

Infertility Part One Show Notes

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Natasha: [IVF](#)³ a lot of times is stereotyped as being like the easy way out. Or like, this thing where they can place the [embryo](#)⁴ anywhere they want to and if you're having trouble getting pregnant, it's just going to be this like super easy scientific streamlined process. It really is so not that. It's probably the most emotionally charged thing I've ever done in my life and it's also the most difficult thing I've ever done in my life. One of the things a lot of people don't realize about people going through IVF and one thing you'll see if you are a member of an [IVF support group](#)⁵ is that a lot of people on a daily basis are going through [miscarriages](#)⁶. They're going through these really, really horrible just graphic and painful experiences with pregnancy that people never talk about. So there's a lot of [ectopic pregnancies](#)⁷, there's a lot of what's called a [chemical pregnancy](#)⁸. I've also had one of those, which is where you get positive originally on a test and then you'll have an early miscarriage and lose it. There's this other type of miscarriage called a [missed miscarriage](#)⁹ where you don't even see any evidence of a miscarriage. It's just you go in for one of your routine ultrasounds and suddenly your baby's heart isn't beating. People have these types of experiences on a daily basis. I've had a failed cycle. I've had a chemical miscarriage and I had a successful cycle, but it took three of them in order to get to this point. Honestly, I was on a daily basis near falling apart.

¹ <https://www.patreon.com/join/EmpoweredHealth?>

² <https://empoweredhealthshow.com/>

³ <https://americanpregnancy.org/infertility/in-vitro-fertilization/>

⁴ <https://www.merriam-webster.com/dictionary/embryo>

⁵ <https://www.fertilityanswers.com/infertility-blogs-podcasts-and-online-support-groups/>

⁶ <https://www.plannedparenthood.org/learn/pregnancy/miscarriage>

⁷ <https://www.mayoclinic.org/diseases-conditions/ectopic-pregnancy/symptoms-causes/syc-20372088>

⁸ <https://www.healthline.com/health/pregnancy/chemical-pregnancy>

⁹ <https://www.miscarriageassociation.org.uk/information/miscarriage/missed-miscarriage/>

Emily Kumler: That was Natasha. She's a Boston based special education teacher who is very candidly telling us about her journey with IVF. And in vitro fertilization is something that more and more women are turning to as a means of making babies. But, it's something that doesn't come without really sort of serious complications and side effects. Physiological side effects are things that are more well known, but psychologically, [women are more likely to have miscarriages when they do IVF](#)¹⁰. Not to mention the fact that their bodies are really pumped with hormones and there's a lot of waiting and seeing, which we know is really stressful in any kind of medical situation. Not least of which when you're trying to become a mom. We're going to go back to her for a second and she's going to sort of keep telling us about her own experience and then we're going to spend the next two weeks talking about infertility, specifically looking at IVF and when it's necessary and when it's not. And one of my pet peeves, having been the friend to several women who have gone through IVF, is that it doesn't seem like anybody really goes into it and then gets a diagnosis of what's wrong. But everybody is sort of treated identically, which when I was younger and people were going through IVF, it seemed like all around me. I remember just being sort of confused like when else would you go to the doctor and they would just start treating you without knowing what the underlying cause of the problem was. And that seems to be most rampant when it comes to infertility issues. And as we'll talk about, IVF doctors, or fertility doctors in general, are ranked on their ability to get women pregnant. So that doesn't mean that they're getting people to have live, healthy babies. So that's important to know when you're looking up a doctor's statistics. It means they're getting you pregnant and they will do that by whatever means necessary, the fastest they can. It's also something that makes tons of money. It is a [huge industry](#)¹¹ and I feel like that's always in sort of important to keep in the back of your mind. If you're entering the phase of life where you're trying to have a baby and you're feeling frustrated, there's a lot of research out there which we're going to get into next week about other ways of maybe trying to do stuff before you go the super hardcore medical route. Because it definitely takes a toll on your body. And I think instances of IVF are way up and I don't know that people actually have a handle on what the long term impact is of taking those kinds of hormones. So we're going to get into all of it this week and then we're going to look at treatment options for next week. Let's go back to Natasha.

Natasha: So it's been a really long journey. It started about two and a half years ago when we had been trying to conceive for several years, after having a very devastating ectopic pregnancy. It was a [ruptured ectopic pregnancy](#)¹², meaning that my [fallopian tube](#)¹³ where the baby had implanted

¹⁰ <https://academic.oup.com/humrep/article/29/6/1218/625512>

¹¹ <https://www.statnews.com/2017/12/04/infertility-industry-investment/>

¹² <https://www.acog.org/Patients/FAQs/Ectopic-Pregnancy?IsMobileSet=false>

needed to be removed surgically. For several years we tried after that devastating loss and we couldn't conceive on our own. So we went in for a lot of testing. About two years after having the ectopic pregnancy, the testing was very inconclusive. It didn't determine that anything in particular was wrong. Even though I'm missing one of my two fallopian tubes, the other one was entirely clear. So, I should have been able to conceive naturally, but I wasn't able to. So we started pursuing IVF few years ago. The process begins with a lot of very rigorous testing. So they do different types of [ultrasounds](#)¹⁴ in order to determine what your [ovaries](#)¹⁵ look like, what your tubes look like, the size and shape of your [uterus](#)¹⁶, as well as some genetic types of testing to look at your chromosomes and see are there any abnormalities in your chromosomes that might be producing this problem. They also check the [male partner's sperm](#)¹⁷ to see are there any abnormalities in the sperm. And it turned out there just weren't any abnormalities. So what they will term those cases is [unexplained infertility](#)¹⁸, which is very frustrating as a diagnosis because when it's unexplained, there's not really necessarily any route to solve the problem. So after a certain amount of trying, they have you start something called [timed intercourse](#)¹⁹, which is where you will take a [trigger shot](#)²⁰ in order to trigger ovulation and then you will have intercourse that night in order to try to get everything synched up and timed correctly. So that didn't work for us. It took three rounds of that for them to determine that we were eligible for IVF.

Emily Kumler: So have they put you on like [Clomid](#)²¹ or any of those other kinds of [follicle stimulating hormones](#)²²?

Natasha: Yeah, they did put me on a medication, I can't remember the name of it, but it increased the number of eggs that were released, but it didn't increase them wildly the way that stimulation medication does for egg retrieval, it does like maybe two eggs instead of one. They prescribed me the trigger shot and it turned out I was ovulating on my own. They thought maybe it was an ovulation problem, but I was ovulating on my own so I didn't even need to take the trigger shot.

Emily Kumler: That's so annoying. So like, you basically were like, okay, so you've looked at everything inside of me, you've determined there's no

¹³ <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/fallopian-tube>

¹⁴ <https://www.mayoclinic.org/tests-procedures/ultrasound/about/pac-20395177>

¹⁵ <https://www.healthline.com/human-body-maps/ovary#1>

¹⁶ <https://medlineplus.gov/ency/imagepages/19263.htm>

¹⁷ <https://americanpregnancy.org/getting-pregnant/male-fertility-testing/>

¹⁸ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2505167/>

¹⁹ <https://www.ncbi.nlm.nih.gov/pubmed/25775926>

²⁰ <https://www.verywellfamily.com/ovidrel-and-trigger-shots-for-fertility-treatment-4583799>

²¹ <https://medlineplus.gov/druginfo/meds/a682704.html>

²² <https://medlineplus.gov/ency/article/003710.htm>

problem but now you're going to make me ovulate assuming that might be the problem even though now you know it's not the problem. I mean I feel like all of this feels like backwards kind of, right?

Natasha: Well, it is. It is. And you'll find that people who've gone through the IVF process end up purchasing... Somebody's awake. People who go through the IVF process end up purchasing a lot of medications that they don't end up using and they're very expensive. Trigger shot is like, for me with insurance, 60 bucks a pop. More for other people without insurance.

Emily Kumler: And you didn't need it.

Natasha: Yeah, exactly.

Emily Kumler: And you can't like then sell it to somebody on Craigslist or something.

Natasha: You can't, you technically legally cannot even give it away.

Emily Kumler: That's heartbreaking.

Natasha: It's really sad. Like knowing that other couples all started going through this. Some programs will have med give back programs, but the [Brigham](#)²³, which is where I did IVF, does not have that program.

Emily Kumler: So do you have any estimate in terms of like how much money you spent on stuff that you didn't use?

Natasha: I was very lucky because my husband has very good insurance. He works at Pfizer. Maybe like \$300. And I know that sounds like a lot, but you got to understand some people are paying \$300 for one prescription. And I didn't use like six different prescriptions that I was given because when you're stimulating for the [egg retrieval process](#)²⁴, they don't know how long it's going to last. They give you a prescription for medication and then if you start needing to stim longer, they'll give you a new prescription. But they can't tell you if you're going to use it or not.

Emily Kumler: So you just don't even fill it if you don't need it?

Natasha: I had to, and like a lot of people who have certain types of insurance, they have to use a specific pharmacy that isn't even in

²³ <https://www.brighamandwomens.org/obgyn/center-for-infertility-and-reproductive-surgery>

²⁴ <https://uihc.org/health-topics/egg-retrieval-process>

Massachusetts. So if you have even the possibility that you might need to stim longer, than you need to get this medication to you through the mail early.

Emily Kumler: So you should probably explain what stimulating is.

Natasha: So [stimming](#)²⁵ is the process by which you take medication in order to stimulate the ovaries to produce extra eggs so that they can be retrieved and then combined with sperm to create an embryo.

Emily Kumler: And that's once you've started the IVF cycle?

Natasha: Yes, once you've started the IVF cycles. So the [IVF cycle begins](#)²⁶ usually with birth control, which will sort of down regulate the cycle, make it so that they can control a lot of what's happening better than if they just started giving you stimulation medication. So they start with birth control and then after a certain number of days on birth control, depending on the person, I only had to do seven days, some people do like 30 days. After that you begin your stimulation medications, which are medications, hormonal medications, that will make your body produce more eggs.

Emily Kumler: So that they can then take them out?

Natasha: Yes. And they are vastly different numbers than you would get with any average or normal cycle.

Emily Kumler: Because it's an unpleasant process to have them taken out too, right?

Natasha: Yes. [Extremely unpleasant](#)²⁷. The process is actually that they take a needle and it's inserted into the vaginal wall and then goes through some tissue to get to the ovary. The eggs are pulled out that way.

Emily Kumler: And are you sedated?

Natasha: You get put under full anesthesia at most clinics. Some clinics don't.

Emily Kumler: I mean that seems sort of traumatic.

Natasha: Yeah, well I've heard people describe the process of having it done while they were awake through some of the support groups I'm

²⁵ <https://www.aspirefertility.com/blog/what-to-expect-from-ovarian-stimulation-in-ivf>

²⁶ <https://www.shadygrovefertility.com/blog/treatments-and-success/ivf-treatment-series-part-one/>

²⁷ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5586085/>

in. And it sounds ridiculously traumatic. For me, I was very well sedated and put to sleep and well pain managed afterwards.

Emily Kumler: At this point, how many years into this are you?

Natasha: So, I'm about four and a half years into trying to conceive and two and a half years into IVF.

Emily Kumler: So your first round of IVF, you go through all this sort of stimulation medication and you have the extraction and how many eggs did they get?

Natasha: So I was someone that they call a [high responder](#)²⁸, meaning that my body overproduces eggs in response to the stimulation medications. So we retrieved 49 eggs.

Emily Kumler: Wow, that's a lot.

Natasha: But then, if you're a high responder, the chances that you'll get something called [ovarian hyperstimulation syndrome](#)²⁹ goes up. So, I got ovarian hyperstimulation syndrome.

Emily Kumler: What does that mean?

Natasha: You get really sick, you start like [retaining water](#)³⁰ really badly. I gained like 12 pounds in three days. And you have a lot of pain in the pelvic region and it has to do with like how the hormones respond when you're given the stimulation medications. For me, I had too much estrogen circulating through my body and it made me sick. So, there's [two types of embryo transfers](#)³¹ that you can do after you've done this stimulation process. And one thing that happens if you have ovarian hyperstimulation syndrome is that you can't do a fresh transfer, which is what most women really want to do because it's the fastest form of transfer. They take this embryo that has been freshly made and they put it into you three or five days after it's been made. The other type of transfer, which ended up being the type I had to do, was frozen transfer where they freeze the embryos after a certain number of days, thaw them and transfer them later. So the reason I had to thaw and transfer later is because if I had achieved pregnancy that cycle, it would've made me sicker because of the types of hormones that circulate through the body during pregnancy. So when you

²⁸ <https://www.ncbi.nlm.nih.gov/pubmed/28635413>

²⁹

<https://www.mayoclinic.org/diseases-conditions/ovarian-hyperstimulation-syndrome-ohss/symptoms-causes/syc-20354697>

³⁰ <https://www.healthline.com/health/water-retention>

³¹ <https://www.ncbi.nlm.nih.gov/pubmed/30388233>

have ovarian hyperstimulation syndrome, you cannot do a fresh transfer. You have to do a frozen transfer.

Emily Kumler: Because they want to give your body time to rest in between?

Natasha: Yes, exactly.

Emily Kumler: Once you've produced the eggs, the stimulating drugs are no longer needed?

Natasha: Correct. As long as you've produced viable eggs. A lot of people get stuck at the stage where they don't produce viable eggs or they lose all of their eggs. We didn't have that problem in the end. After five days we had 28 embryos left.

Emily Kumler: I wanted to learn more about infertility in general. Again, anecdotally, it seems like women are always treated and the protocols seem to be basically the same for almost all women. Some women who are diagnosed with [polycystic ovaries](#)³² will have a course of [Metformin](#)³³ or other things to try to treat them before going into IVF, but there is this sort of urgency about aging that is really put on women. And so I was curious, like what are the larger issues when it comes to infertility and like what is the role of men? It doesn't seem like men are put through the same kind of rigorous testing and is that fair? Is it really usually the woman or the aging uterus that's the problem, or the egg quality that seems to go down? So we're going to get into the medical side of this and what is really happening and what some of the stats are.

Alan Penzias: I'm [Alan Penzias](#)³⁴. I'm a [reproductive endocrinologist](#)³⁵ at [Boston IVF](#)³⁶. I direct the reproductive endocrinology and infertility fellowship program at [Beth Israel Deaconess Medical Center](#)³⁷ in Boston, where I am also an associate professor of obstetrics, gynecology, and reproductive biology at [Harvard Medical School](#)³⁸. The [most common infertility issues](#)³⁹ that we see today relate to one thing: lack of ovulation. That's a big problem that we see and it's fairly common. Number two would be people who have a male factor in the relationship undiagnosed and unknown to them because all things seem

³² <https://www.mayoclinic.org/diseases-conditions/pcos/symptoms-causes/syc-20353439>

³³ <https://www.mayoclinic.org/drugs-supplements/metformin-oral-route/description/drg-20067074>

³⁴ <https://www.bostonivf.com/our-practice/physicians/AlanPenzias/>

³⁵ <https://www.rmact.com/our-fertility-doctors/what-is-a-reproductive-endocrinologist>

³⁶ <https://www.bostonivf.com/>

³⁷ <https://www.bidmc.org/>

³⁸ <https://connects.catalyst.harvard.edu/Profiles/display/Person/58797>

³⁹ <https://www.ncbi.nlm.nih.gov/pubmed/17390595>

otherwise normal. And then three, all falls into the unexplained category, which is quite a big catchment of a variety of different problems.

Emily Kumler: What percentage of fertility issues do fall on the male side?

Alan Penzias: [Male infertility](#)⁴⁰ has been attributed to approximately [45 to 40%](#)⁴¹ of the problems. Historically. There's no really accurate, perfect metric for that.

Emily Kumler: But that's in terms of like couples that have been treated or both have been tested?

Alan Penzias: For couples who have been tested for infertility it seems that a diagnosis of a male factor is picked up somewhere between 35 to 45% of the time.

Emily Kumler: I mean I find that fascinating because I feel like it always seems that, at least anecdotally, it starts with the woman assuming that, you know, she's too old or there's something wrong with her eggs. And if it really is almost like, you know, half, a little bit less than half. It sounds like percentage problem with men. Is there an education piece in terms of couples who might be listening that you sort of feel like, is there more of a stigma against men having fertility problems than women?

Alan Penzias: There's a huge [knowledge gap with respect to male infertility](#)⁴² or the attribution of male factor to why a couple isn't getting pregnant. And I believe that a lot of it becomes evident because men can really observe one feature of their reproductive self and that would be the ejaculate volume or the ability to have and maintain an erection. And if those two things seem to be working well, they will make the incorrect assumption that the quantity of sperm, those sperms that are moving and the percent of those sperm with a normal shape has to all be normal. But one fact that's an interesting one and I think most people don't really realize is that a man who has had a [vasectomy](#)⁴³, will have the same semen volume and sexual performance as he did prior to the procedure. So you can't really tell unless you test.

⁴⁰ <https://www.mayoclinic.org/diseases-conditions/male-infertility/symptoms-causes/syc-20374773>

⁴¹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4424520/>

⁴² <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6087846/>

⁴³ <https://www.mayoclinic.org/tests-procedures/vasectomy/about/pac-20384580>

Emily Kumler: And so, when you have couples come to you, and [Boston IVF is one of the best in the world](#)⁴⁴, I think. Right? So you guys probably have people who come to you who have tried going to other doctors. Do you find that there are sort of other miscommunications like that that are important to let people know about?

Alan Penzias: I think that with regard to picking up something big, like a male factor, the word is really out there among the medical community. So I think that it's much less common nowadays to have somebody come in who has had any form of testing where they've completely neglected to test the male partner. So that's fortunately much less common. But I do think that there are a couple of things that do sort of dovetail with sort of a knowledge base deficit and that is the quantity of eggs that a woman has as opposed to the other characteristic of eggs, which is the [egg efficiency](#)⁴⁵ sometimes referred to as quality. So I think that's another place where there's a big knowledge gap. When I think about the two features of the eggs, the quantity of them and the quality, when I start with the quantity aspect, I'm not saying that somebody may be able to test and find out that they have a hundred or a thousand eggs. That's not what we really need. But functionally, do they have an excellent reserve⁴⁶, good, fair, or reduced, and that really reflects how they might do if we tried to go retrieve eggs. For example, if a woman goes through an IVF cycle and we retrieved twelve eggs from one woman or three eggs from another, how does come to be? The architecture of the ovary is such that every month there is a group of eggs ready for recruitment. Typically, her hormones will be produced in a sufficient manner to rescue one egg and she'll throw away the rest, so someone with excellent reserve may have 20 available. She rescues one, she discards 19, her twin sister or best friend may also have a regular cycle, have a reduced reserve, three are available. She rescues one, she throws away two. Neither woman knows what their egg quantity is because all they know is if they have normal, regular cycles, they are each releasing one egg per month. When we do blood tests and we do ultrasounds and talk about [ovarian reserve testing](#)⁴⁷, we're only just testing the quantity which asks the question in a given month, how many eggs are available potentially for recruitment that month and that's a separate property from the egg quality or efficiency.

Emily Kumler: Is it correct that when that is the sort of recruitment process, which is a great word to describe that, is happening, that it's really almost like sort of a natural selection where the best egg is selected?

⁴⁴ <https://www.bostonivf.com/our-practice/why-we-are-different/>

⁴⁵ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4090586/>

⁴⁶ <https://arm.coloradowomenshealth.com/services/diagnosis/ovarian-reserve>

⁴⁷ <https://arm.coloradowomenshealth.com/services/diagnosis/ovarian-reserve>

Alan Penzias: It's actually the most hormonally competent follicle, not necessarily the genetically healthiest egg. So when we think about these, and we'll use the example of a woman who has done some ovarian reserve testing, we estimate that she has an excellent reserve and she's ovulating once a month. Her follicles, which are little cysts on the ovary that each contain an egg, are receiving the signal from her [pituitary gland](#)⁴⁸ and there are two hormones that are being released and that are bathing the ovary. One is called [FSH, follicle-stimulating hormone](#)⁴⁹, and the other is [LH, luteinizing hormone](#)⁵⁰. Those 20 follicles, each with an egg, don't have the same number of receptors for FSH and LH equally distributed. So there may be one follicle that starts to take the lead, and through a series of fairly complex hormonal interactions that's beyond the discussion point today, one is rescued and the rest become [atretic](#)⁵¹ and kind of die off. That rescued egg is no more likely to be genetically healthy than one that was discarded because the selection process, because of the hormonal competence, not the genetic inner workings of the egg itself.

Emily Kumler: And so is competence also sort of like compatibility, like it can uptake more of those hormones and therefore it has the ability to grow faster?

Alan Penzias: Yes, that's exactly it. And in fact all of the fertility therapies that drive egg recruitment are really predicated on either using an oral medicine and commonly used ones include [clomiphene or Clomid](#)⁵². Those are oral tablets and what they do, for the few days that you take medicines, they actually raise the level of FSH and LH that a woman is naturally producing from her pituitary to try to recruit. Not only the one she would recruit, but maybe a second or even a third egg. When we do in vitro fertilization, I write a prescription for FSH and LH to try to raise the level to recruit 10 or 12 of the group that are available for recruitments. And so it's really a simple dose response curve.

Emily Kumler: And so if the most common infertility issue that women face is the lack of ovulation, does Clomid or these sort of other hormone stimulating prescriptions help her to ovulate if she is not? Or you have to go in and sort of extract the eggs?

Alan Penzias: No, because they generally do. So if a woman has somewhat [irregular menstrual cycles](#)⁵³, it's very clear if somebody has periods

⁴⁸ <https://www.healthline.com/human-body-maps/pituitary-gland>

⁴⁹ <https://medlineplus.gov/ency/article/003710.htm>

⁵⁰ <https://medlineplus.gov/lab-tests/luteinizing-hormone-lh-levels-test/>

⁵¹ <https://www.merriam-webster.com/dictionary/atresia#medicalDictionary>

⁵² <https://medlineplus.gov/druginfo/meds/a682704.html>

⁵³ <https://my.clevelandclinic.org/health/diseases/14633-abnormal-menstruation-periods>

only every five or six weeks that there may be a problem with ovulation, but some women will have 26 day cycle one month and a 33 day cycles the next month, then a 23, a 35, and it pops around. So that woman probably has some version of an [ovulatory disturbance](#)⁵⁴. So instead of releasing one egg a month for a total of perhaps 12 a year, she may release six eggs in a year or five eggs, eight eggs. And that just reduces her chances of pregnancy. Those oral hormones help with ovulation to get it back on track.

Emily Kumler: So talk to me a little bit about age. I know that there is, you know, sort of mixed messages out there about women and you know the biological clock and the [risks of having a baby after a certain age](#)⁵⁵ and I have certainly come across conflicting research on that. I know there was some really interesting study that was done, I'm going to guess five years ago that was sort of suggesting that a lot of the age related miscarriage data was really hard to tease apart because of the use of [amniocentesis](#)⁵⁶ on older women, which puts you at a much greater risk for a miscarriage and therefore saying older women were more likely to miscarry when they were all having amnios makes it very hard to tease apart.

Alan Penzias: There's a lot to unpack here and to kind of start pulling on the thread to sort of unravel it in a way that's digestible, I'll start with this. A woman is born, and if you rewind the clock to when her mom was halfway finished being pregnant with her, she probably had, the estimates are [six to seven million eggs](#)⁵⁷ in her ovaries. By the time she is born, she's down to about a million. And by the time you get to puberty, you're down to about four to 500,000. So, more eggs are lost prior to birth than you will ever ovulate in your life. The way the architecture of the ovary is set up, is in this sort of discrete month by month packets that sort of become available. And if you think about it, that design is actually terrific because if all 400,000 eggs were eligible for recruitment at age 13, you'd ovulate all those eggs once and that would be the end of the game. So not very good for the species in terms of reproduction. So the way that nature has set this up is that in every single month a cohort of follicles that have eggs in them are designated to march down the path toward maturity. And that march is inexorable. So if she is ovulating regularly and talking about a woman who has excellent reserve, there may be 20 that are recruitable and she'll rescue one and throw away 19. Suppose that woman is pregnant. What happens to those 20 eggs? Well, those 20 are available, but she'll actually throw all 20 away if she's on the [birth control pill](#)⁵⁸, if she has an

⁵⁴ <https://www.ncbi.nlm.nih.gov/books/NBK327781/>

⁵⁵ https://academic.oup.com/humrep/article-abstract/10/suppl_2/77/639137

⁵⁶ <https://www.mayoclinic.org/tests-procedures/amniocentesis/about/pac-20392914>

⁵⁷ <https://my.clevelandclinic.org/health/articles/9118-female-reproductive-system>

⁵⁸ <https://www.hhs.gov/opa/pregnancy-prevention/birth-control-methods/birth-control-pills/index.html>

IUD⁵⁹, if she's using the [estrogen Nuva ring](#)⁶⁰, if she's using a [birth control patch](#)⁶¹, [Depo-Provera](#)⁶². The 20 become available. No hormones come to rescue an egg. All 20 are discarded. A woman who starts birth control pills, for example, at age 13 and takes them faithfully up to age 49 has not saved a single egg because every month a group were available for recruitment and rescue, but none was because of the hormone suppression and she threw them all away. And you can't stop the process, which is a very key component of this. Secondly, if I were to do IVF on somebody and I give them prescription for these LH and FSH and I rescued 12, I have not shortened their reproductive life by a full year. In fact, in June of 2019 I cannot steal an egg from July, August, or September, no matter how hard I try. So all I'm doing is working within the confines of the group that's available in that month. Let's say there are 20 available, I rescue 12, she's going to throw away eight of them so I don't change her reproductive course. So with that kind of in mind, if we think about starting with a lot and ending with none. So from age, let's say 11, first period, 51, last period, many times people imagine that there's a linear decline. You can draw almost a straight line between a high point and the low. And it happens that over the course of time, year by year, month by month, the quantity available in each individual month slowly decreases from maybe 25 available at the beginning to three per month at the end. And that may be the case for some people, but not everyone. There are some women who will retain excellent quantity up into their mid, I would say late forties and then all of a sudden drop off the cliff. And others who in their early twenties will have a tremendous drop and then sort of float along the bottom, ovulating perfectly normally, one egg per month, until their [menopause](#)⁶³, but never know it. So when we're doing tests, we're looking at egg quantity only. And when we think about the quality, that's the next feature, and that sort of bears to the miscarriage and some of the other rates. When we're thinking about egg quality, just imagine this example. I have a 24 year old woman. Who I've now retrieved, at the time of IVF, ten eggs. And I have another woman who is 44 who has the case right after. I also get ten eggs from her. So quantitatively, I have ten eggs from each of them. If I were to ask you to guess from the woman who was 24 how many of those 10 eggs would you guess have a reasonable chance to become a baby? What would your guess be?

Emily Kumler: 90%.

⁵⁹ <https://www.plannedparenthood.org/learn/birth-control/iud>

⁶⁰ <https://www.nuvaring.com/how-nuvaring-works/>

⁶¹ <https://www.plannedparenthood.org/learn/birth-control/birth-control-patch>

⁶² <https://www.mayoclinic.org/tests-procedures/depo-provera/about/pac-20392204>

⁶³ <https://www.mayoclinic.org/diseases-conditions/menopause/symptoms-causes/syc-20353397>

Alan Penzias: 90%? Reasonable guess. I have 10 eggs from the 44 year old. What would your guess be as to how many of those have a reasonable chance to become a baby?

Emily Kumler: Ten?

Alan Penzias: 10%, right? So even without specific medical knowledge, you guessed correctly, that even stipulating the same quantity that the egg quality or the egg efficiency, was not the same by a long shot. And so that's the inherent difference between the quality and the quantity. I specified that we got 10 but you knew even without really knowing, you just had this inclination, that nine were unhealthy in the older woman, which is correct. So now we start to think about people as they age. And if we look purely at just background and miscarriage rates, just completely discounting any amniocentesis or any intervention, and we just look at the natural background, the risk of an induced miscarriage is about [half a percent with an amnio](#)⁶⁴. That's kind of a traditional number. The [risk of Down's Syndrome](#)⁶⁵ is thought to be about half a percent at 35. So, that's why that age was chosen historically because the risk of causing a miscarriage with the procedure and the risk of having a down syndrome pregnancy intersected at age 35.

Emily Kumler: Which is one of the things you're testing for, essentially?

Alan Penzias: Yes, it's one of the things we're testing for. So, if we were to just take away the amniocentesis and just purely look at miscarriage risk: In the younger age group, probably baseline human miscarriage and the women who are in their twenties and early thirties is about [10 to 15%](#)⁶⁶ of the time somebody has a positive pregnancy test, it does not result in the baby. If you follow that out to women in their mid to late forties, that number is anywhere between 50 and 80% of the pregnancies are lost that way. Again, completely separate than with an amniocentesis. We see that also reflected in the sort of the inverse part of that curve is the pregnancy and delivery rates with in vitro fertilization. Women using their own eggs at an older age have higher miscarriage rates and lower delivery rates. Even kind of pound for pound, egg for egg, than their younger friends. If you look at, well is it the egg or is it the uterus, it seems to be the egg, not the uterus, because if we take a donor egg, put it into a 47 year old who's had natural menopause or take a donor egg and put it into a 27 year old who had chemotherapy for [non Hodgkin's lymphoma](#)⁶⁷ when she was a teenager, and that caused her to have a

⁶⁴ <https://americanpregnancy.org/prenatal-testing/amniocentesis/>

⁶⁵ <https://www.mayoclinic.org/diseases-conditions/down-syndrome/symptoms-causes/syc-20355977>

⁶⁶ <https://americanpregnancy.org/pregnancy-complications/miscarriage/>

⁶⁷ <https://www.cancer.org/cancer/non-hodgkin-lymphoma/about/what-is-non-hodgkin-lymphoma.html>

[chemotherapy induced menopause](#)⁶⁸, their chances of having a baby are exactly the same, 50%, because you're using the egg of a healthy young donor. So the fact that you get a 50% delivery rate at age 47 or 27 using donor egg suggests that the uterus tends not to age from a reproductive standpoint. But, using the egg from a 27 year old has a way higher chance of live birth and a very low chance of miscarriage, while the from the 47 year old has a 95% chance of miscarrying and maybe at best, a few percent chance of resulting in a healthy baby. So that's where the quality or the efficiency of the egg declining over time contributes to more miscarriages and lower pregnancy rates.

Emily Kumler: And is it accurate to say that's because the most qualified or the best quality eggs are presented when you are younger and then you sort of are on this reserve basis as you get older?

Alan Penzias: It may be a storage issue because a human man has 46 XX or 46 XY chromosomes, that's the chromosome content we call that their [karyotype](#)⁶⁹. And every egg, if I were to biopsy the ovary of a woman, and look at an egg right now, just here in the office going to the surgery center and do that, those eggs each have 46 chromosomes and the 46 XX, but the sperm are 23 X or 23 Y. So how do we get a 46 XX egg and a 23 X or 23 Y sperm to make a unique new human who's 46 XX or 46 XY? It's a process that's referred to as [meiosis](#)⁷⁰. At the time of ovulation, a separation of the two sets of chromosomes occurs or it's completed, and it's the shedding of what we call the polar body in the extrusion of 23 chromosomes at the time of ovulation. That then leaves the egg, presumably, with 23 chromosomes ready to go. Those eggs have all been there. So you take a woman who was born 35 years ago, those eggs have been sitting there with 46 chromosomes waiting for 35 years. When that ovulation happens, when that LH surge occurs, the separation of that two sets of chromosomes is very clean and easy and breaks down a small percentage of the time. That same egg, from additional 10 years in the ovary and now it's 45, does not fare as well because the ability to separate out because of over just the course of time and there's little breaks in the DNA and tears and cytoplasmic issues and structural elements that go on inside the nucleus. So it's basically the fact that reawakening when the egg does not separate cleanly, that results in most of the chromosomal abnormalities we see in the resulting embryos. So it's not that they start with the best eggs. If you were to look across all the eggs at a given age, let's say 31 years old, they would all likely be the same degree of health. The one that is released the following year, two years later, do great. The ones that are released 10 years later, 12 years later, don't fare as well.

⁶⁸ <https://www.liebertpub.com/doi/abs/10.1089/jwh.1.1999.8.949>

⁶⁹ <https://www.genome.gov/genetics-glossary/Karyotype>

⁷⁰ <https://www.khanacademy.org/science/biology/cellular-molecular-biology/meiosis/a/phases-of-meiosis>

Emily Kumler: And that's the same with the quantity, right? Can you talk a little bit about your study, where you looked at the extraction and how if you have 15 eggs or more, that can sort of serve to be enough for somebody who wants two kids?

Alan Penzias: Correct. So that's what we call the [one and done study](#)⁷¹ we looked at. In the old days, you know, way back when I was training years ago, and IVF wasn't as successful. We would really be just aiming at an error discussion really all calibrated around getting the person pregnant once. It was all aimed at the pregnancy. Now because IVF is so much more successful due to a whole host of different advances, we're now asking people a question, what is your desired family size? Because that impacts what we might do treatment wise going forward. So if a couple were to come in and say, you know, we're 31 years of age, our goal, we'd love to have two children. That's really kind of our ideal. And they asked me, well, if we go through this one IVF cycle, what are the odds that I will be able to do this one egg retrieval in my life, generate several embryos, put one in now, [single embryo transfer](#)⁷², get pregnant, have a baby, and then have another embryo or more leftover that I can use in the future to have my next child so that I never have to do the egg retrieval again. And the answer turns out that for young women, who are under the age of 35, if they happen to have more than 15 eggs retrieved at the IVF, there is a very high chance that that cohort will be enough to have enough embryos to be able to satisfy a family desired size of two children.

Emily Kumler: And that is based on the assumption that the number of eggs released has something to do with the health or the quality of the eggs.

Alan Penzias: It's largely tied to the age that she when the treatment is done, so that if there's very healthy or very efficient, coming back to our example of the 24 year old, where you guessed maybe 90% of the eggs were healthy, if I get 12 eggs for that person, I may have at the end of the day, four healthy enough embryos that I can put in one and then have at least another one for the future, that would work. As people get older and that efficiency drops, the number that you need to overcome, the mathematics of the efficiency then becomes the driving force. So that at 35, it seems to be 15 or 16 at an older age, 15 or 16 may be enough to have one pregnancy. But if the efficiency of the eggs is relatively low, we may not have enough in that single cohort to serve their needs into the future.

⁷¹ <https://www.bostonivf.com/content/editor/One-and-Done-FandS-2017.pdf>

⁷² <https://www.cdc.gov/art/patientresources/transfer.html>

Emily Kumler: And I feel like this is probably a good segue into the idea of younger [women freezing their eggs](#)⁷³, which I feel like is again, one of these places where you know, one week you read like this is great, women should do this. Google's paying for all their female employees to do it, right? Versus nobody really knows because those are not fertilized eggs. Right? So that's a big difference. They're just the eggs. Can you talk a little bit about why that's different and why that's still sort of not an area that's completely known?

Alan Penzias: Sure. So the technique that we use now to preserve eggs, the word that you'll hear bandied about is called [vitrification](#)⁷⁴. And it's a technique that has replaced the older technique that was called the [slow freeze](#)⁷⁵, which was exactly as it sounded, one that we had developed years and years ago, where we thought that you needed to freeze the egg very gently and bring the temperature from core body temperature down to the freezing point before putting it in liquid nitrogen to allow the ice crystals to form in a very gentle manner and then you could plunge it. It turns out that ice crystal formation is very unhealthy for eggs or embryos and doing it that way, you get very poor survival and poor function. With vitrification, you're able to take the eggs, put them in their preservatives, run them through some preparatory paces, and then plunge them immediately from core body temperature, 98.6, into liquid nitrogen and the rate of cooling is so fast. The ice crystals just, h2o molecules don't have time to form ice, so they form this lattice and it has this glassy looking machine, hence vitrification.

Emily Kumler: Sounds like my sushi coming from Japan.

Alan Penzias: There you go. Exactly. So, people talk about freezer burn. Well freezer burn happens in your home refrigerator because of all the ice crystals and the oxidation. Vitrified materials are glass like and pristine and they don't suffer the same fate. So likewise with the proof of concept with donor eggs. We have many egg donors who are donating eggs. The eggs are being frozen and then being used within a few months to a year. So we know the technique works well with egg survival, embryo generation, and then the use of those embryos turning into babies. So, that's the great proof of concept.

Emily Kumler: But that's a relatively short period of time.

Alan Penzias: It's a short period of time and there's very good data that goes out to [five years](#)⁷⁶ that shows absolutely no change for the quality or function of those eggs. And they continue to function the same way as fresh

⁷³ <https://www.mayoclinic.org/tests-procedures/egg-freezing/about/pac-20384556>

⁷⁴ <https://www.fertilitymemphis.com/vitrification/>

⁷⁵ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2729856/>

⁷⁶ <https://www.sciencedirect.com/science/article/pii/S0015028208002318>

eggs did. The author on that study is named Ana Cobo and that was published a few years ago in the [Journal of Human Reproduction](#) looking at [frozen eggs from egg donors](#)⁷⁷. I used five years later, and now they also have some data I believe that goes out even to 10 years and that's not a big surprise because the technique itself suggests that's what the purpose is. Now, when we take somebody and we think about kind of these overlapping circles, take a group of women between the ages of 25 and 30 since in that age range, maybe 15% of those women will have an infertility problem, but yet in that age range, that's when egg function and egg health is largely the best, if somebody were to just speculate. This is pure speculation. If I were to have a hundred women of age 27 come in, freezing eggs for their future use, and then they go off, they're happy, they're healthy, they begin to form relationships as they begin to get older, well, let's say between the ages now of 30 and 35, those same women then start to try to get pregnant. Most of those women will get pregnant on their own and will never need to use those frozen eggs. So the younger you are, when you freeze them, up to about a backstop of let's say age 25, the more likely to have a high percentage that could function normally. But also if you start to try to get pregnant at 30, the odds are unless you have some other serious problem or your partner does, you're never going to need those eggs. So maybe doing the egg freezing in the situation when they may never need to be used because sometimes when you see some advertisements and so everybody should freeze eggs when they're 25 and you've got to empower yourself in the future. I rather like the idea of using the technology as an empowerment for women, giving them options, giving them a technique that's available. But the last thing that I'd ever want to do is go out and try to scare a bunch of 25 year olds into going to freeze their eggs for fear that they're going to dry up and then never going to be able to get pregnant. So that's one component. So some people in that 25 to 30 age range are starting to feel that the value proposition for them is to allow them not to think about it. Not that they're worried about getting pregnant in the future, but not to think about the fact that they may have a problem. And so therefore they can focus on whatever else they want to focus on. For women who are between 35 and 38 for example, what I tend to see, and I was just at dinner with some friends last night, we were having this very conversation, is that many professional single women who are between the ages of 35 and 38 are feeling this very undue pressure that men don't feel. And that is that every time they go out on a date it's this, is the guy? Is he going to be the one that's going to help me get pregnant? Just having that worry is just very unfair. And I think that if somebody wants to take that pressure off and go ahead and at that time, even though the eggs are a little less efficient, you go ahead, they freeze their eggs so that the next time they go out for somebody for a cup of coffee, it can just be a cup of coffee and they take the pressure off. It's a pressure release

⁷⁷ <https://academic.oup.com/humrep/article/27/6/1606/620076>

valve. That can be the value proposition for that person because at any age, it's never a guarantee that the frozen eggs will work, but it's a backup to natural conception, should that not work in the future. And just like, you know, any time you're frustrated with something and you're working really hard on it and you're just trying to do a task and it's not working, you get frustrated more, start feeling very inefficient. Then you go, you have a breather, you take a deep breath, you come back to it with a fresh eye, maybe a rest. Now all of a sudden you can tackle the problem and you just feel refreshed. Same thing if somebody is in a social situation where every time they're at the gym or any social interaction and trying to go out and just have a normal life, but they feel this pressure of reproduction in the background and it's actually interfering with them being able to just live a happy, healthy life. Knowing they have a few frozen eggs can be the pressure release valve that just allows them to be and just be happy. They again may never use those eggs or they may find they get into a relationship, get pregnant really quickly and it's the second baby that they then come back to use those eggs for.

Emily Kumler: To turn it back on men for a second. Is there any similar process with aging and men in terms of fertility or is it the problems that you come across likely have always been there and they just never knew?

Alan Penzias: Well, no, there's definitely two things with aging. So we have a paper that we presented an abstract for a couple of years ago at the [European Society Meeting](#)⁷⁸. We've got the manuscript now being ready to be resubmitted and reformatted with comments back to the journal, but basically what we said in the abstract, [because that's already publicly available information](#),⁷⁹ and it was at [ESHRE](#)⁸⁰ in Finland two years ago. [Laura Dodge](#)⁸¹ was the first author on that in our group and she is an epidemiologist. So what we showed was if you look at women's age and the pregnancy rates and then look at men, as their [male partners](#)⁸², who are within five years, five to 10 years, or more than 10 years age discrepant older than them. So, a 35 year old woman with a 51 year old man would be a big 16 year age difference. And a 35 year old woman with a 37 year old man is just two. The older the man was within that age set controlled for the woman, the lower the pregnancy rates were. So that probably the attributable factor to the female side is maybe 70% or 75% at a younger age. As women get older because the eggs fail so much, that becomes the dominant factor and the discrepancy becomes less. But there's definitely a male factor contribution here. As men get older, beyond the age of 50, we also

⁷⁸ <https://www.eshre.eu/Annual-Meeting/Helsinki-2016>

⁷⁹ [https://www.fertstert.org/article/S0015-0282\(19\)30970-7/abstract](https://www.fertstert.org/article/S0015-0282(19)30970-7/abstract)

⁸⁰ <https://www.eshre.eu/>

⁸¹ <https://www.eshre.eu/Annual-Meeting/Geneva-2017/ESHRE-2017-Press-releases/Dodge/Bio>

⁸² https://www.eurekalert.org/pub_releases/2017-07/esoh-dri062817.php

know that there are other, not just genetic conditions that could be passed down, like with women getting older it's Down's Syndrome with an extra chromosome, with men it's more epigenetic problems, disease, in the offspring that is attributable to male age over time. So when we think about things like [schizophrenia](#)⁸³ and autism and a handful of things like that.

Emily Kumler: I feel like the male side of this is largely unreported compared to the female side.

Alan Penzias: I think that largely because the chromosome contribution is such a large make or break factor. If you imagine that the chromosomes are just unhealthy for a 40 year old woman, 95% of the eggs are unhealthy. It doesn't matter what her partner's age is because it's a nonstarter because the chromosomes are healthy. When you have healthy chromosomes, then you can start to have secondary impact from other things from the male factor. So that's why I said the percentage of attributable cause for the infertility or the attributable cause to a lower pregnancy rate is a little bit higher at the younger age with discrepant ages in aging men because as women get older, the chromosomally unhealthy egg becomes such a dominant factor. That kind of blacks out the sun with everything else.

Emily Kumler: There is this sort of misnomer about how men can, you know, impregnate women their whole lives, right? And like women stop being able to do that.

Alan Penzias: Correct. And I think that, you know, if you think physiologically why that may be a design, because a woman who is getting older and her eggs are starting to fail, pregnancies themselves become more risky as women get older. So even though you could take a healthy embryo from donor egg and put it into a 60 year old woman and make her pregnant at the same percentage rate as a 40 year old or same percentage rate as a 30 year old woman, those people will all have the same rate of positive pregnancy tests, clinical pregnancy, but being 60 years old and having a pregnancy in your body. Your body is not designed to handle pregnancy. So the risk of premature delivery, premature [pregnancy induced hypertension](#)⁸⁴, [preeclampsia](#)⁸⁵ or eclampsia, severe [gestational diabetes](#)⁸⁶, and a whole host of other things really

⁸³ <https://www.mayoclinic.org/diseases-conditions/schizophrenia/symptoms-causes/syc-20354443>

⁸⁴ <https://academic.oup.com/ajh/article/14/S3/178S/205336>

⁸⁵ <https://www.mayoclinic.org/diseases-conditions/preeclampsia/symptoms-causes/syc-20355745>

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https://www.brighamandwomens.org/campaigns/mfm-nicu/gestational-diabetes?cmp=hrprg_high_risk_ob_complications_pd_search&utm_source=google&utm_medium=cpc&utm_campaign=2019mfm&utm_content=conditions_multiples&gclid=EAlaIqobChMI2Yzvwm3R5QIVDW6GCh0TDw2NEAAYASAAEgKwGvD_BwE&gclsrc=aw.ds

are bad. So in some ways by having the eggs decline in their function prior to hitting menopause, it may be sort of an evolutionary adaptation to making sure that the pregnancies, when they occur, have a chance to be occurring in a healthier body.

Emily Kumler: Well and protective of the female, of the mother's body, too.

Alan Penzias: That's what I mean, the mother's body. Whereas the father of any age contributes so little. I mean, we contribute this tiny little piece of sperm that goes into an egg, which is maybe half a percent of what it takes to do a pregnancy and to make an embryo. But we cause at least 40% of the problems. I don't think we have much to brag about.

Emily Kumler: I had this sort of vicarious experience with one of my closest friends who was the first one I knew to go through any kind of infertility treatment. It was interesting because she was pretty open about it, so a lot of people knew that she had been trying and that it wasn't working and it was so expensive and it was also such a hassle to have to like go call your insurance company and see if they pay for another round or figure out about supplemental insurance. I always knew she was going to be a great mom and I always knew that she wanted to be a mom and so to see her facing this as her friend and not really know how to help her was really painful. I mean obviously painful for her, but also in a vicarious way, kind of painful for me. And I became super protective of her and I can remember her taking her out to dinner, just wanting us to have like a nice time and fun and be relaxed and like we kept bumping into people that we knew who were pregnant. At one point there was this woman who was sitting at the bar and we were sitting at a table like kind of below her to the corner and we said hi. And she turned around and she literally like stood up to give us a hug. And I was like, ugh, because it seemed like everywhere we went, we were seeing people who were pregnant and it was sort of like this joyous, happy thing. And at the same time, I could see that my girlfriend wanted to cry every time this happened to her because she kind of couldn't avoid thinking about it. And I think when we're trying to go through, or we're preparing to go through big life changes, transitions in life, right? And this is true for every stage of life. There is a little bit, or maybe a lot, of anxiety that comes up where we're sort of thinking about how life will be different when this change happens. And motherhood is definitely like that. I had such a hard time with my pregnancy, which was normal, because I kept of wanting to just get to the finish line and know what it was going to be like to be a mom. And I think when you're going through something like infertility treatment, that is incredibly powerful and can be very painful, because at each step you're sort of reminded that this is a chance. That there's a ratio, that there's a high probability that

things won't work out. But, people are trying to reassure you. And one of the things that seems so incredibly annoying and inconsiderate is sort of before you go through infertility treatment, if you talk to people about how like, oh yeah, we're hoping to get pregnant or we want to have a baby, it's been, you know, difficult for us. It seems like everybody's go to response is, oh honey, just try to relax, just relax and have fun. And it's like what? Like, no, this is maybe a medical problem. And when somebody tells somebody else to relax, it's like telling somebody else to be grateful. It's like, it drives me bananas. You have to feel those feelings on your own. You cannot tell somebody else how to feel. It doesn't work like that. It's not good advice. It's not reassuring. If you know anybody in your life who is trying to get pregnant, do not tell them to relax. They know that they need to calm down if they're feeling anxious and they're probably working on it, but chances are this is a bigger problem than them just relaxing. And if they could just relax, they already would have. So that's not going to be a solution.

Alan Penzias: The advice to just go relax and it'll work, but not saying go get your fertility workup done at the same time, I think is bad advice. But by the same token, you're absolutely correct in that stress is not going to add anything positive to the issue. So if somebody is having trouble getting pregnant, if a couple are under a lot of stress, and we do see this, and one of the ways that we can sometimes pick this up is on our questionnaire, we have a pretty benign looking question that asks how frequently does the couple have intercourse in a given interval of time, on a weekly basis. And for people who are trying to get pregnant, typical numbers are, you know, two, three times seems to be average for two to three times in the peak fertility window seems to be typical. When I start to see numbers like 0 or 0.5, what does half a time a week mean? What it means is that couple is so wildly stressed that it's no longer love making, it's baby making, and the stress is through the roof. [Stress hormones have an impact on the reproductive system](#)⁸⁷, the fight, flight, or fright hormones. It can interfere with ovulation. It certainly can make people feel very isolated and want to have intercourse less. If they're having intercourse less, it just spirals and makes the whole problem worse. So stress is a big problem in that if it's not addressed as a component or acknowledged as a component of this, it can be very insidious and undermine some relationships. Or at a physiological level, it can actually sometimes interfere with ovulation.

Emily Kumler: And is that just because cortisol interacts with estrogen in some way?

⁸⁷ <https://www.ncbi.nlm.nih.gov/pubmed/15288182>

Alan Penzias: The sort of pathways of stress tend to cause ovulation to cease.

Emily Kumler: How frustrating, right? That's awful.

Alan Penzias: And then the harder you're trying to work at it and the more you're focusing on it, the more you're concentrating, the more into that spiral, the deeper you seem to get.

Emily Kumler: Which is almost like the opposite of the practical advice we're all given in life. Right? Which is that when something is hard for you, just really focus on it and get it right.

Alan Penzias: That's right. And there's a good point, you know, when we talk about people who are peak performers and you talk to professional athletes, you talk to people who are professional musicians or anybody who does anything that really requires acuity and dexterity and some physical use of their body to achieve an end goal. They're always talking about good nutrition, good sleep, psychological rest. So rather than plowing away until you just fall into a heap because then you can't perform anymore, because your performance degrades as you become tired and more physiologically depleted. But making sure that you pay attention to something basic, get enough sleep at night. If you're not resting well, is there something going on? So those are all like little building blocks in the background. I wouldn't say that any one of them is a stop that it's going to prevent you from getting pregnant. But slowly, over the course of time, if you have one factor compounded on the next, on the next, the combination of physiologic suppression, depression, stress, anxiety, interpersonal relationship issues, a decreasing frequency of intercourse can all really spiral to make you feel fairly hopeless when in fact there is biologically a lot of good opportunity going forward. So our multidisciplinary approach is really to take care of the whole couple, the whole patient, the whole couple, with the mindset of our job in the doctor's office is to make sure that we do a [comprehensive fertility evaluation](#)⁸⁸ touching on all the areas right at the start. So we don't miss something like a man with normal ejaculate volume but no sperm cells in it. We take care of the psychological needs. We have psychologists on staff, we have social workers on staff, who will help with mind body interaction, who will help with creating that outlet that people need. Some people are very open, have a good group of friends that they can rely on, and family, and talk about it a lot. The analogy I like to make is if somebody breaks their arm and as a cast it's visible to the world that they have a medical problem, people can acknowledge it and they can have a public discourse about it. Infertility, still, some people are talking about it and one of the things that the

⁸⁸ <https://www.acog.org/Patients/FAQs/Evaluating-Infertility?IsMobileSet=false#what>

in the media and television programs and movies where people are acknowledging that they've done IVF and acknowledging stress and acknowledging that treatment is available has been good because it's taken away some, but not all, of the stigma. But there are many, you know, corners in which it is still such a shameful thing and people feel so bad about it. It's hidden. Then you start to get all of their friends around them getting pregnant and family members jokingly, oh you guys have been married for two years now, when are you going to bring me grandchildren? Or when are you going to have something to add to the family? And nobody knows that this couple is dying to have a child. And that silence sort of gets into that psychological spiral. By helping people recognize that there's psychological help and outlets other than just talking to their best friend that will help them shed some of that sort of pressure release valve and techniques they can use to mindfully kind of get back on track. And that way, making sure that the fertility evaluation is done, being aware that there is treatment that's available on a range of opportunities. It's not all in vitro. It could be a lot of in vitro, but there's many other techniques depending on the circumstances. So taking this as a comprehensive couple package in making sure we're treating all of the components and looking at them rather than just, here's your prescription for Clomid, call me in six months if you're not pregnant. We want to get rid of that type of philosophy. We'd rather have people acknowledge that this is a problem and stressful, acknowledge that we can work on the building blocks and then customize the treatment that you tailor so that you can address all of the issues, not just the one that seems to be most visible.

Emily Kumler: We're going to go back to Natasha now to hear a little bit more about her patient perspective.

Natasha: If you're in the beginning process, the stimulation process, it's something where you don't even want to go to work if you can avoid it because it's so many different medications, so you're injecting two to three to even like five or six different medications on a daily basis and then going in for monitoring every single morning, which includes blood work, sometimes an ultrasound, a [transvaginal ultrasound](#)⁸⁹, which is even more uncomfortable because it uses a wand internally inside of the vagina rather than on the stomach, in order to determine how far along your eggs are growing and the reason you have to have almost daily monitoring is because if they don't time it correctly, you could ovulate and then lose all of the benefits of all of those medications immediately. Because if you ovulate them, they cannot collect the eggs at all.

⁸⁹ <https://medlineplus.gov/ency/article/003779.htm>

Emily Kumler: And so then you have to wait a whole, another month?

Natasha: Then you have to wait a whole another month and you have to buy medications again, which can run, you know, between \$1,000 to like up to like \$15,000 if you're paying out of pocket. It's not the type of like investment that you could just easily like do again next month. It's that expensive in that much time. And then after that point, there's a lot of waiting for things like insurance to approve the next cycle. So if you're doing a frozen embryo transfer, insurance has to approve it each time, which means there's a lot of run around with paperwork and things like that. And then when you finally get to the point where you're preparing for the transfer, you have to start medication again, pills, progesterone shots for a lot of women, which are incredibly uncomfortable, as well as monitoring again. As you're leading up to this, it feels like once I get pregnant, this will all be over. I'll feel so relieved, it'll feel wonderful. But then, you realize once you get pregnant that you're so scared of losing the pregnancy, especially if you've had a previous loss, that you can't relax for even a moment. Plus, at that point, you're still on the injections for 10 weeks. For most pregnancies, you'll be either on [progesterone inserts](#)⁹⁰, [progesterone injections](#)⁹¹, or both, as well as estrogen. There's this pressure where you have to take this medication every day and because it's a shot, you don't want to necessarily be in public for it. There's a lot of funny stories on IVF boards about the weirdest places people have had to inject their progesterone. So it's like I injected mine at a wedding. I personally injected mine at the Nutcracker ballet.

Emily Kumler: Because you have to do it at a certain time of day?

Natasha: You do. Yes, and people don't necessarily want to go out like I avoided going out because of this. When you get finally beyond the meds, then it's a totally different ball game because you're not worried about that, but you're so worried about losing the pregnancy. For a lot of women, they're having like daily panic attacks. For me, I was having daily panic attacks. You start paying so much attention to the tiny, tiny, tiny little things your body is feeling like you start researching things obsessively on Google, that's one thing we tell each other in the support groups not to do, but everybody kind of does it.

Emily Kumler: It always seems like everybody when they're trying to get pregnant or when they're, you know, newly pregnant people are like relax, you know, just try to enjoy it and you're like fuck off. Like what do you, like everybody's nervous and then certainly if you've gone through something.

⁹⁰ <https://my.clevelandclinic.org/health/drugs/20862-progesterone-vaginal-insert>

⁹¹ <https://fcionline.com/fertility-blog/ask-the-doctor-10-questions-about-progesterone-supplements/>

People mean well so I shouldn't have reacted so strongly. But I just feel like it is one of those things where like the more people tell you to relax, the less relaxed you usually are. Right? Did you develop any tricks that you think could be helpful for other people in terms of trying to keep some of that worry in check? I mean some of it is just, I think it's just so normal, right? Like we talk on this podcast a lot about like how I really believe that like women are truly superheroes because we can regenerate the species, which nobody else can do. Well, I guess men can't do. And I think, you know, the other part of being pregnant is just that you are making a person and you don't really know how you're doing it. It's not like you're following an instruction manual and it's all working out. Like you just, your body is just doing it. And I think that sense of lack of control in the experience, you know, is something that maybe a hundred years ago women didn't really think too much about because there wasn't so much science behind it. But I can't imagine that women never worried because your body is changing so dramatically.

Natasha: Well and especially when in the past pregnancy was leading cause of death for women. So, I think they did worry about it, but it was just, you know, fact of life. As far as different coping mechanisms and ways, strategies for dealing with the stress, one thing I find very useful, there's an app, parts of it are free, called [mindful IVF](#)⁹². It does guided meditation specifically surrounding the ideas of fertility and whatever stage you're on in IVF. So it literally will do guided meditations for stimulating or for the first two weeks of pregnancy, three weeks of pregnancy, things like that. That was extremely helpful to me. One thing that is sort of controversial, but a lot of women like is something called [miscarriage calculator apps](#)⁹³ or miscarriage calculation data where you can put in all of your different biometric data, as well as the number of weeks pregnant you are, and you can see your miscarriage risk and you can watch it go down week by week. For me, and I know a lot of other women, because I've shared that one a lot, is very soothing because you watch it go down and it goes down kind of drastically between like some of the weeks like 10 and 11 and it's just very soothing. Data is something that really helps you. The third thing that I think is the most helpful is creating a community, and this is actually the way that I was put in contact with you guys, which is through one of the IVF support groups on Facebook. And there's multiple support groups. There is an IVF support group Massachusetts, there's a larger one that's international that's called IVF support group, and when you finally get pregnant you can usually find one for your due date. Those are extremely helpful because people are going through the same process as you or have gone through it so they can tell you what's normal, what isn't normal, you know, should I be bleeding at this point in my pregnancy? Does this test look like it's actually

⁹² <https://www.mindfulivf.com/>

⁹³ <https://datayze.com/miscarriage-reassurer.php>

positive because at a certain point you can't believe you have a positive test. That was probably the most helpful thing I used during the IVF process because you start feeling like these people are your family, they're like your sisters.

Emily Kumler: So tell us about when you were pregnant and you carried the baby to term, who we just heard making sweet little noises in the background.

Natasha: Alright, so that is Juniper Briar. Her original name as an embryo was Juniper Snowflake because she was a frozen embryo. We named her the day that we transferred her, which was February 13th, 2019 she was actually conceived on August 25th, 2018 that's when we had our embryos. That's when our embryos were created after egg retrieval. Then she was frozen while I had my two other transfers that did not work. I actually found out that I was pregnant with her on the anniversary of the day that I lost my first baby due to the ectopic pregnancy, so it was really special to me. As much as a lot of people say to try to enjoy pregnancy, I have to say pregnancy was really rough on me. I had a lot of complications. I had [velamentous cord insertion](#)⁹⁴, [bilobed placenta](#)⁹⁵, you probably don't want me to explain these, but there were a lot of things bilobed placenta, gestational diabetes, and then everything ended with preeclampsia, which is why I delivered her early. I had severe preeclampsia and started going blind due to my blood pressure being so elevated and they were worried that I would have seizures. So they induced me at 25 weeks. She came on September 29th, two days later.

Emily Kumler: Wow, that's so intense. And I mean I feel like having had the ectopic pregnancy, like before that, you didn't have any idea that you had any issues. And so it's like you're really in the period of a few years learning so much about your body, right? And then it's like this idea of like wanting to be a mom and like having gone through all of this, what is it like to now hold her in your arms?

Natasha: It's the most amazing thing that I've ever felt in my life. It is sublime. It is the most beautiful thing I've ever created in my entire life and it makes me so, so filled with joy, like overwhelming joy, greater than I've ever felt in my life. And I, I feel like most mothers have to feel something similar. But then, knowing that she really is a miracle that like my body did not want to do it, and that she's here makes me feel tremendously, tremendously lucky.

Emily Kumler: For both of you, right?

⁹⁴ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3517836/>

⁹⁵

https://embryology.med.unsw.edu.au/embryology/index.php/Placenta_-_Abnormalities#Bilobed_Placenta

Natasha: Yes, yes, yes.

Emily Kumler: That's it for this week. Next week we're going to be looking more at this and we're going to talk to a really phenomenal researcher who also had her own infertility experience, which made her realize the massive gap in knowledge that there is around infertility treatment. Her hypothesis is that a lot of women probably don't need IVF. They might just need progesterone. So, she's going to break that all down for us next week and we're going to continue talking about IVF and women's health. I'm Emily Kumler and that was Empowered Health. Thanks for joining us. Don't forget to check out our website at empoweredhealthshow.com for all the show notes, links to everything that was mentioned in the episode, as well as a chance to sign up for our newsletter and get some extra fun tidbits. See you next week.