

Separation of bacteria from blood for rapid sepsis diagnosis

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Introduction

Sepsis is a serious bloodstream infection caused by bacteria growing in the blood. Antibiotic resistant sepsis has a high mortality rate which increases as the time passes. This makes it necessary to quickly identify the bacteria and its resistance profile so that the infection can be controlled by the relevant antibiotic. Traditional diagnostic methods involve a culturing step before a genetic amplification by PCR which adds at least 24 hours to the diagnosis procedure. The rapid separation of bacteria from blood makes it possible to diagnose the infection without a culturing step.

Material and Method

Our method of separating bacteria from blood uses a sedimentation process to separate the bacteria from blood components. The driving force for the separation is the difference in size and the density of the blood components and the bacteria. The blood is spun at 3000 rpm for 1 min inside a carefully-designed hollow disk which is 12 cm in diameter. Differences in size and the densities of the blood components and the bacteria results into various sedimentation velocities, producing a separation which leaves bacteria in the plasma. As we reduce the spinning speed, the plasma (containing the bacteria) flows to the center of the disk while the blood components are trapped in the disk.

Conclusion

Using this technique, we were able to separate and recover about 40 percent of the bacteria in the recovered plasma from 7 milliliter of whole blood in 1 minute.