

CENTER FOR PERINATAL DISCOVERY

Community Newsletter - September 2021



In this issue:

Assisted Reproduction, IVF,
and Embryo Donation



Launch of Our Center Newsletter

We are pleased to begin the production and distribution of our new Center Newsletter, beginning with this issue on Assisted Reproduction, In Vitro Fertilization (IVF), and Embryo Donation.

We were inspired to find a platform to keep in touch with the broader community because of our patients' stories and their contributions to research. Patients who have participated in our research studies often ask how their participation has contributed to advancements in scientific discoveries; therefore, we are using this platform to be able to provide insight on and highlight the activities of the Center for Perinatal Discovery.

We hope to shed light on the intersection of the perspectives of the patient, physician, and research scientist, all of whom are involved in clinical and translational research and provide updates pertinent to our vision of improving maternal and child health through high-quality, high-impact, collaborative science.

Center Updates & Events

-Read about the Launch of the CPD!

(La Jolla Light)

-Welcome Dr. Karen Mestan!

Dr. Mestan, M.S., M.D., Professor and Division Chair of Pediatrics, Division of Neonatology at UC San Diego is joining our Center Leadership this coming October.

-Check out our most recent and upcoming monthly seminars

CPD Website-Upcoming Seminars

If you are not already a CPD member but would like to receive this newsletter, please contact perinataldiscovery@health.ucsd.edu to be added to our mailing list.

Three Perspectives on Assisted Reproduction, IVF, and Embryo Donation

Entering the world of assisted reproduction and in vitro fertilization (IVF) is a daunting experience, and patients and their families choose to do so for a number of different reasons. Assisted reproduction and IVF enable patients to achieve their reproductive and fertility goals, but can be complicated and can bring a tumult of emotions and frustration.

One of the decisions many patients who undergo IVF need to make is what to do with their excess embryos. While most patients choose to discard them, some choose to donate their excess embryos for use for IVF by other couples, or for scientific research that may lead to discoveries that could help other patients experiencing infertility in the future.

Here, we highlight the tightly woven relationship between patient, researcher, and clinician, presenting assisted reproduction and fertility treatment from each of their perspectives.

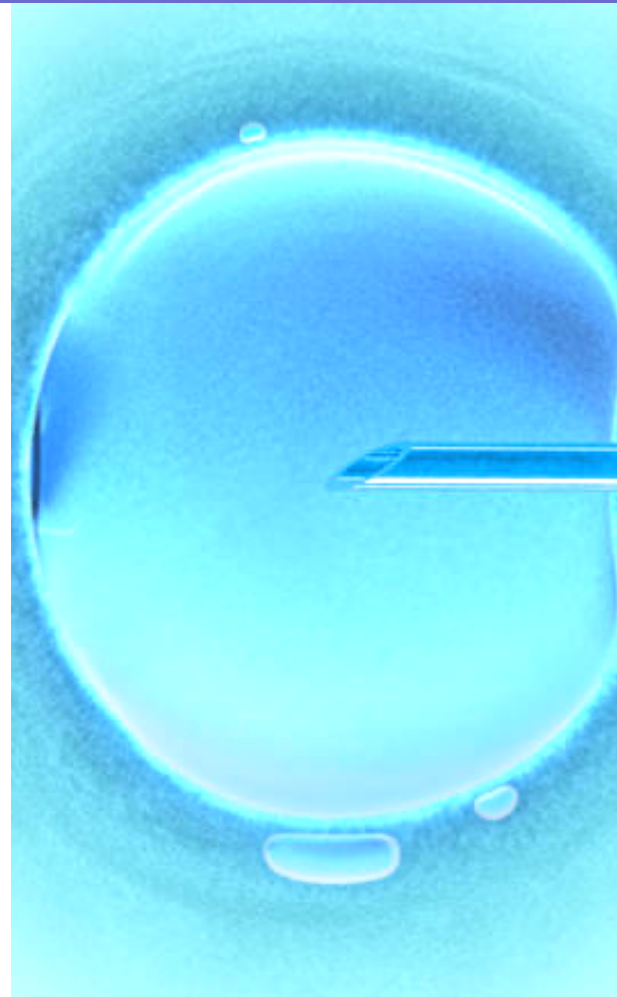
The Patient Perspective

About 10 years ago, Susan Valoff and her husband chose to undergo IVF for infertility. The first three rounds of IVF using her eggs were unsuccessful. Because it was found during this process that her eggs were of poor quality, Susan and her husband chose to donate the remaining embryos made using her eggs for scientific research at UCSD.

"It was an easy choice," Valoff said, "These embryos had not been successful in giving us a child, but donating them allowed us to do some good."

Their next step was to use an egg donor, which gave them their son who is now 9 years old. They conceived a second time using IVF and the same egg donor, which unfortunately resulted in stillbirth. Seeking to answer why they suffered this great loss, they asked for a placental examination by their hospital's pathologist. The analysis came back inconclusive, only stating that there were findings that might be consistent with an infection.

Is there anything we could have done to prevent this? This question tormented Valoff, and spurred her into action to find her own answers. Scouring the internet and following every lead, she reached out to clinicians and researchers studying pregnancy loss and infection. Eventually, she found Dr. Parast, a perinatal pathologist at UC San Diego. She sent the slides from her initial placental analysis to Dr. Parast, who was able to provide some much-needed answers. The baby was unusually small and so was the placenta, leading Dr. Parast to conclude that placental insufficiency was likely a factor in the stillbirth. This information was finally able to give Valoff some amount of comfort.



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“There is no greater loss [than stillbirth], so knowledge gives parents agency. They'll have the information to understand risk factors and warning signs... They can be a part of the solution.”

-Susan Valoff (Patient)

After this experience, Valoff embarked on a mission to help prevent other parents from experiencing pregnancy loss, establishing the San Diego chapter of the Star Legacy Foundation, a national non-profit dedicated to raising awareness, supporting research, and promoting education about pregnancy loss. She advocates for parents to be educated on risk factors from the start: "There is no greater loss [than stillbirth], so knowledge gives parents agency. They'll have the information to understand risk factors and warning signs...They can be a part of the solution."

Valoff and her husband are considering whether to donate their remaining embryos, this time to other individuals who are trying to conceive. When asked why they would consider donating embryos to help other people trying to get pregnant, Valoff stated that this would allow other parents-to-be to realize their dreams of having a child, despite the struggles they may have had in the past.

By donating embryos for use in scientific research, and considering embryo donation to parents-to-be, Valoff and her husband are working to create the most positive outcomes from their tumultuous fertility journey.

The Researcher Perspective

IVF has helped many people fulfill their fertility goals, but more research is needed to improve its success rate. Thanks to donations from patients like Ms. Valoff, the Cook-Andersen lab, led by Dr. Heidi Cook-Andersen at UCSD's Sanford Consortium for Regenerative Medicine, has the unique opportunity to study human embryos to discover why some IVF cycles are successful while others are not.

The Cook-Andersen lab studies the early development of human embryos in order to identify factors associated with embryo quality and to unravel the detailed processes involved in implantation. Understanding these aspects of embryonic development may help improve IVF success rates by enabling development of strategies that increase implantation, prevent miscarriage and stillbirth, or avoid pregnancy complications like preterm birth and preeclampsia.

During IVF, an embryologist visually grades the quality of each embryo, scoring them based on their appearance, with lower quality embryos generally having lower rates of implantation. However, this system is far from perfect, partly because it is somewhat subjective, based on the appearance of the cells within the embryo. Until now, there have been very few ways to actually quantify this difference between low- and high-quality embryos.

According to Dr. Cook-Andersen, an Assistant Professor in the Division of Reproductive Endocrinology and Infertility, implantation is a critical stage of development, which about half of human embryos do not pass. Once an embryo successfully implants, it has a much higher chance of making it through the rest of pregnancy. Researchers and clinicians think that the failure to implant can be affected by both issues with embryo quality and with miscommunication between the embryo and the maternal uterine lining, but not enough is known about these processes to develop treatments for them.

To explore the factors that impact embryo quality, the lab is comparing the gene expression profiles of embryos with low and high quality scores. This will allow lab members to determine whether there are differences in the activity of certain genes and/or in the development of specific cell types within low- and high-quality embryos. To better understand implantation, the Cook-Andersen lab cultures donated embryos through the relevant time window and compares the activity of genes at different timepoints.

Many research groups study embryo development using mice; however, major differences exist in the early development between different species, making the findings in these and other animals difficult to translate to humans. Therefore, in order to conduct this research, the lab needs donations of both high- and low-quality embryos from patients. Dr. Joseph Owen, a postdoctoral fellow in the Cook-Andersen lab, says, "Without patients choosing to donate embryos, we don't really have anything to study."

IVF is an expensive, time-intensive, and emotionally-taxing endeavor for patients. Their generous donations of excess embryos to research are greatly appreciated by researchers like Dr. Cook-Andersen and her team. "As a researcher, you can get short-sighted, facing institutional barriers, obtaining funding," Dr. Owen says, "but I am often reminded of and humbled by the real-life applications that my work can have on individuals' lives."

The Clinician Perspective

To Dr. Irene Su, reproductive health is a fundamental human right, and family building is an integral part of it for many patients. Dr. Su is a practicing physician at Reproductive Partners Fertility Center, which is a clinical affiliate of UC San Diego Health. Dr. Su's clinical and research work specializes in oncofertility, which focuses on helping women with cancer to preserve their fertility while undergoing cancer treatment. Day to day, she uses medical

advances enabled by research, by her group and others in the field, to assist individuals facing infertility or the risk of infertility, and she sees it as a privilege to be able to walk alongside patients in their fertility journeys.

To patients, scientific research may seem like a distant world, where faceless researchers contribute to a pool of knowledge that does not appear to be relevant to their clinical care. Clinicians and clinician-scientists can serve as a bridge between patients and researchers, advocating for patients and helping to communicate their needs to the scientific community, and also helping to guide patients in making informed decisions based on new research.

While IVF is a complex and painstaking procedure, it can be a rewarding experience for all involved. The biggest challenge, according to Dr. Su, is the limited ability to predict the outcome of the infertility treatment. From her perspective, there are fundamental aspects of IVF that need to be better understood. Discovering more about the processes leading to the development of high quality eggs, sperm, and embryos, as well as the factors contributing to proper establishment of the uterine environment, will help improve treatments moving forward.

"Once exciting basic science discovery occurs, then rigorous and thoughtful translation and clinical studies need to follow to really impact fertility outcomes," Dr. Su says.

Each patient has their own challenges and goals, and it is the clinician's job to present options based on the latest science and to work with the patient to develop a personalized plan of care. In Dr. Su's case, this may involve anything from advising a patient about the number of IVF cycles that may be needed to giving a patient the information needed to decide whether banking oocytes can help her reach her fertility goals. She finds her work with cancer patients especially rewarding, providing them with options for fertility preservation that give them the ability to choose to have children when it works best for them.

Patients, their families, and their stories are the reason that our researchers and clinicians do what they do; in fact, without the generosity of our patients, this work would not be possible.

The Center for Perinatal Discovery strives to enable the voices of patients to guide clinical and translational research, with the goal of improving maternal and child health, now and in the future.

The Cook-Andersen Lab



Find out more about the Cook-Andersen lab and its research activities:

<https://cookandersenlaboratory.com>

Help support our valuable work and contribute to the health of our communities

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Find more information on the Center and its activities at our website:

<https://perinataldiscovery.ucsd.edu>