BREAKTHROUGH PAVES WAY FOR NEW LYME DISEASE TREATMENT

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"Borrelia burgdorferi peptidoglycan is a persistent antigen in patients with Lyme arthritis," PNAS (2019)

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A deer tick (left), one of the species of tick that transmits the bacteria that causes Lyme disease. High resolution fluorescently tagged image of the bacteria B. burgdorferi that causes Lyme disease (right). Credit: Virginia Tech / Brandon Jutras

The discovery

- A cellular component contributes to Lyme arthritis, a debilitating and extremely painful condition that is the most common late stage symptom of Lyme disease

- As the Lyme-causing bacteria Borrelia burgdorferi multiplies, it sheds a cellular component called peptidoglycan that elicits a unique inflammatory response in the body

The message

- “This discovery will help researchers improve diagnostic tests
- and may lead to new treatment options for patients suffering with Lyme arthritis”
- “This is an important finding, and we think that it has major implications for many manifestations of Lyme disease, not just Lyme arthritis”

The message

- Peptidoglycan: essential component of bacterial cell walls
- All bacteria have some form of peptidoglycan
- The form found in the bacteria that causes Lyme, *Borrelia burgdorferi*, has a unique chemical structure
- When the bacteria multiply, they shed peptidoglycan into the extracellular environment, because its genome does not have the appropriate proteins to recycle it back into the cell

Explanations

- We can detect peptidoglycan in the synovial fluid of the inflamed joints of patients that have all the symptoms of Lyme arthritis but no longer have an obvious, active infection
- Peptidoglycan elicits an inflammatory response and *the molecule persists in the synovial fluid*
- Which means that our bodies continue to respond…
- Receptors in our immune system sense bacterial products and determine a patient's body reacts to peptidoglycan

Perspectives

- The next phase of Jutras' work is:
  - to use methods to destroy the peptidoglycan
  - or intervene to prevent a response, which could get rid of Lyme disease symptoms
- Jutras: with either therapy patients would start recovering sooner

Clinical and Lab Study

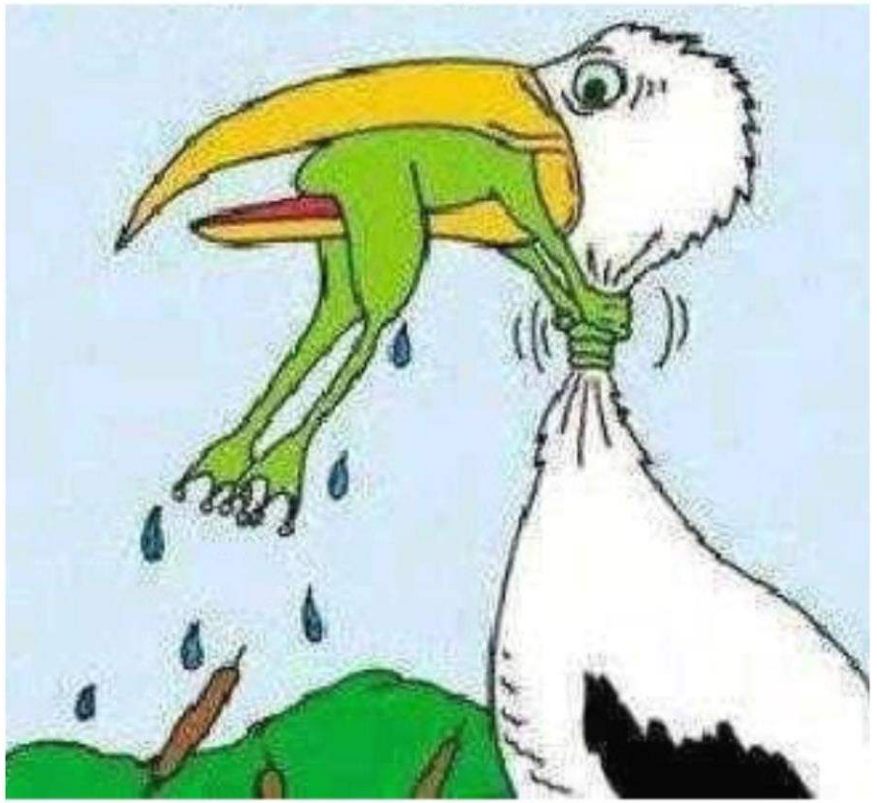
- Clinical samples: patients that had confirmed cases of Lyme disease (CDC Guidelines), but all did not respond to oral and/or intravenous antibiotic treatment
- The presence of peptidoglycan in these patients' synovial fluids may explain why some people experience symptoms of late stage Lyme disease in the absence of an obvious infection
- In this case, the usual antibiotic treatments for Lyme disease would no longer be helpful !

More studies on mouses

- Members of the Jacobs-Wagner lab purified the peptidoglycan and removed all other bacterial components and asked
- *Is peptidoglycan all on its own capable of causing arthritis in a mouse model?*

- Within 24 hours post-injection, mice presented with dramatic joint inflammation, indicating that peptidoglycan can cause arthritis

Aldri gi opp!!!



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