# SUMMIT:IVF – discussing the future of assisted reproduction

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In the midst of a severe winter storm, SUMMIT IVF celebrated its inaugural meeting in Aspen, Colorado, on February 6–8, 2020. This invitation-only thought retreat gathered >50 clinicians, administrators, investors, and researchers from across the world to discuss the future of assisted reproduction, understand existing challenges, and explore opportunities for the future. The meeting was organized by the Fertility Collective, a group of fertility focused companies dedicated to establishing best practices in reproductive medicine.

The summit was intentionally small to foster community, and no sponsor funding was accepted. The intimate size of the meeting allowed for ample group and individual discussions and created an exciting environment where attendees could engage on a broad range of topics openly.

## BIG DATA AND ARTIFICIAL INTELLIGENCE

One focus of the meeting was how to leverage the power of large datasets in assisted reproductive technologies (ART). Because of the importance of accurate outcomes reporting in our field, we have accrued large amounts of data, some of which can be structured and queried for useful insights. With ever-increasing computer processing speed, limitless data storage capacity, and inexpensive memory, no dataset is too large or too complex for analysis; the limiting factor is the quality of the data itself.

Pirate Yurtlas Beim, CEO and founder of Celmatix, opened the conference by describing how her precision medicine company applies artificial intelligence to drug discovery. Celmatix is currently partnered with the Gates Foundation to discover novel contraceptive methods, and with pharmaceutical companies to developing drug targets for other unmet needs in women's health. Noor Siddiqui, a Stanford computer scientist, discussed advances in polygenic risk scoring. Using whole genome sequencing and large datasets, researchers have identified correlations between certain genetic sequences and higher than average risk for certain adult onset diseases, a technique that could, in theory, be applied to embryos as well. The application of image machine learning to improve outcomes in embryology was discussed by Dan Nayot, M.D., medical director of Future Fertility. His company is currently developing a computer algorithm that classifies oocytes and predicts embryo development and pregnancy outcomes.

These projects need to overcome significant challenges to ultimately become standards of care. The large datasets do not function autonomously and require significant human intervention for maintenance and scrubbing. There are also complex interoperability challenges, including laboratories with different procedures, adoption of inconsistent clinical definitions and guidelines, and the use of different testing assays. The eventual adoption of data-driven procedures depends in large part on the development of unbiased, patient-centric, and outcomes-focused uses, rather than blind adherence to what may be unrecognized limitations of the data sources themselves.

## INVESTMENT IN ART

In 2018, $646 million was invested in research and development in fertility. The overall United States fertility market is predicted to grow to $15.4 billion by 2023, up from $7 billion in 2017 (1) Several trends are contributing to the growth of the market: delayed childbearing, expanding state mandates and private fertility coverage benefits, growth in elective egg freezing, preimplantation genetic testing for prevention of genetic disease, onco-fertility, and lesbian, gay, bisexual, transgender, and queer (or questioning) families seeking ART.

David Sable, M.D., a reproductive endocrinologist and investor, discussed how private equity firms have driven consolidation of practices into larger groups, with adoption of the procedures and methods of clinics delivering the highest outcome statistics. This movement toward a best practice standard is a positive development for the currently served population. This private equity driven consolidation, however, does not improve access to the larger, unserved population. To fund the research and development needed to improve on the current best practices, scale delivery to a much larger population of patients and expand the industry, we must invest in innovation. These types of investments are traditionally funded with venture capital, a source that has been largely absent from the fertility industry until the present.

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## CAPACITY AND AUTOMATION

Dr. Sable presented a model for a United States IVF market with a minimum steady-state need for >1,100,000 cycles/y, compared to the 280,000 cycles performed reported by the US Centers for Disease Control in 2017. This represents >1,000 cycles per reproductive endocrinologist, compared with 200–300 at present (2). How do we better leverage our limited number of not only physicians, but facilities, scientists, embryologists, genetic counselors, and trained nursing staff?

One important tool is the use of predictive analytics. Patty Stull, co-founder of Fertility Dynamics, discussed how her company uses complex prediction models to identify unmet demand by zip code. Her clients use these data to optimize the growth strategies and focus their efforts on areas of high potential and unmet need.

Increased use of laboratory automation is another approach. Overture Life vice president of operations, Ana Garcia Poyo, described how her company is designing a compact "lab in a box." This device, which is still in development, will automate gamete fertilization and development, through the blastocyst stage, and use spent media for embryo diagnostics using preimplantation genetics and metabolomics to improve outcomes. As the repetitive procedures in the embryology laboratory become increasing automated, and the laboratory itself becomes self-contained, faster and less expensive to build, IVF as a procedure should scale closer to the underlying demand.

With the combination of private equity financed consolidation leading to adoption of high performing clinics' methods and standards with venture-backed innovation leading to process and outcomes improvements and industry-wide scalability, we will be much better prepared for growth, even with the constraints imposed by limited numbers of practitioners and facilities.

## OTHER ASPECTS

The exchange of ideas was not limited to the lecture topics. Other areas explored in depth included growth of the direct to consumer fertility marketplace and the changing expectations of our patients. Millennials account for a larger percentage of our patents. This technologically savvy generation has different expectations for how they want to interact with their providers. They expect timely, tech-enabled communication and high-quality customer service. Although excellent clinical outcomes will always be a prerequisite for success, we are seeing practices invest more on their customer experience as patients place increasing value on this aspect of their fertility journey.

By all measures, the first SUMMIT: IVF meeting was a success, and plans are underway for Summit: IVF 2021.

## REFERENCES

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