart of a number of these instances is reduced or otherwise altered production of and/or sensitivity to gonadotropin signaling, which I'm personally interested in.

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My big question, however, is- in your professional opinion- where do you think the cause of these trends in infertility lie? In a temporal sense, should we be looking towards development or prepubescent exposures (thinking endocrine disrupters, here) that might alter ovarian organogenesis and development, or are contemporary, adult exposures more promising as explanatory variables for sub-fertility? I understand that these don't have to be (and likely aren't) mutually exclusive, but I would expect their respective impacts to be different in magnitude.

Or is the whole concept of EDCs in this context totally off-base?

figgy_puddin

Great question - we are all living in an environment that has more chemicals in our food, water and air than ever before. Modernity has an impact on our lives but in ways that we cannot fully quantitate. Endocrine distruptors are real and have impact at many levels of the reproductive system. The specific impact on ovarian or testicular function directly or on the gonadotropin hormones that that you mention are still under investigation in many laboratories. The changing landscape of fertility/infertility is no doubt being impacted at the developmental level and in adults. The magnitude of difference between these two has not been compared.

Thank you for doing this AMA, Dr. Woodruff.

I have read articles that by age 30, a woman has lost some 90% of the million or so eggs that she was born with, and the overall quality of the remaining eggs has deteriorated, with attendant higher risks of miscarriage and birth defects. Is that true?

One such article: http://abcnews.go.com/GMA/OnCall/women-fertility-falls-lose-90-percent-eggs-30/story?id=9693015

hillsfar

Yes! Here is the story - women are born with all the follicles we will have that contribute to fertility and endocrine health - on average 1 million follicles per woman. Follicles are selected from this 'ovarian reserve' from birth through menopause. Menopause is the time when no follicles are left in the ovary. Since the oocytes are present from birth through the fifth decade, it is AMAZING how good the quality is for so many years. But, they do start changing around age 37 when the oocytes are no longer able to maintain good chromosome quality - this leads to miscarriage and birth defects. My good friend and amazing reproductive scientist Francesca Duncan is working on this problem and has identified the tissue that surrounds the follicle as creating a negative environment for the egg. I look forward to her work because it is a new way to think about maintaining good egg quality, by targeting the physical environment of the follicle.

Dr. Woodruff, thank you for doing this AMA. My question is in regards to PCOS - why isn't there more known about it? Or, perhaps a better question - is there any new information that the general public may not know about in regards to treatment or causes?

I have been diagnosed with PCOS, but am not currently trying to conceive. How does this disorder affect me and what more can I do to regulate my hormones and help ovulation occur?

le_vicious

PCOS impacts nearly 10% of women and is an endocrine disorder where the ovaries make more androgen than estrogen. Some folks will be surprised to know that the ovarian makes androgen, we typically think of this as the 'male' hormone But females make androgen which is ordinarily converted

to estrogen. In PCOS, many small follicles grow and do not make this transition. Work from my lab points to an interesting new mechanism behind PCOS, the physical rigidity of the ovary. When we change the rigidity of the matrix that we use to grow follicles, the more rigid the ovary the more androgen is made. There are definitely genes that are part of the PCOS pathway and endocrine disruptors during development that can cause this phenotype as well. So PCOS is likely a series of diseases, each with its own origins. As we learn more about each factor we will be able to treat PCOS in a more personalized way! Stay Tuned for More Science on this!!

What is one topic or thing that you feel should be better known by the general public?

kjoro

We should be better aware of our reproductive systems and how they impact the rest of our physiology - estrogen, for example, is important to bone and heart health. In middle school we teach 'sex ed' but I advocate 'reproductive ed' - what are the organs of our reproductive system, what are the hormones they create - how does that cause menstrual bleeding and why - what is the male reproductive cycle etc. It will help folks make better decisions about the own health!! I created a free MOOC in order to help folks understand these concepts a bit better see (link in the intro) and the repropedia.org (link as well) that provides short definitions of reproductive terms. This is a API and can be linked to any website. This way you don't have to get to unsavory parts of the web if you want to know about a simple reproductive term.

Dr. Woodruff,

How large of a role does the obesity epidemic play in rising levels of infertility? How will this direct the future of medical care?

Many of our most impressive advances have been in IVF and IVM; how would you address more conservative groups about the benefits of these procedures?

KnightofBaldMt

The world is facing a tsunami of diseases associated with the obesity and diabetes epidemic that is not just washing over our shores but is literally starting to take down the walls of our health. The food that we eat, the times that we eat it and the way chemicals in processed food changes the hunger centers in our brain is all contributing to these issues. These are the externals associated with obesity and the medical outcomes that are their consequences. Weight loss is hard in this setting but is associated with good outcomes in reproductive health and for overall health.

Hi Dr. Woodruff! I'm a 32 yr old woman who is currently undergoing chemoradiation for large cell neuroendocrine carcinoma of the cervix. I wasn't given an opportunity to preserve my fertility due to the rarity and the aggressive behavior of my cancer.

But what I want to know is (and nobody has been able to answer me): Will the radiation*definitely* kill my ovaries? I know I won't have kids, but I'd really like to not go through menopause either. And I'd also like to avoid taking HRT. Do ovaries (that aren't transposed) ever "come back to life"?

I'm currently having extended field radiation to cover my pelvic region as well as my paraaortic nodes, 30 fractions, followed by 5 boosters, and 2 brachytherapy.

Chemo is EP in 21 day cycles.

Thanks in advance!

sssyjackson

It is not know whether radiation or chemotherapy will be definitively sterilizing to any individual. This is for a variety of reasons, one of which is that every woman has a different starting pool of follicles (the ovarian reserve). It is critical for oncofertility patients to talk with a reproductive endocrinologists or an oncofertility specialist to make sure that tests are done along the way. It is also important to think about contraception - young cancer survivors sometimes think that sterility is the only outcome of their treatment, but unintended pregnancies can occur and hormonal or barrier contraception is important to consider!!

Hi Dr. Woodruff,

Thanks for doing this AMA! Can you talk at all about any work being done on pre-pubertal male/female fertility preservation? It's pediatric cancer awareness month, and most people don't know that kids can get cancer, or that it's treatment it can leave them infertile. I know it's a relatively new field, but would love to hear about the new advances. Cheers!

Parrot_Face_21

This is the newest frontier in the oncofertility field - children are now surviving cancer diagnosis in high numbers - nearly 85% of pediatric cancer patients have a 5 year survival rate. Fertility is not often on the minds of parents during this time, but to spare reproductive function for later time, intervention may be necessary. My friend and colleague, bioethicist Laurie Zoloth calls oncofertility the Joseph Project - this takes its name from the biblical story when grain must be stored during 7 years of feast in order to protect against an upcoming 7 years of famine. The American Association of Pediatrics in its guidelines instructs physicians that parents are encouraged to consider fertility sparing options for their children. The options for pediatric patients should only be done under IRB. Parents make many difficult decisions on behalf of their children and are often glad to know that fertility is something that should be considered.

Hi Dr. Woodruff, and thank you for doing this AMA.

I have always considered myself to be a feminst as well as a scientist. One of the most impactful ways that feminism has helped the sciences as of late is to bring in to focus some of the masculine distortions in the scientific enterprise. One such distortion, in particular, has been the failure to include women in clinical trials (and even female organisms in basic research). We are developing a clearer picture of major diseases (cardiovascular disease, depression, lung cancer etc.) with major differences in biology and pathology for men an women, yet the bulk of all research and clinical trials have been conducted in men. Thankfully this is starting to change. With this in mind, however, I have several questions for you:

- How do you respond to the popular critique of moving towards greater gender parity in research that it will increase costs and limit the ability to make statistically significant discoveries?
- What do you think are the origins of the decision to not include more women in clinical research? From what I can tell, it seems to be an example of benign sexism (not wanting to include women of child bearing age in dose limiting studies).
- Do you have any interesting examples of how not including gender-balanced cohorts in research has led to misinterpretations of data, or a failure to capture the bigger scientific picture?

Thanks!

SirT6

I believe in good science. The absence of females in clinical trials, in animal research and in cell culture is not good science. As of Jan 25, 2016, the NIH mandates inclusion of both sexes in fundamental studies or justification of why not. This is going to aid scientists who hadn't thought about sex as a major contributor to biology (e.g. see: http://www.womenshealth.northwestern.edu/news-and-events/news-archive/nih-director-addresses-sex-inclusion-northwestern-visit to see what Francis Collins said). I predict that science and medicine will change dramatically in the coming 2 decades and we will look back at the time before this date as the stone ages!! See the WHRI for a lot more info on the topics above!!!

Thanks for this AMA. I froze my eggs at age 37 in 2007 during the time when vitrification was in its experimental stage. My eggs were frozen using the traditional slow-freeze method. 17 eggs were retrieved and 11 were good/mature enough to be frozen. Realistically, what are the chances of these eggs thawing well enough for fertilization and being viable embryos? I guess the real question is whether it is worth the time and money thawing the eggs and trying to create embryos from them.

justacpa

This is a question that is medical advice. I would talk with my health care provider and make a decision based on their guidance.

During your research, have you ever run into roadblocks because of people raising ethical concerns? If so, would you be able to shed some light on the best ways you have found to combat these kinds of roadblocks?

Some people seem to be a lot more sensitive to ethical concerns when it comes to research that relate to reproduction. We don't want to just brush away these ethical concerns, yet it's important that we continue and expand research.

Tiothae

Before we had the first live birth from in vitro grown follicles (NuBorn and NuAge) I had a discussion with a group of colleagues in a center I created called 'The Center for Families After Cancer'. This is before I coined the term Oncofertility. The first invitation to that 'center' was Laurie Zoloth - the bioethicists and religious scholar that I mentioned in an earlier post. I asked her to 'think with me' as we moved forward, appreciating that this was an area that would involve a variety of options on the validity of intervention etc. She said that ethicists are never invited in an *a priori* way but are only asked after the fact of invention, etc. She said her job would be voice 'worry' and think about 'meaning'. I've had the good fortune of her wisdom throughout the development of oncofertility. She does not tell me what I want to hear - which is a vitally important part of her job! I think science is done best when it 'worries' about its long term impact even while doing the work....

Hi Dr. Woodruff. Thank you for doing this AMA. I have come across with your work as a I am a cancer survivor who hopes to be able to become pregnant in the future. As I understand there are currently options for women diagnosed with cancer to preserve their fertility prior to undergoing chemotherapy/radiation. However some patients don't have the option of waiting before begining treatment with the devastating and permanent consequences of most cancer treatments on ovarian function even at a young age. Is there any research being done to restore ovarian function in cancer

survivors with chemotherapy induced menopause ? I read about a study in Egypt where they are injecting mesenchynal autologous stem cells into the ovary, which had succesful outcomes in studies with mice. Are there any studies like this being done in US? And how close would we be of achieving this in the future?

Another question: Has any of your work focused on restoring receptivity of the uterus after damage from radiation treatment which might help in achieving a succesful pregnancy (in my case TBI in preparation for a bone marrow transplant)? I apologize if I have not used the correct terms as I am not in the medical field. Thank you!

champagneonthebeach

Reproductive options for oncofertility patients continue to emerge from the global research community. There are studies such as the one you mention, studies from Dr. Monica Laronda who is developing an ovarian bioprosthetic and other work that is creating hope for tomorrow - indeed, I believe that the reason we have basic science in our medical schools is to ensure that tomorrows patient is treated better and more effectively than todays. The field of oncofertility is working very fast but we are not there yet with stem cell development or the other technologies I mentioned above. But keep supporting basic science - I am hopeful that there are options that will be available to enable ovarian, uterus, and cervix function in the future.

Hi Dr. Woodruff,

I am curious, with the increasing use of birth control methods that prevent menstruation, does that mean women will have more oocytes left later in their lifetime? Does this imply that fertility will continue later into a woman's life? And, will genetic risks typically associated with "older" eggs (ie. Down syndrome) be decreased or mitigated?

orcazebra

Nope - the small follicles continue to develop, they just don't release an egg.

Dr. Woodruff -

Thanks for doing this AMA. I'm interested in your knowledge on any relationship between hormonal birth control and infertility/fertility, cancer, and full-body hormonal balance.

I am also interested in the variations within PCOS. I have PCOS and was able to conceive from a low-carb diet and exercise. Some women have excessive hair growth, or weight gain, or insulin resistance. There seems to be a huge variety within the syndrome called "PCOS". Can you speak to your understanding of this?

Thanks for doing this again, I am literally blocks away from NWU at this moment and love that important things are being done so close to home.

moarpi34me

Hormonal birth control - the pill - is the most prescribed medicine on the planet. Billions of doses have been taken by otherwise health women. We do not have an association of any medical issues with the pill. That said, we need more fertility management options for males and females!

Hi Dr. Woodruff and thank you for doing this AMA!

I wanted to ask what your thoughts were on leupron injections in the setting of chemotherapy or radiotherapy. I feel like many times when we counsel patients (I should say I'm a medical student looking to do rad onc), it seems like leupron is our first go-to move. However, I also feel like I have seen a more mixed picture of efficacy with using this drug lately. What has your experience been like with using leupron, and have there been any more efficacious alternatives?

Secondly, any advice on how to advise younger female patients undergoing pelvic radiation therapy when their main concern is for future fertility?

BourbanMeyer

These are medical questions - generally, lupron has not been shown to be fertility sparing. More studies are needed in this area of 'fertoprotective medical management'. I would love to see a drug that could be offered to a young cancer patient that would be the 'sunscreen to the ovary' and ward off the off target effects of chemo or radiation. My lab is working on this now!

Hi Dr. Woodruff!

Do you think ex vivo tissue engineering ovaries supplied with a woman's eggs pre-chemotherapy or incubating whole excised ovaries in a bioreactor ex vivo is a viable approach that should be researched? I was particularly fascinated by Dr. Ariella Shikanov's research at the University of Michigan.

Thanks for doing the AMA!

da6id

Dr. Shikanov is doing VERY EXCITING research. She was a postdoc with me and Lonnie Shea at Northwestern and is a great bioengineering who thinks in multidimensions about how to solve the problem of fertility management - she is a great leader and I follow her work with great interest!

Thank you for this AMA. First of all, this may be to elementary and i apologize for that, why do women have so many eggs when it's biologically impossible to uhhm, "dispense them", within a lifetime? It sounds like a "waste."

But, my real qestion is this. Increasingly we see that women choose to have babies at later ages and the older the mother, there are more chances of problems with the pregnancy and the child. (at least that's what i've been told, feel free to correct me). Given that this trend is going to continue, are there any research into how we can mitigate these risks? For example, will there be a pill that negates the effects of ageing reproductive organs?

Thanks!

remulean

Men make 10,000 sperm with every heartbeat and only need one, occasionally. Reproduction is an energetically costly endeavor - for human, plants, corals - but it is a great way to ensure that species as a whole persist.

The aging sperm is also something that is being studied, and what makes and breaks a good gamete is an important part of NIH - e.g. tax payer - funded research. Please continue to support reproductive science research!!

How often does sexual bias play out across the medical community?

Shaeos

Probably similar to all fields in which humans are involved.

Any technologies on the horizon to end menopause, e.g ovarian transplant or rejuvenation?

Liberteez

Many organs could be harvested and body function rejuvenated. This is not the goal of oncofertility - it is to heal the body in the case of disease. Female reproductive lifespan could, theoretically, be expanded. Bioethics has been a close companion of the field of oncofertility and would necessarily weigh in on this conversation as well.

Hello! So, I'm in an interesting situation. I'm a transgender woman who has a family history of estrogen positive breast cancer (though I am not a survivor myself).

Being trans my female hormones are sort of a "blank slate" so I was wondering if any of the work you've done has implications on what hormones might be safe or unsafe to take?

chaucer345

This is a medical question but there are oncofertility specialist who are experts in transgender medicine who you can talk to. If you have medical questions about oncofertility please call the FertLine 1-866-708-FERT (3378)

Hi, Dr. Woodruff. Thanks for doing this AMA. As I'm sure you're aware, sex and gender issues are not just scientifically important but can generate a lot of political/social heat and controversy.

As the NIH embraces the study of sex/gender differences, it seems there is some pushback -- for instance:

- this study in PNAS that concludes "human brains cannot be categorized into two distinct classes: male brain/female brain." or
- this opinion piece from PNAS, which concludes, "If the goal is to advance human health, we see a stronger empirical basis for directed funding initiatives in two areas: scientific validation of preclinical models for studying human sex differences, and human studies of the interaction of sex- and gender-related variables in producing health outcomes that vary by sex."

I'm wondering how you might respond to criticisms such as those.

oldvineyzin

The most important reason I can provide to any criticism of the new policy is that excluding one sex (for no good reason) is not good science. The effort here is to improve the quality of science, increase the pace of research and in the end make sure that our medical pipeline provides the best most efficacious drugs for each person. Personalized or precision medicine dictates that we take this step. Indeed, we would be unable to use these terms if we didn't include sex as a biological variable. Right now, some of the criticism is due to the fact that we don't like to change our habits and we don't like others to tell us what to do. If there was not problem, there would be no need to have a policy. But as the work that Melina Kibbe and I have published shows, sex bias in the literature still exists and in fact has gotten

worse with time. I think the discussion is constructive and look forward to this issue being the same as whether or not spittoons should be included in the halls of congress. History will judge Jan 25, 2016 as a date when science changed for the better - it is a fulcrum that moves us from old fashioned science to better science - one that values every chromosome alike.

Hi Teresa! My daughter who is 14 has ovarian cysts that cause her a lot of pain. Occurrences of this has gone down. She was told to just stack advil and tylenol. She hasn't gotten her period yet as well. Is that strange and will the cysts affect her fertility in the future? Thank you.

secretpink

Talk to a pediatric reproductive endocrinologist! There are great physicians who can advise directly.

Dr. Woodruff, how does the body react to the surgical removal of one ovary? Does the second ovary pick up the other menstrual cycles? What mechanism regulates which ovary ovulates?

makingplansfornigel

Great question!! Humans release one mature egg each month in a process known as ovulation - mice release 12-15 mature eggs every four days (WOW! Perspective!) The hormones that control mono-ovulatory and poly-ovulatory species reproductive systems are remarkably similar. One of the big questions we have is what causes an individual follicle to begin growing in any given 28d or 4d cycle. In mice, the eggs are released from the follicles in roughly equal numbers from the right and the left ovaries. We don't know what the intra-ovarian factors are that are communicating between the right and left ovaries of women. When one ovary is removed - in experimental mice or in women - the other ovary 'compensates' for the loss of the other tissue and now that ovary ovulates 12-15 (mice) or 1 (human) egg each cycle. The endocrine hormones that communicate the 'status' of the ovaries to the higher brain center are in control of this part of the equation. Thus, a woman who has one ovary will go through menopause at roughly the same time as the general population - perhaps a short time earlier.

Hello, this is super interesting and I'm glad to see you posting about it. I am just concerned though, if you are interested in preserving fertility in former cancer patients, can it really be considered ethical to help a person have a biological child that may also be predisposed to cancer? At what point would you draw the line and say it is unethical to help someone conceive due to potential health risks in the child's life?

INeededACoolerName

Most cancers (95%) are spontaneous not hereditary. This means that most cancers are not going to be passed down to an offspring. This doesn't mean that a child born to a cancer patient won't have cancer but that is true for any child born to any parent.

Hi Dr. Woodruff.

What fields of science do you think will benefit most from a new focus on gender in studies?

GenericVodka13

Thanks for the question - just want to make sure we know that 'sex' and 'gender' are terms for different things - see Dr. Nicole Woitowichs' recent blog post on this topic - she is the Director of Science

Outreach and Education for the Northwestern University Women's Health Research Institute: http://www.womenshealth.northwestern.edu/blog/sex-and-gender-are-not-synonyms

I think you are asking about 'new focus on sex in basic science' which is a great question!!! I think basic knowledge about cardiac cells, muscle cells, the cells of the eye and lung. We are on the verge of one of the most exciting revolutions in science, the inclusion of an entirely new group of individuals!!!

To quote Steven Colbert - "Women if you want all those bumpy bits it comes at a price, like we don't make medicine for you". By 2030 this statement will be so hard for men and women to understand - but for today - it is our clarion call to action!!

Hello doctor,

regarding oncofertility, I guess you can provide as best of an answer to me as I can get on the internet. I am a man, I went through chemotherapy, first line: doxorubicin plus ifosfamide, second line: gemcitabin + docetaxel, third line: CYVADIC.

Basically I want someone relevant to tell me how fried my swimmers are, or if I would/could(? english is hard) produce mutants.

Dont really want to ask my doc, since I bother them with other more key stuff and I missed my chance of freezing my boys anyway, so this is just an academic question, in reality I cant reproduce, probably (or shouldnt).

Suckylegs

I don't want to answer a medical question per se - but please call the Fertline listed above to talk with an oncofertility specialist. The oncofertility consortium is a global network and folks are available in a variety of languages.

Hello Dr.Woodruff, I'm a 19 year old young woman with PCOS. My mother had breast cancer and tested positive for the BRCA2 gene, but I still have yet to be tested. I'm currently pursuing an undergraduate degree in Biomedical Sciences and I would love to keep an eye on new research and information pertaining to ovarian biology and oncology due to my personal situation. I also find the topic interesting and am considering exploring it. As a professional in this field, do you have any suggestions or tips you could send my way on where I could get started? Thanks so much.

Rapolaro

I think passion is an important part of any career trajectory and your personal relationship to these medical concerns is a great part of honing your own professional development. Being a scientist, clinician, health care business administrator, program officer at NIH, etc etc etc are all potential directions you can take. I advise my high school students that an understanding of science is a good foundation for life, not just a life in science! There are great journals of public interest to stay up on general science - Scientific American, Discover magazine, (check out the article on Oncofertility in the Sept 2016 issue: https://www.woodrufflab.org/media). You can also look a the NIH publication MedLine Plus and even Science for additional info. We also keep the Oncofertility website up to date with news and recent papers. http://oncofertility.northwestern.edu/about-oncofertility-consortium

Thank you for doing this AMA, Dr. Woodruff. As an undergraduate biology student, I hope one day to do research with iPS cells in human pathology.

My question is this: Aside from the obvious physiological differences, what are the greatest discrepancies between the sexes that pose such an issue for the practical application of research in applied medicine?

what_a_krul_world

Four things differ: the presence and expression of genes from an X and Y chromosome; the hormones that are expressed in males and females; the size difference between male and female organs; and the microbiome that exists in males and females. The last issue may be one that folks are least aware of but my friend and colleague Dr. Jane Danska at the University of Toronto showed that male microbiome transferred to female can ameliorate symptoms of type I diabetes. This is the kind of profound new science that I expect to come in the future!!
http://www.womenshealth.northwestern.edu/national-womens-health-week-event-success

Hello Dr. Woodruff, I actually work in one of the IVF labs that handles the pediatric ovaries...I was just wondering if you anticipate the protocol ever switching to vitrification of the ovarian tissue? We're currently slow freezing them. Thanks for doing this AMA!

MuffinDarling

Most of the life births associated with ovarian tissue transplant -now more than 60 babies - have been from tissues that have been frozen under the 'slow freeze' method. That said, many clinics no longer have the 'slow freeze' instruments. Vitrification methods have been developed in Japan, Korea and by the Oncofertility Consortiums Dr. Mary Zelinski. The goal of each new development within the field of oncofertility is to provide better options for patients and providers. Vitrification has the advantage of preserving the entire tissue and not just the small follicles. While this technology is lagging the slow freeze biology, we hope that both technologies are useful to patients in the future.

Hi Teresa! Here on reddit I have recently found that there is a strong ideological polarization regarding the theoretical basis for sex. It seems that some people (typically from feminist/radical feminist types) that believe sex is a social construct. I have tried arguing that sex is very much biological, and that this is well proven, but these efforts seem fruitless. What is your take on the matter, and how important do you think it is to properly understand this issue as a society?

the_gr33n_bastard

See answer on 'sex' vs' 'gender' discussion above.

Sex matters to our biology and is not polarizing.

How does your lab source ovarian follicles for your research and does the political climate in the United States surrounding such tissue procurement make things difficult? Has your own research or the field of oncofertility suffered from funding issues over the past decade because of political grandstanding?

shiruken

Ovaries do not come out of young healthy women, nor should they. The Oncofertility Consortium has an IRB consent process that provides ovarian tissue freezing as one of the options for young cancer patients. 80% of the tissue is cryopreserved for their later use and we ask that 20% to to the research protocols that we hope will make that stored material useful in the future.

When and why are experiments done with only males or only females? (Besides gender specific studies i.e. Reproductive organs, childbirth etc)

loveschwarma

Ease, cost, scientific tradition.

Hi, thanks for this AMA. I recently watched a video on YouTube of how to prepare an ovarian sample for freezing. They basically chopped up the ovary in all kinds of ways, and then kept a tiny thin slice. This particular slice had a follicle (a slice of one anyway) in it. My questions are: do you use the follicle slice to make new follicles or any bit of ovarian tissue will do?

frenchbritchick

We use the follicles within the tissue.

Thanks for watching the Oncofertility YouTube channel.

Dr. Woodruff,

I am curious about a few things. When an ovum leaves the ovary, what cause it to enter into the fallopian tube? What cause it to move down the fallopian tube? What prevents fluids from going the wrong way in a fallopian tube?

Thanks.

OGIVE

The fallopian tube has two ways it moves the egg toward the uterus (or toward a sperm) - muscular contractions and ciliary movement. My former postdoc Joanna Burdette studies the fallopian tube and has a great new paper on the role that hormones play in the regulation of these two cellular processes. Jie Zhu, a research associate professor in my lab has a series of movies that show the hormonal effects on human fallopian tissue - check out my website.

is there any way to harvest all the eggs from a woman at one time?

officiallyaninja

No - most of the eggs in the ovary are contained in primordial follicles that are not responsive to FSH and LH the hormones that are used in IVF clinics to induce follicle growth - and the same hormones that are part of the monthly reproductive cycle. We don't know what causes one follicle to begin growing when a woman is 19 and its May and one sitting it next to it may not be activated for 5, 10 or 20 years. This is a fascinating biological question that has occupied my entire professional career. See also my TedEx where I discuss this topic: https://www.youtube.com/watch?v=BwOZqxYCoUg