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Squashing Superbugs: Using Procalcitonin Levels to Identify Bacterial Infections to Direct Antibiotic Therapy

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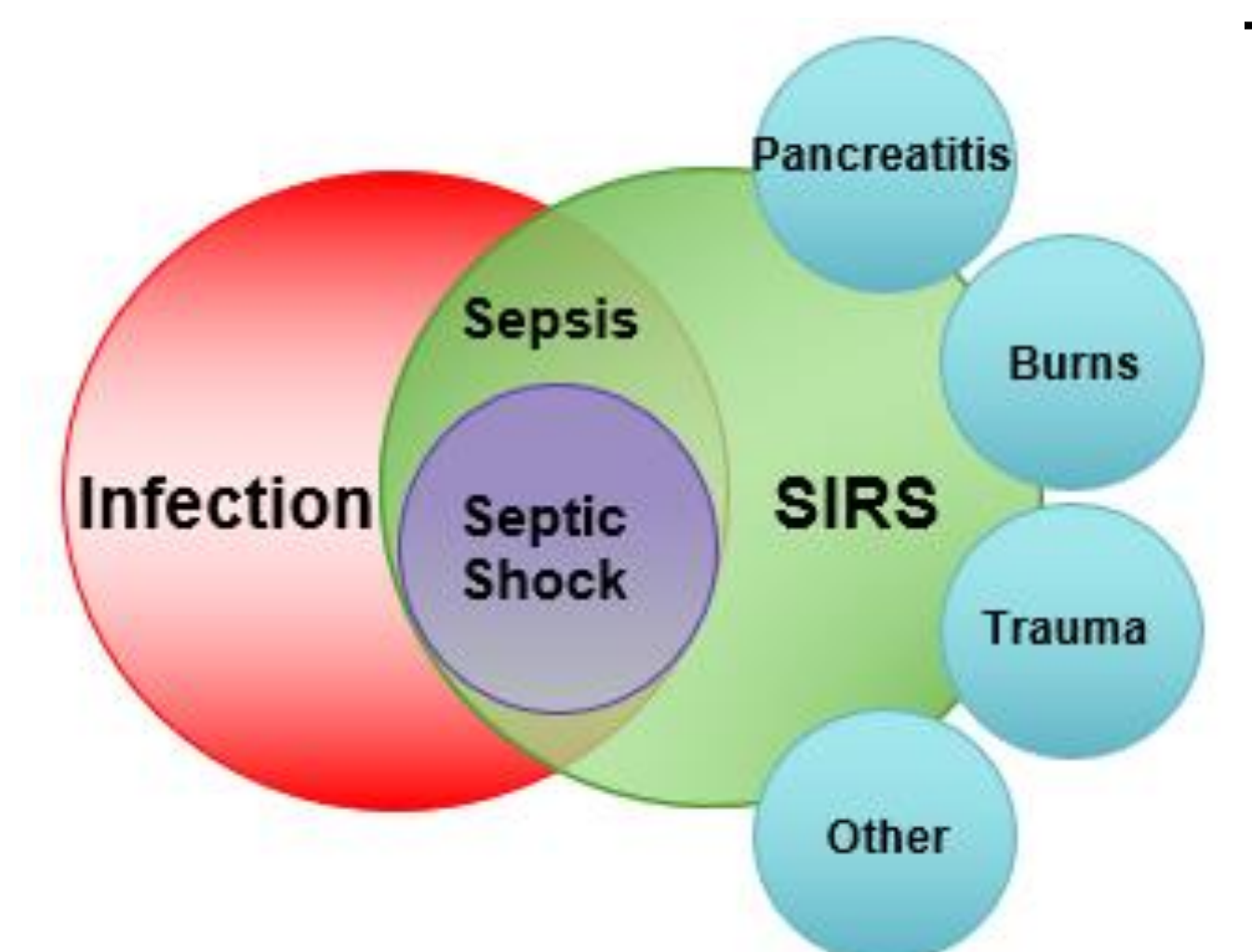
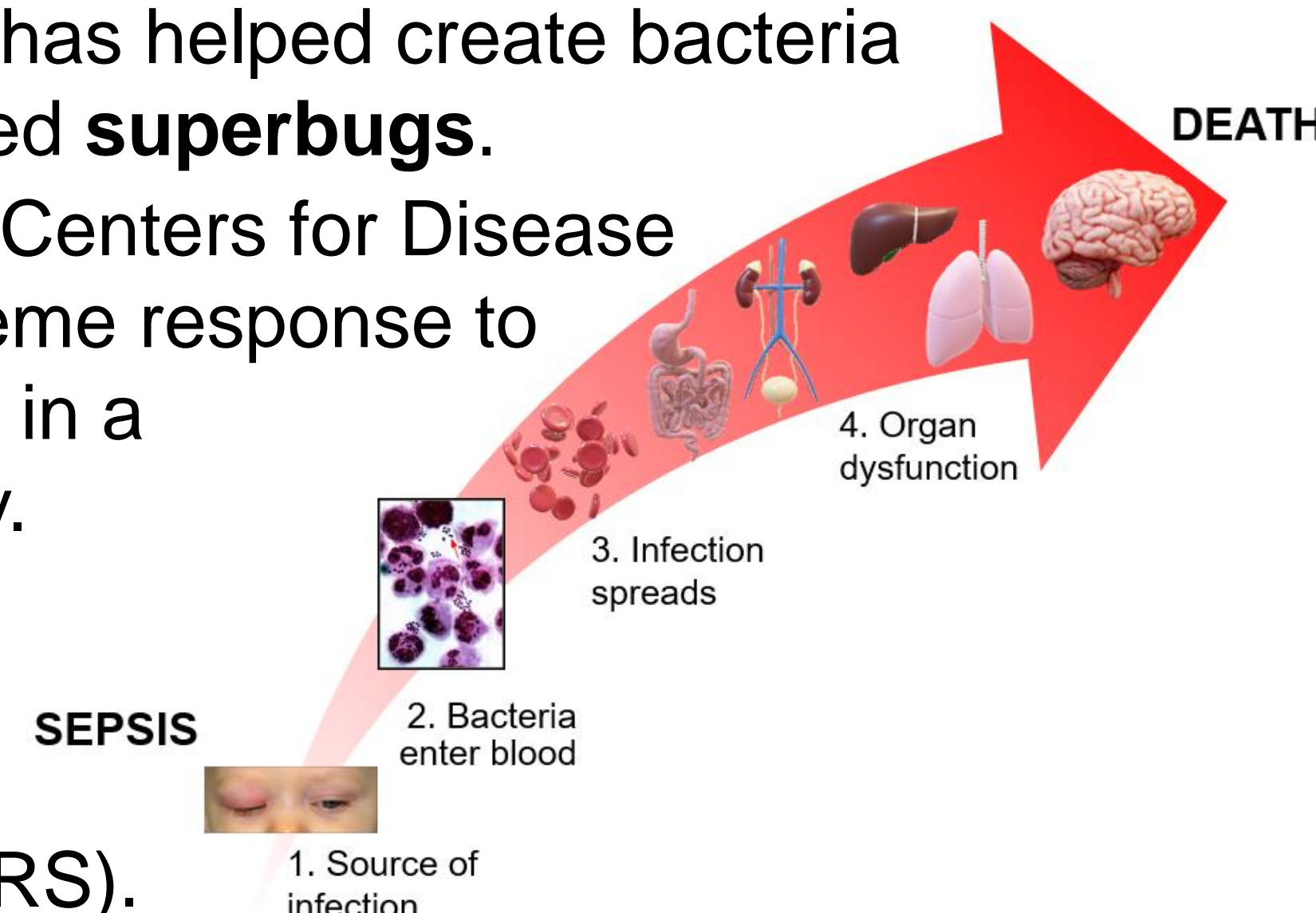
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Background

The overuse of antibiotics has helped create bacteria resistant to antibiotics called **superbugs**.

Sepsis, as defined by the Centers for Disease Control, is the body's extreme response to an infection that can result in a life-threatening emergency.

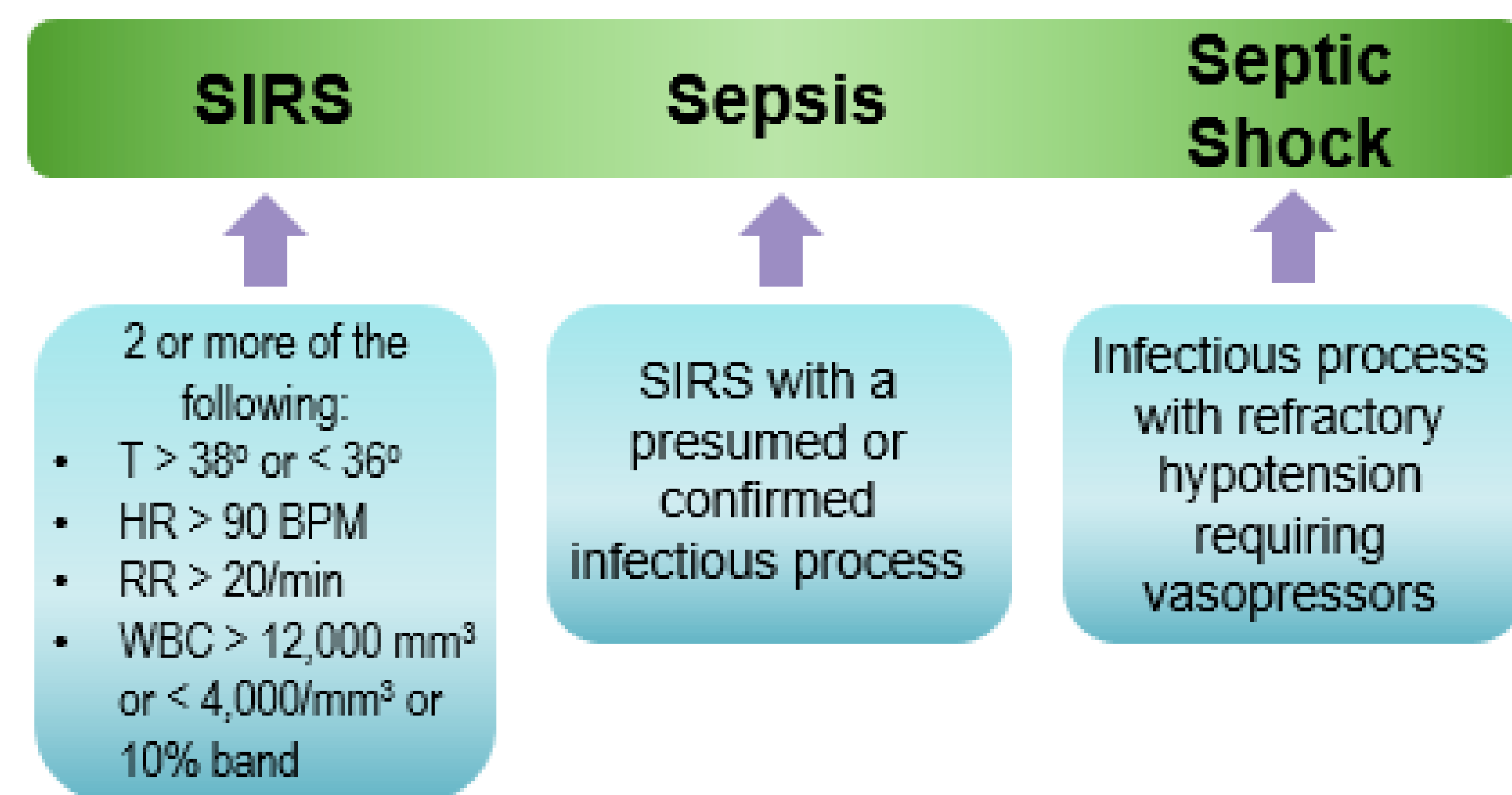
The full body response to sepsis is called the **Systemic Inflammatory Response Syndrome (SIRS)**.



The most accurate test available to determine sepsis is the collection of a **blood culture**. **C-Reactive Protein (CRP)** has served as our standard in diagnosing the presence of Inflammation.

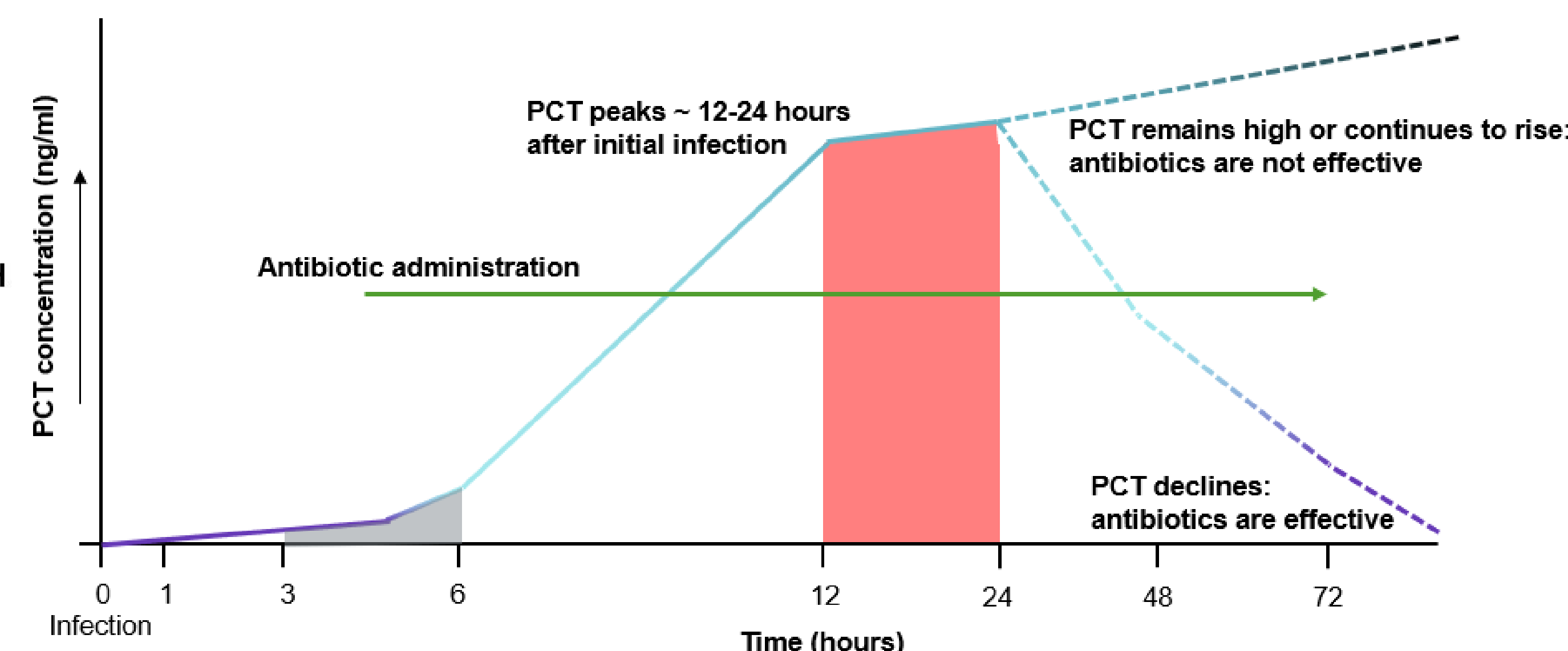
Is there a promising biomarker sensitive and specific to the

presence of a bacterial infection with prompt results that can be used to guide antibiotic therapy?



Method

Reviewed 30 journal articles through scholarly search. The keywords searched were sepsis, c-reactive protein, procalcitonin, biomarker, and antibiotic therapy. The focus was narrowed to studies conducted in pediatrics.



The Investigation

CRP is highly non-specific and does not differentiate non-bacterial sepsis from bacterial sepsis.

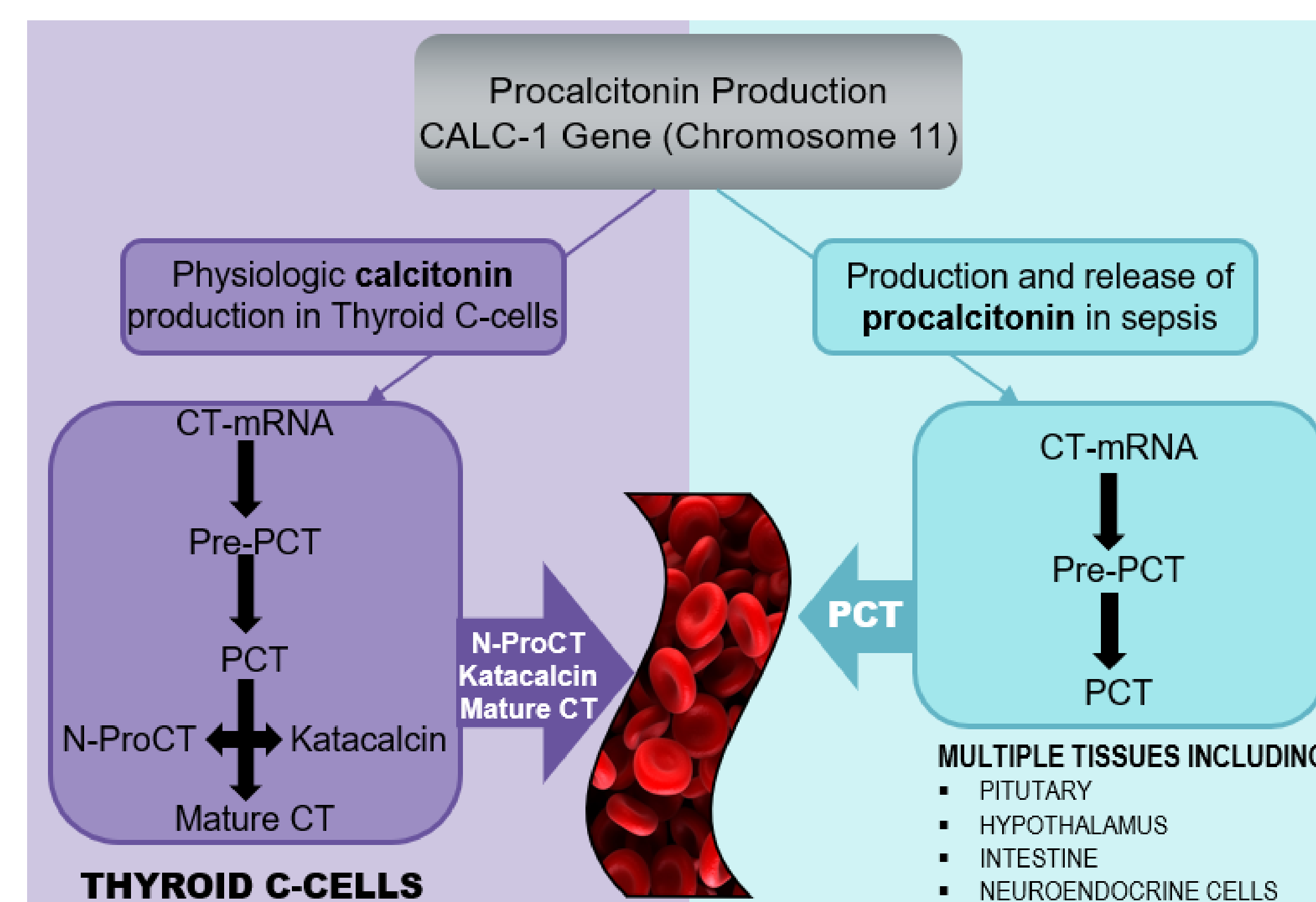
In recent studies, **procalcitonin (PCT)** is showing promise as the defining biomarker.

PCT levels rise sharply and more quickly than CRP values; PCT levels normalize faster when the infection is treated appropriately.

As PCT levels rise, bacterial infections and sepsis are likely which can then be used to in the decision to initiate antibiotic therapy.

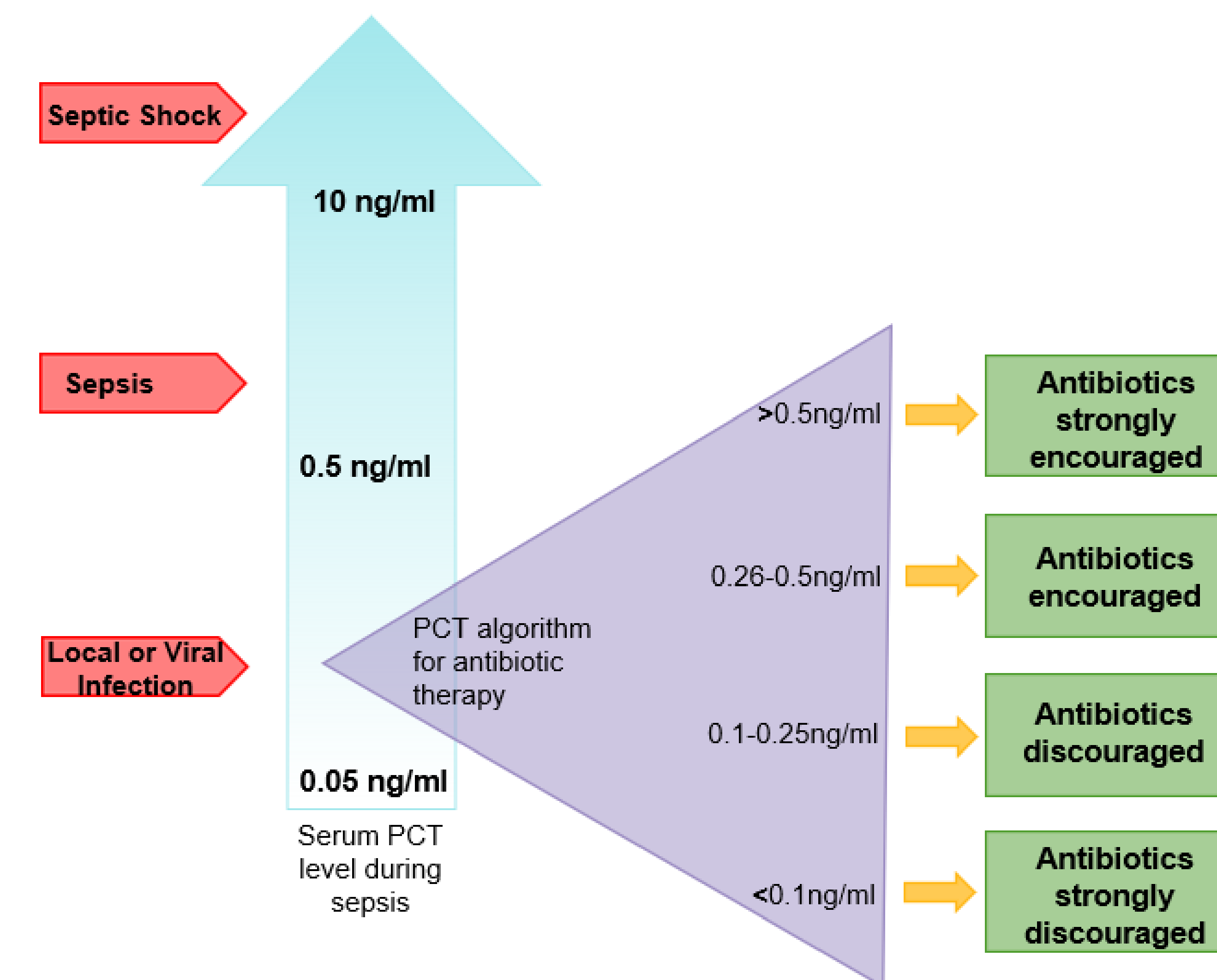
This rise and fall of PCT levels could be utilized to determine the course length of antibiotics.

A normal PCT level in a patient that presents with an infection may eliminate the need for antibiotics, as the infection is most likely viral.



Findings

- PCT levels follow a different pathway in the presence of a bacterial invader
- Waiting for positive blood cultures to treat is not best practice
- Treating infections with antibiotics, while differentiating bacterial versus viral infections, expose patients to unnecessary antibiotic therapy leading to an increased risk of superbugs
- Antibiotic stewardship benefits the patient by unnecessary exposure to medications and lowers the costs to the prescribing facility



Recommendations

PCT should be used as the definitive biomarker to guide antibiotic therapy until blood culture results are obtained; thus, helping to stop the spread of superbugs. Future investigations are recommended due to the lack of studies involving the pediatric population.

Scan for references

