Universal PCR Testing- Is It Worth It?

Navina Birk MD (nbirk1@hfhs.org), Kasturi Saikia MD, Mayur Ramesh MD, Linoj Samuel PhD, Robert Tibbetts PhD

Henry Ford Health, Detroit, Michigan

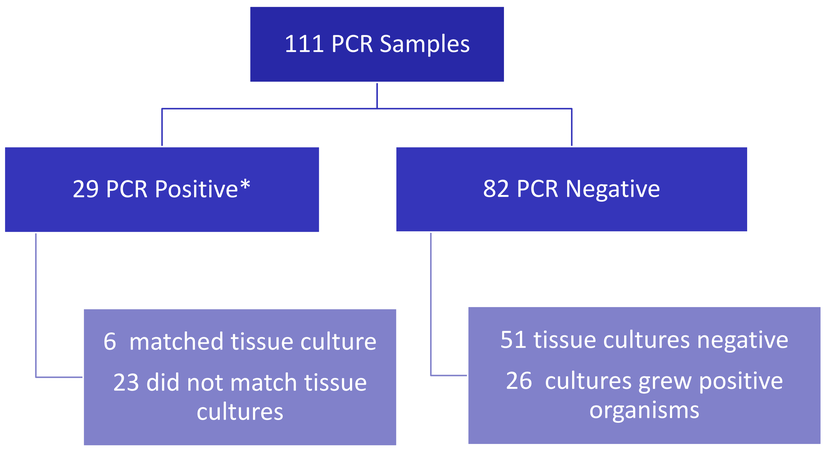
Background

- Universal PCR/Next Generation Sequencing (uPCR/NGS) is a molecular technology in which DNA/RNA of the cultured organism is isolated and amplified using broad range primers and conventional PCR conditions
- Amplified products are sequenced, and the organism/s are identified based on the sequence data
- Molecular based testing is used as a diagnostic modality due to its high sensitivity
- Results must always be interpreted in clinical context

Methods

- Retrospective, observational study
- All consecutive uPCR/NGS tests obtained from at Henry Ford Hospital from 2016-2021 from non-blood fluids and tissue samples
  - Bacterial
    - 16S ribosomal RNA gene sequencing
  - Fungal
    - 26S and 28S ribosomal RNA gene sequencing
  - Acid Fast Bacilli
    - 16S ribosomal RNA gene sequencing
- Concurrent tissue cultures from day of uPCR/NGS were obtained
- Outcomes included if uPCR/NGS testing resulted in a change of choice or duration of antibiotic therapy

Results



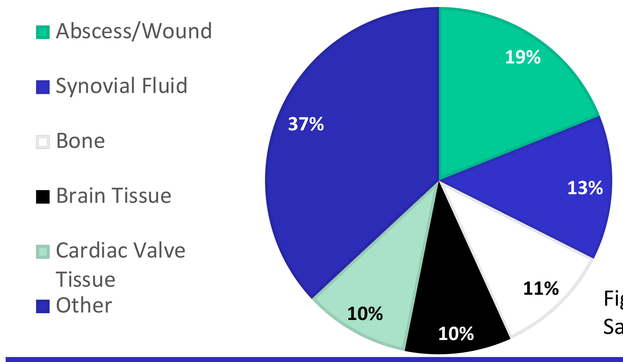


Figure 1. Most Common Sample Types

Table 1. Change in Management by Sample Type

Overall Change in Management	16.2% (18/111)
Cardiac Valve Tissue	45.5% (5/11)
Cerebrospinal Fluid	42.8% (3/7)
Brain Tissue	36.4% (4/11)
Lymph Node Tissue	25% (1/4)
Synovial Fluid	20% (3/15)
Bone	8.3% (1/12)
Abscess/Wound	4.8% (1/21)

* All other sample types including skin, non-valvular cardiac tissue, ocular samples, pleural tissue, pleural fluid, peritoneal fluid, testicular tissue, and hepatic tissue resulted in no change in management

Table 2. PCR Positive Results

Result	Total Samples Positive
Mycobacterium tuberculosis complex	5
Sample Type: Abscess/wound	2*
Hepatic Tissue	1
Synovial Fluid	1
Lymph node	1
Streptococcus intermedius	4
Sample Type: Brain Tissue	3
Pleural Tissue	1
Corynebacterium species	2**
Sample Type: Abscess/wound	2
Streptococcus pyogenes	2
Sample Type: Synovial Fluid	1
Pleural Fluid	1
Aspergillus fumigatus	2
Sample Type: Brain Tissue	2
Mycobacterium chimera	1**
Sample Type: Pleural Tissue	1
Pseudomonas aeruginosa	1**
Sample Type: Brain Tissue	1

*1 Sample matched PCR cultures, 1 sample was a false positive result

** Sample matched PCR cultures

Other positive results with 1 positive uPCR/NGS result: *Alternaria sp., Curvularia sp., C. acnes, H. parainfluenzae, Histoplasma sp., M. avium, M. hominus, S. warneri, S. lugdunensis, S. epidermidis, S. mitis, S. anginosus*

Conclusions

- Appropriate diagnostic stewardship is needed when ordering uPCR/NGS
- Useful test in culture negative samples, particularly when concerned for Mycobacterium tuberculosis
- Utility when used in certain sample types, along with a high index of suspicion for infection