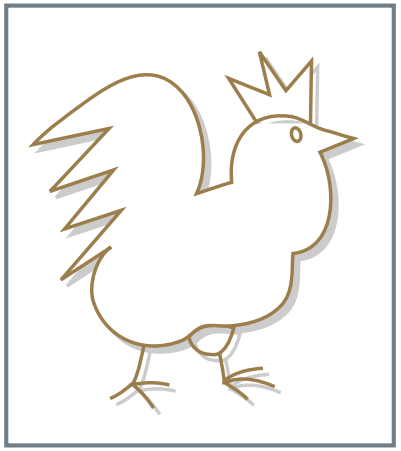
Immunomagnetic separation methods for the isolation of *Campylobacter jejuni* from ground poultry meats



Yu et al. (2001) ***Journal of Immunological Methods.*** **256: 11-18**

Figure by MIT OCW.

Introduction

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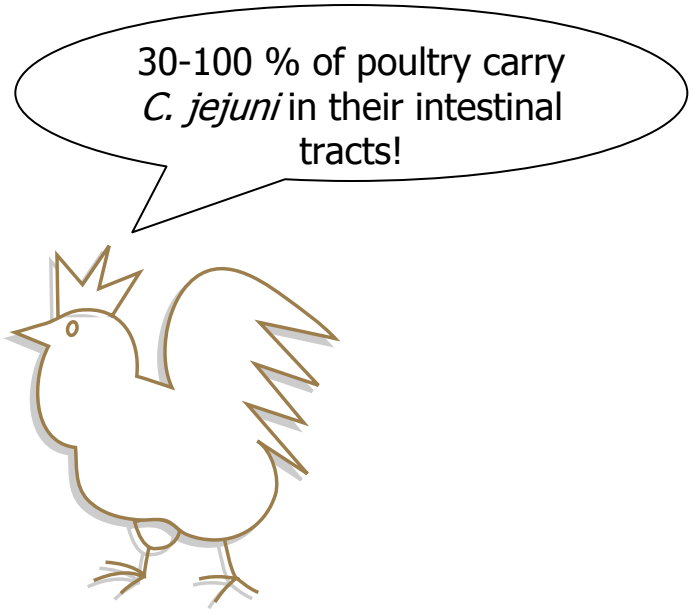
Campylobacter jejuni : the most frequent identified cause of human gastroenteritis and campylobacteriosis

Most commonly found in the intestinal tract of birds.



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Introduction

Traditional methods used to detect *C. jejuni*
- require 4-5 days
- involve selective enrichment followed by confirmation by biochemical and serological tests
- must overcome the problems of inhibitors from food sources

Due to the **perishable nature** of these foods**,** we need **a more rapid, sensitive and specific method** to monitor potential sources of pathogens!!

We evaluated the performance of two types of **Immuno-Magnetic Beads (IMBs)** in capturing and concentrating *C. jejuni* directly from poultry meats

Magnetic Beads

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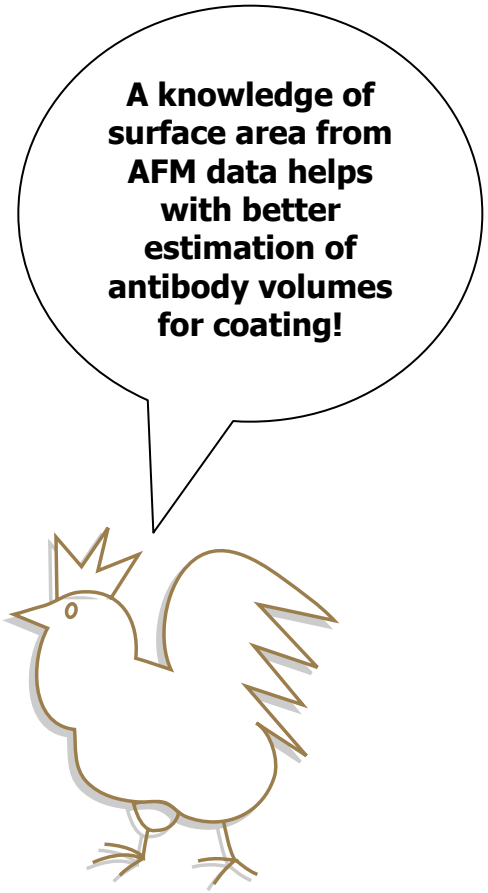
Yu, L. S., J. Uknalis, and S. I. Tu. "Immunomagnetic separation methods for the isolation of Campylobacter jejuni from ground poultry meats." *J Immunol Methods* 256, no. 1-2 (October 1, 2001): 11-8.

Magnetic beads used to detect and separate *C. jejuni* from ground poultry

AFM Imaging of IMBs

We used **Atomic Force Microscopy (AFM)** to characterize the extreme discontinuities in the topography of the magnetic beads, and to emphasize the fine structural composition on different aspects of the surface.

Reacting Surface:
3.4×10^{-3} m^2



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Detection of *C. jejuni*

To ensure that our beads were capturing bacteria, we stained bead-captured cells with DAPI and viewed them under a fluorescence microscope

Tosylactivated beads have a higher fluorescence intensity/area than streptavidin beads.

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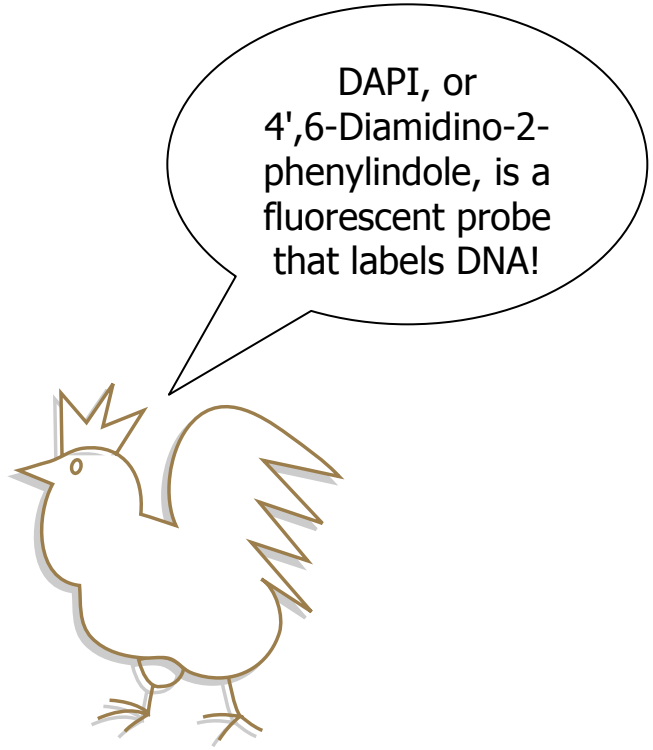

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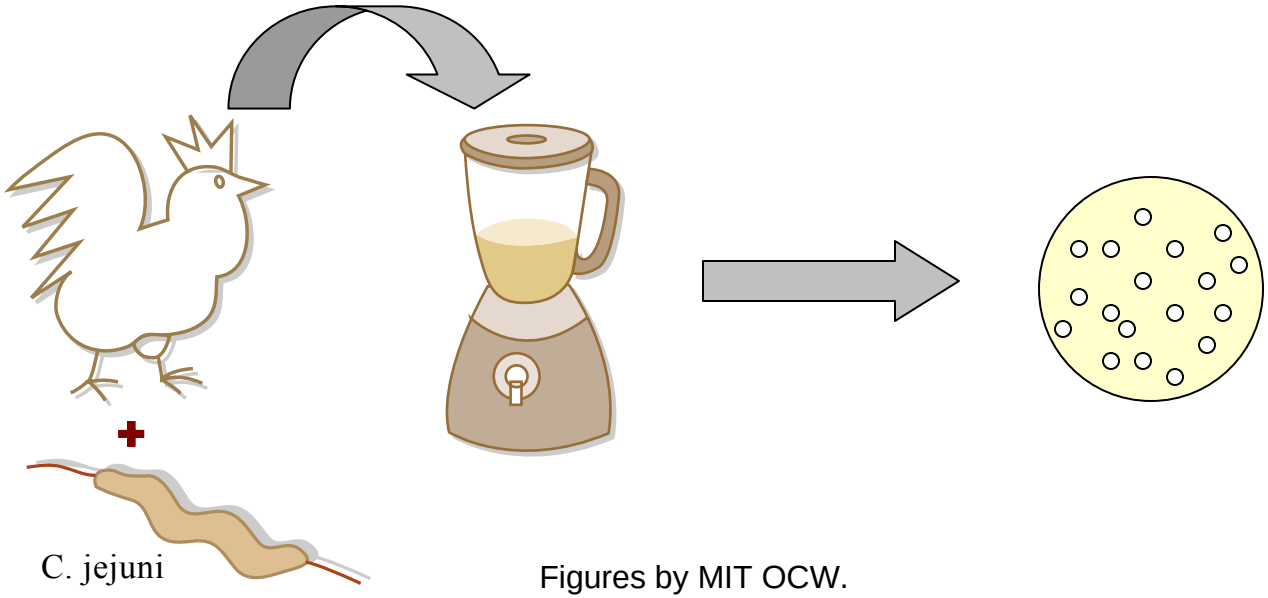
Detection of *C. jejuni*



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1) Inoculate poultry slurry with *C. jejuni*

2) Incubate with IMBs

3) Plate beads and count Colony Forming Units (CFUs)

The reactivity against *Campylobacter* cells with tosylactivated beads appeared to be slightly greater than with streptavidin beads!

Sensitivity Limits:

10^4 cfu/g (ground poultry product)

10^3 cfu/g (pure culture sample)

Conclusions

1) **Proof of concept:** Immunomagnetic separation and agar plating effectively remove debris and concentrate *C. jejuni* from ground poultry meat!

2) **Binding effectiveness:** Tosylactivated beads appeared to have a higher binding efficiency to *Campylobacter* cells.

    * competition for binding sites between biotin and streptavidin beads may explain decrease in binding efficiency

3) **Limitations of our technique:** artificial inoculation of *C. jejuni* into ground poultry meat rather than naturally contaminated poultry meat

    * results may not be directly applied to practical situations

4) **Alternate techniques under investigation:** ELISA assay, bio- and chemiluminescence techniques

    * goal is to get shorter detection time and lower limits of detection