



## 2024 NEW YORK REGIONAL SOCIETY OF PLASTIC SURGEONS ANNUAL RESIDENTS' NIGHT RESEARCH COMPETITION

MONDAY, MARCH 11, 2024  
NEW YORK ACADEMY OF MEDICINE

**ABSTRACT SUBMISSION TITLE:** *A3 - The Use of Next Generation Sequencing to Detect Early Implant Infections: The Future of Microbiology and Targeted Antibiotic Treatment*

**Additional Author(s):**

*Anna M Vaeth, BS; Karina Condez, PA-C; Kristen Castellano, RN; Grant G Black, BA; David M Otterburn, MD*

**Abstract Presenting Author:**

*Jaime L. Bernstein, MD, MS*

**Plastic Surgery Residency Training Program:**

*New York Presbyterian Hospital (Columbia and Cornell Campus)*

**Abstract Text:**

**PURPOSE:**

Infection is a major source of morbidity following implant-based breast reconstruction, with rates as high as 35%. Early detection and treatment of implant infection prior to clinical symptoms could mitigate the devastating complication of implant loss. Next generation sequencing (NGS) has the ability to use polymerase chain reaction technology to detect and identify, with precision, a large spectrum of microbial DNA at a low cost. Our standard method of breast reconstruction is drainless with the utilization of a dual chamber tissue expander (TE) in the pre-pectoral plane. This provides the unique ability to sterilely sample and study the fluid surrounding the implant using NGS to better understand when implant infections arise and if peri-prosthetic fluid could detect infections earlier.

**METHODS:**

This is a single surgeon, prospective study of patients undergoing mastectomy, followed by pre-pectoral, drainless, TE reconstruction. Every patient was given one dose of peri-

operative antibiotics. Patients were given additional antibiotics with each percutaneous drainage. Peri-prosthetic fluid was collected through the TE drainage port in the OR immediately after closure, at 1 week post op, and 3 weeks post op. This fluid was sent for traditional culture and NGS. Patients were observed for signs of infection, antibiotics, return to OR, or implant loss.

#### RESULTS:

33 breasts from 20 patients were included. Patients had a mean age of 50 years. The average length of drainage was 21 days post-operative. Eight breasts had concern for skin necrosis. In 25 breasts (76%), complete sterility was achieved at the end of the case with no NGS detection of microorganisms in the initial peri-implant fluid sample. However, NGS detected microorganisms in the initial sample in 8 breasts (24%). In 5 of these 8 breasts, microorganisms were cleared by the 1-week sample and another 2 cleared by 3 weeks. The remaining 1 breast continued to have positive NGS and developed clinical signs of infections by week 2, which were not picked up by traditional culture until week 3. One breast with skin necrosis developed a positive NGS at week 3 and clinical signs of infection at week 4. No other clinical infections were seen throughout the study.

#### CONCLUSIONS:

We are one of the first groups to demonstrate the ability to achieve peri-implant sterility at the time of implant insertion in the operating room. This could have significant implications for understanding the necessity of peri-operative antibiotics following breast implant placement. Our investigation into the microbial composition "sterile" peri-prosthetic breast implant fluid provides insight into when microorganisms arise and when they become clinical infections. These promising preliminary results suggests that peri-prosthetic fluid monitoring through Next-Generation Sequencing (NGS) holds significant potential in preemptively detecting implant infections before the onset of clinical symptoms, thereby reducing infection rates. Ongoing work is beginning to explore the impact of microorganisms within the fluid on breast capsule formation, as we strive to enhance our understanding of breast implants and infections.