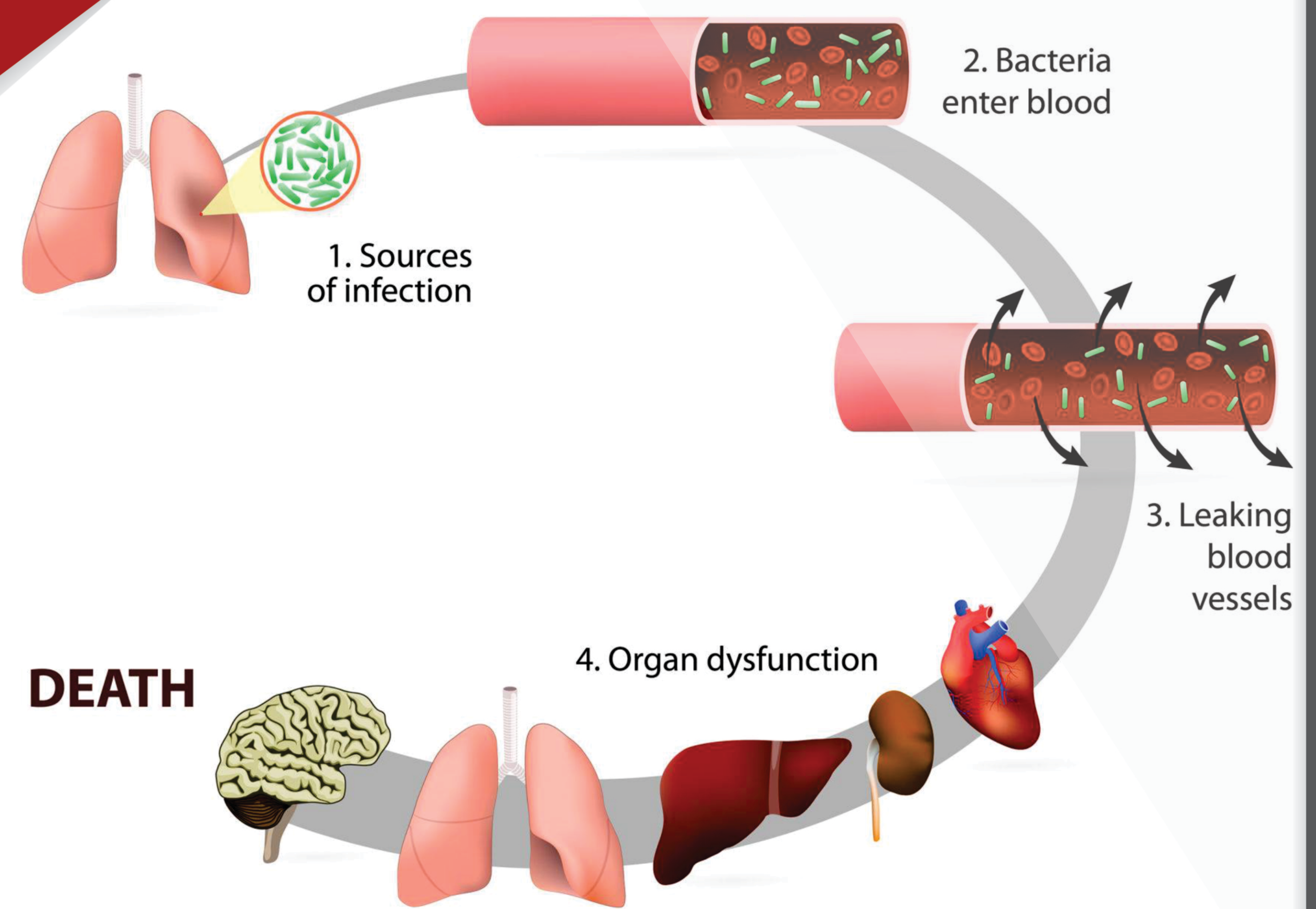


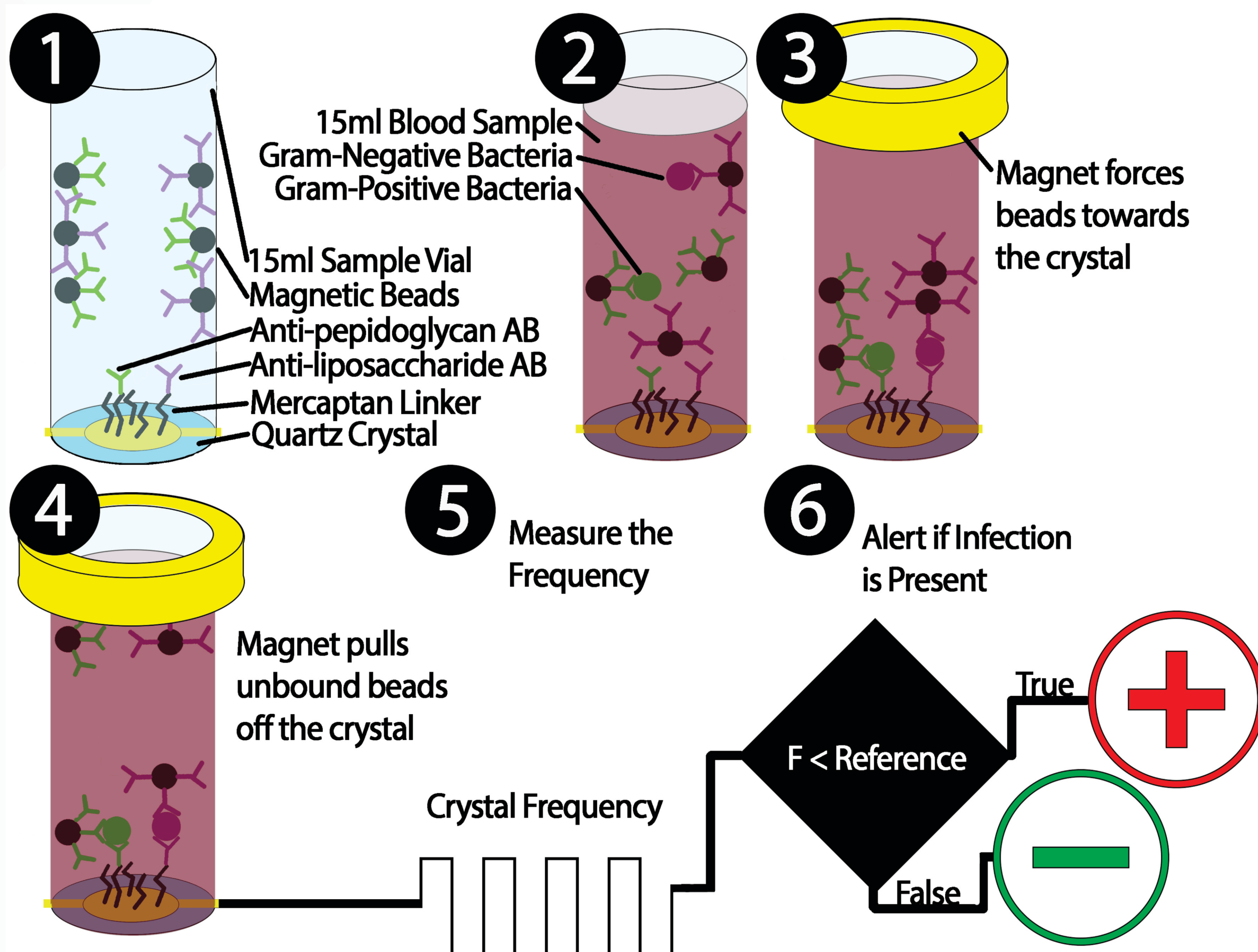
# Bacterial Microbalance

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**Current testing methods for blood-borne bacterial infections are slow, expensive, and prone to error. This causes overuse of antibiotics in clinical institutions.**

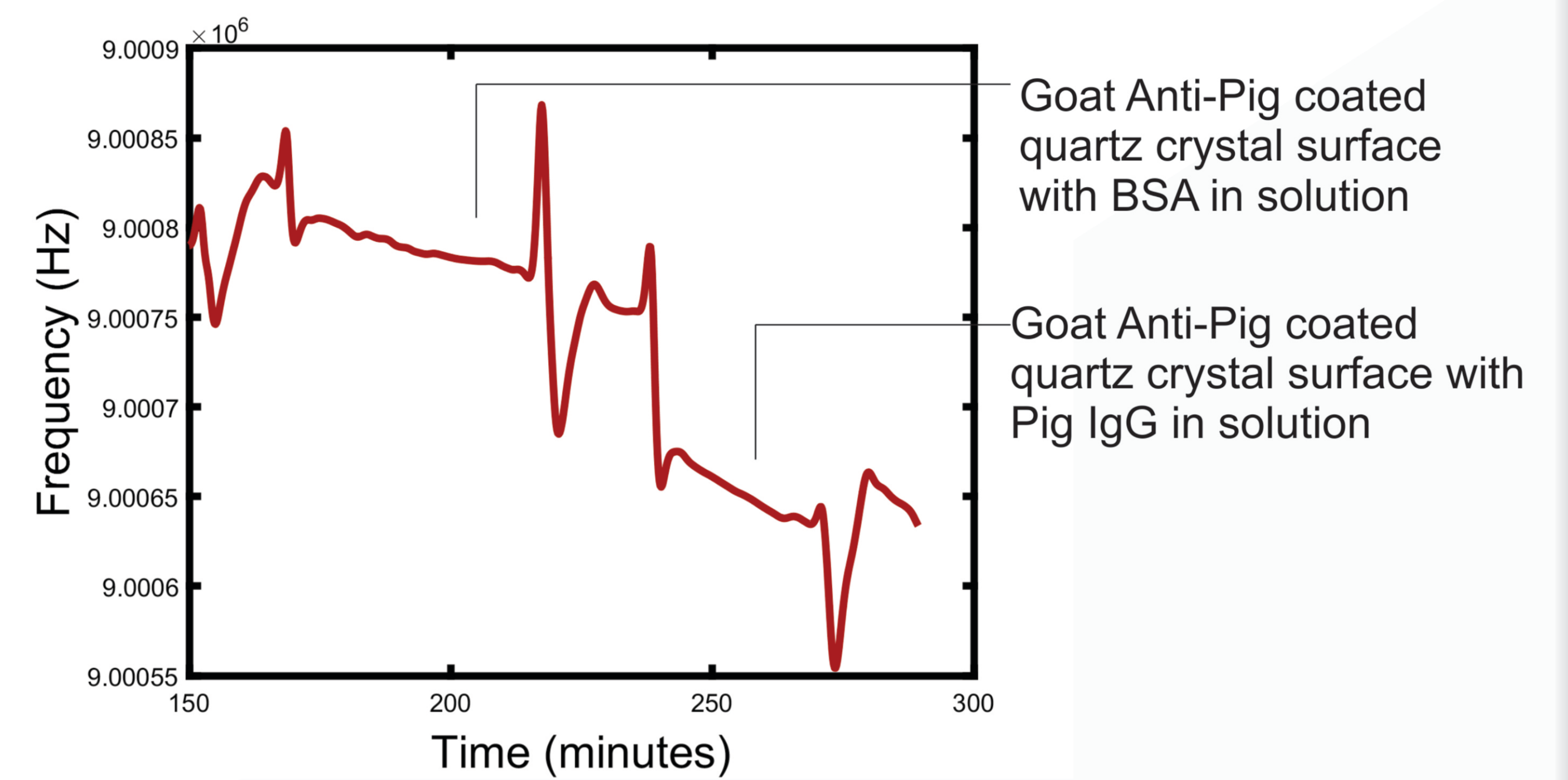


Constraints	Criteria
Zero false positives	Minimal false negatives
Cost less than a blood culture test	Give a result in under 30 minutes
Simple interfacing, easily incorporated into current workflow	Compete with and replace current methods



## Testing

- A model system was used to test the antibody-magnetic bead-quartz crystal microbalance
- Magnetic beads were bound to Pig IgG, and Goat Anti-pig IgG antibodies were bound to the crystal surface
- The frequency was measured under these conditions:
  - Bovine serum albumin (BSA) in solution
  - Pig IgG in solution
  - BSA coated beads
  - Pig IgG coated beads within a magnetic field



## Cost Analysis

- Annual cost of treating sepsis in this market is \$17 billion USD [1]
- Analytical Unit: \$9,000
- Disposable Biosensor: \$92.09
- Estimated Annual Savings: \$32,917.50

D. Hulisz, "Sepsis Drug Pulled from the Market," AMN Healthcare, Inc..

## Conclusions

A feasible design for detecting bacteria in whole blood has been developed. The antibody-antigen model and the magnet-magnetic bead systems have been tested and refined.

## Next Steps

- A different antibody system will be tested to detect the cell surfaces of gram-positive and gram negative bacteria
- Anti-peptidoglycan AB and Anti-liposaccharide AB will be used to detect gram-positive and gram-negative bacteria respectively
- 15mL blood samples will be tested with this system
- If testing is successful a clinically safe desktop device will be developed
- Further study on the effect of a magnetic field on the quartz crystal

