

Looking Beyond the Classic Foodborne Pathogens

Gregg S. Davis, MPH, Ph.D.

April 16, 2016

Milken Institute School
of Public Health

THE GEORGE WASHINGTON UNIVERSITY

ANTIBIOTIC
RESISTANCE
ACTION CENTER

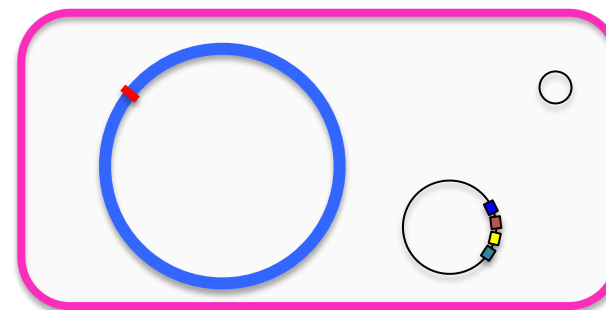
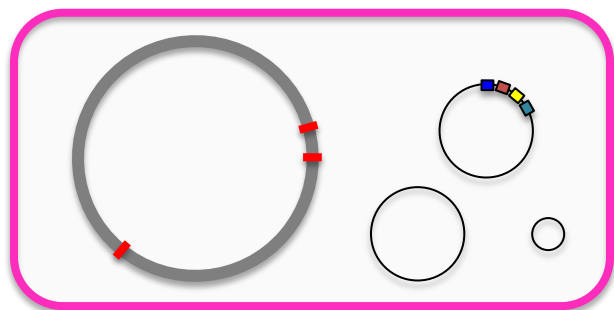
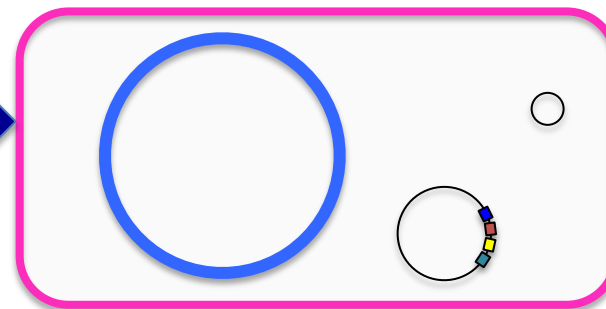
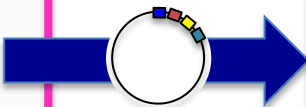
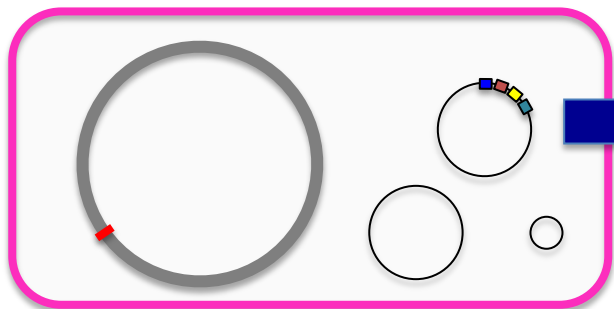
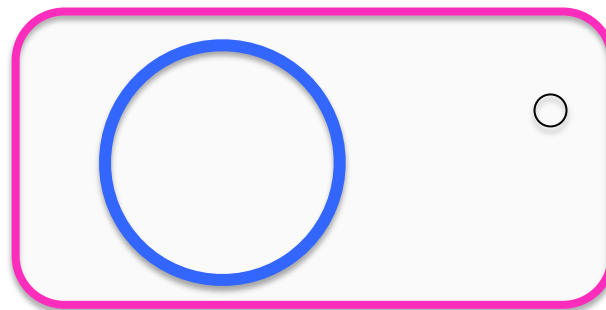
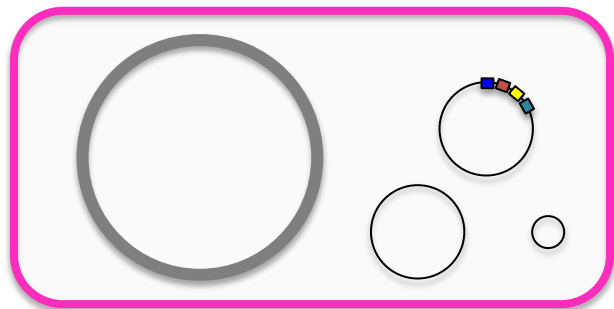
ANTIBIOTIC RESISTANCE THREATS in the United States, 2013

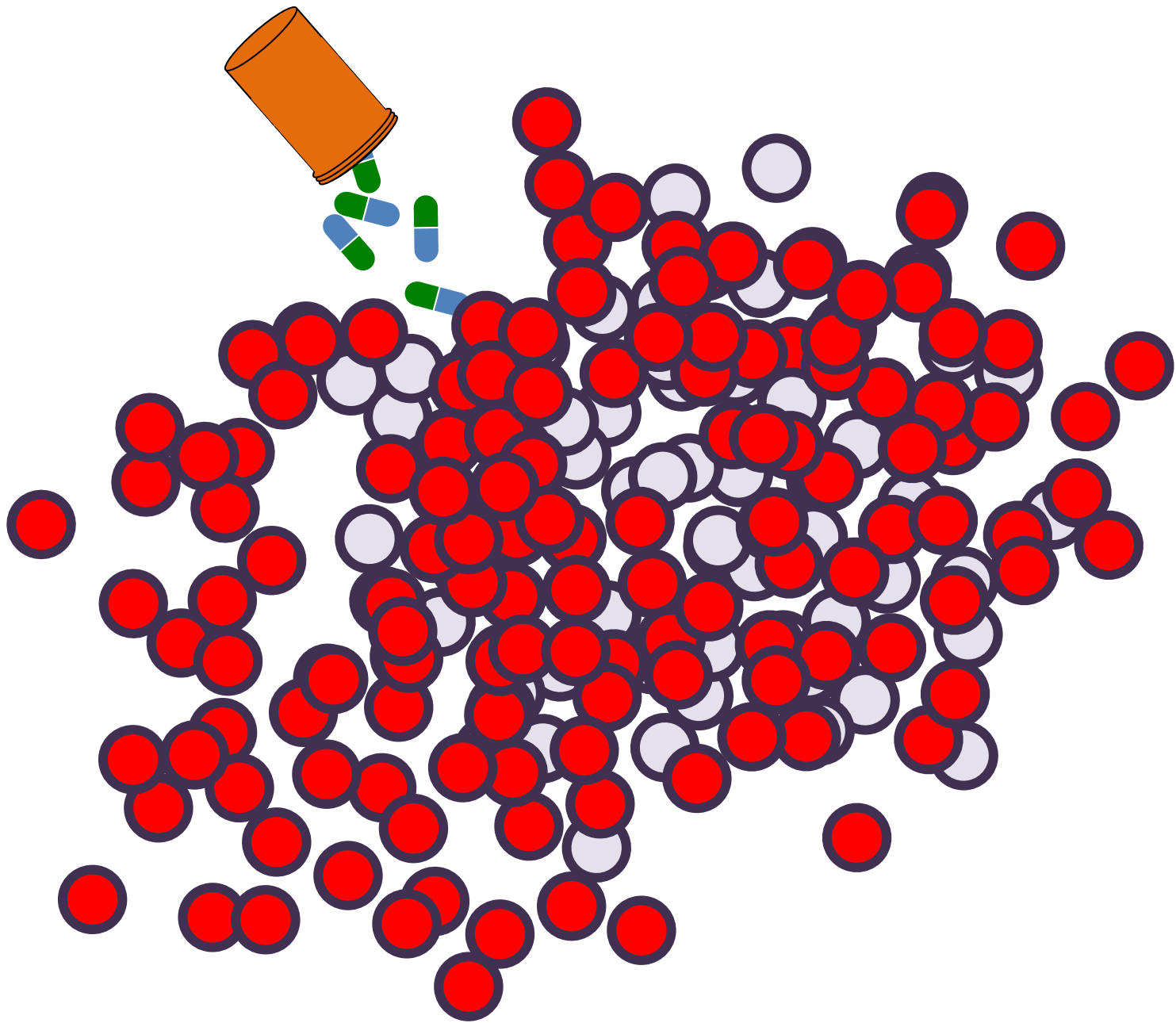


**U.S. Department of
Health and Human Services**
Centers for Disease
Control and Prevention

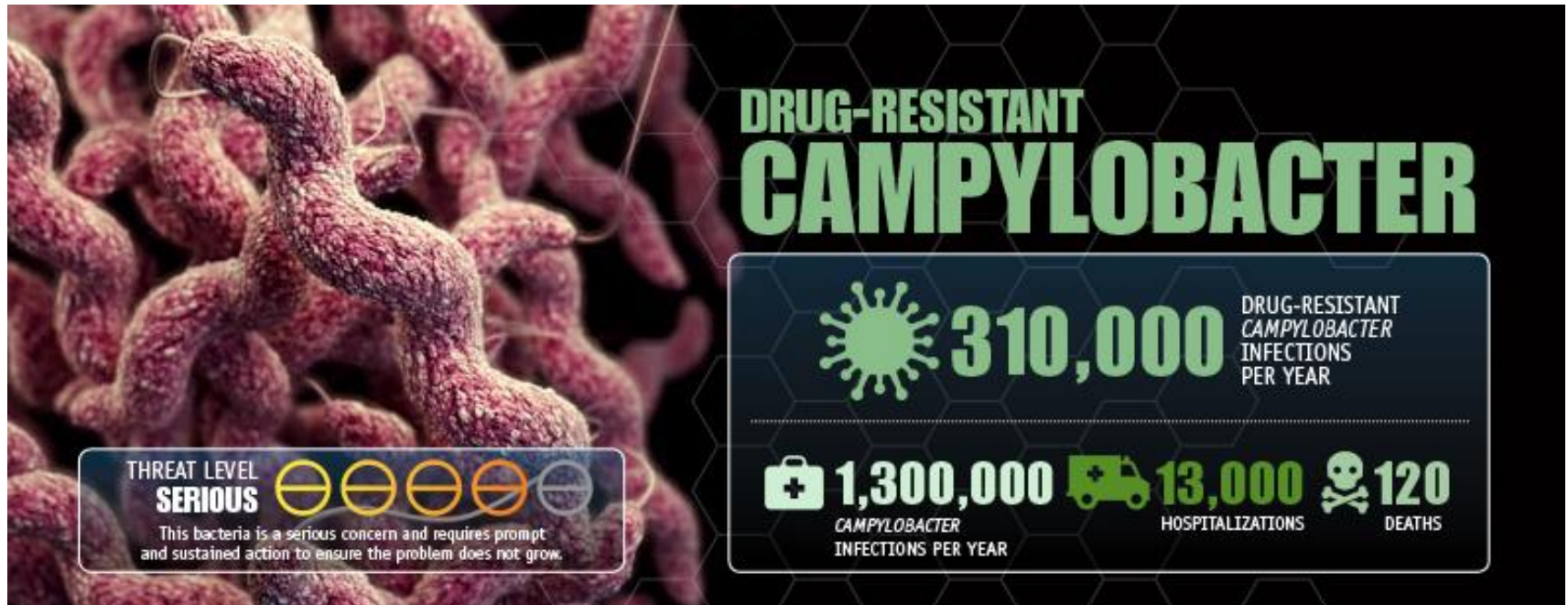


Post-antibiotic era in medicine

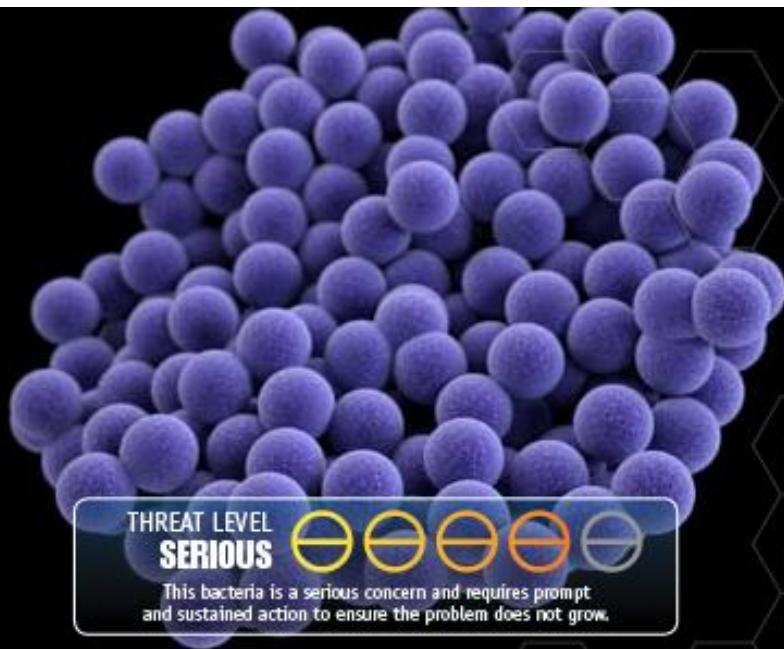




The Classics...



**Looking beyond the classic
foodborne pathogens...**



METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA)

THREAT LEVEL
SERIOUS



This bacteria is a serious concern and requires prompt and sustained action to ensure the problem does not grow.



80,461

SEVERE MRSA
INFECTIONS PER YEAR



11,285

DEATHS FROM
MRSA PER YEAR



STAPH BACTERIA ARE A LEADING CAUSE OF
HEALTHCARE-ASSOCIATED INFECTIONS



EXTENDED SPECTRUM β -LACTAMASE (ESBL) PRODUCING ENTEROBACTERIACEAE



26,000

DRUG-RESISTANT
INFECTIONS



1,700

DEATHS



140,000

ENTEROBACTERIACEAE
INFECTIONS PER YEAR

THREAT LEVEL
SERIOUS



This bacteria is a serious concern and requires prompt and sustained action to ensure the problem does not grow.



\$40,000

IN EXCESS MEDICAL COSTS PER YEAR
FOR EACH INFECTION



Colonizing Opportunistic Pathogens

COPs

Staphylococcus aureus

Klebsiella pneumoniae

Escherichia coli

2014 WHO Report:

Globally, resistance among *E. coli*, *K. pneumoniae* and *S. aureus* to commonly used antibacterial drugs exceeds 50% in many settings.

Paradigm shift



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Livestock-associated MRSA CC398

- ST398 – discovered in Dutch swine herds in early 2000's
- Disproportionately infects farmers, livestock workers, and veterinarians
- Currently, up to 40% of MRSA cases in Denmark, the Netherlands, and regions of Germany are caused by CC398



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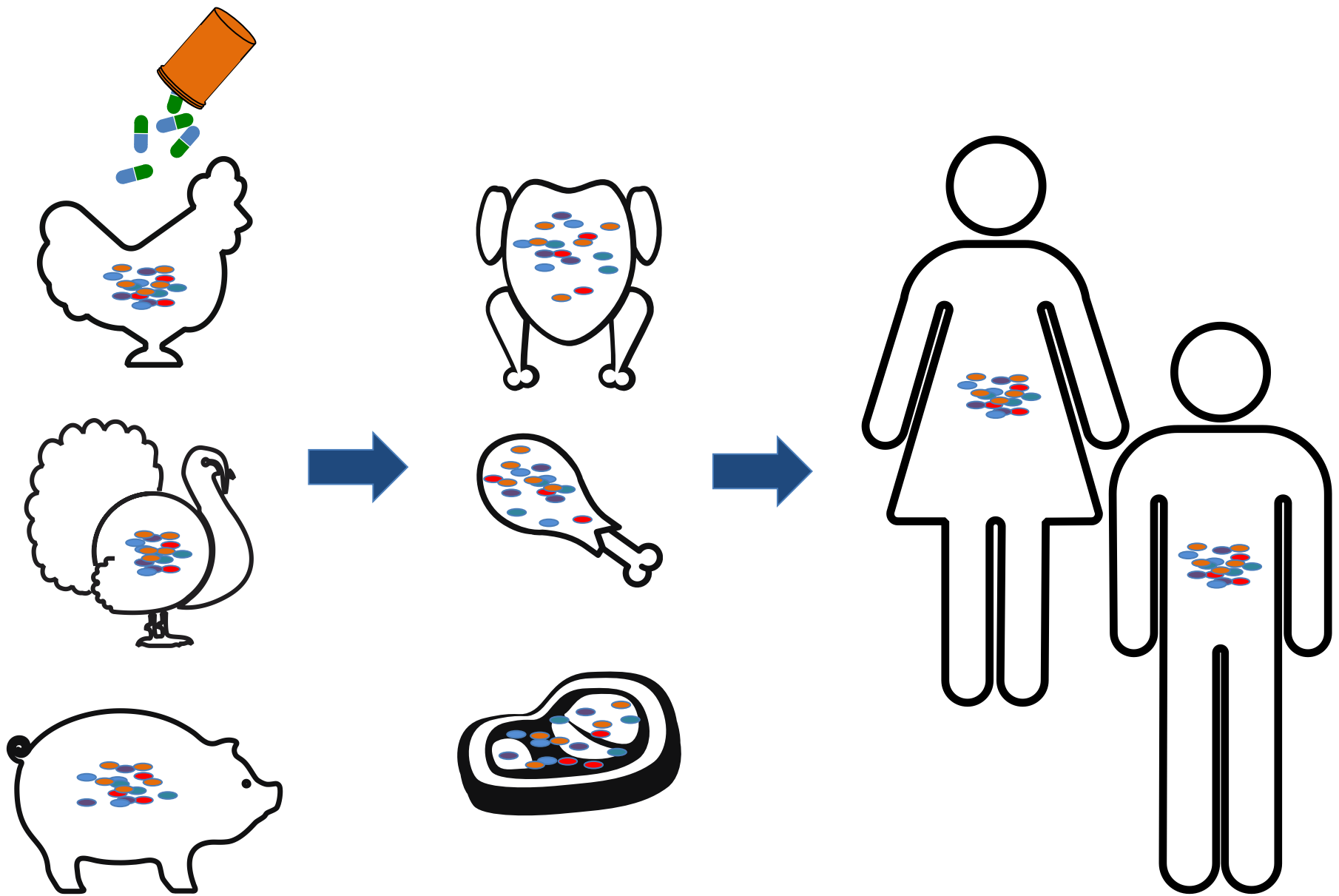
IN EXCESS MEDICAL COSTS PER YEAR
FOR EACH INFECTION



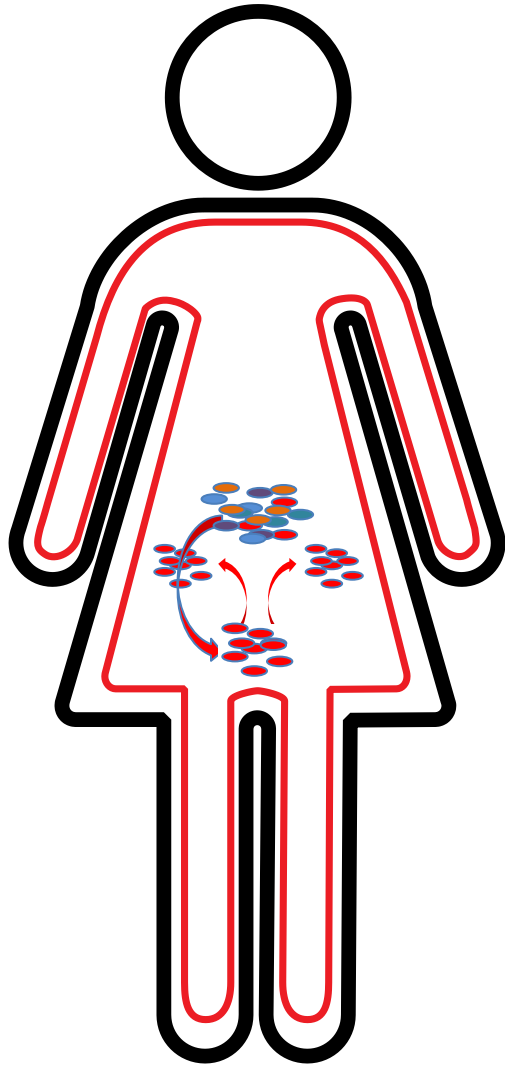
**Is it possible that foodborne
E. coli are causing UTIs?**

Urinary Tract Infections (UTIs):

- 8 - 10 million UTIs annually
- *E. coli* is the leading cause of UTIs
 - extra-intestinal pathogenic *E. coli* (ExPEC)
- *K. pneumoniae* is the second leading cause
- Antibiotics are key treatments



Foodborne & Travel-Related Infection



septicemia (blood)

pyelonephritis (kidney)

cystitis (bladder)



Flagstaff, AZ

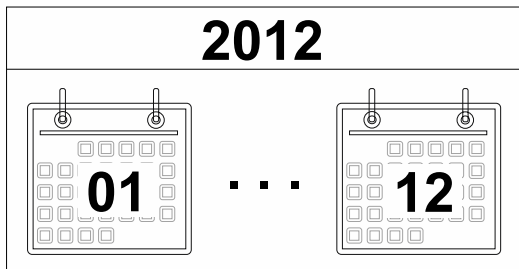
Population: 65,870

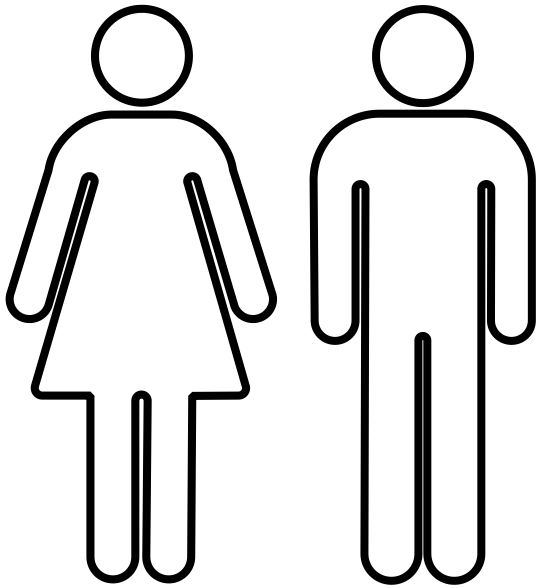
Distance to Phoenix: 147 mi

Major Grocery Store Chains: 9

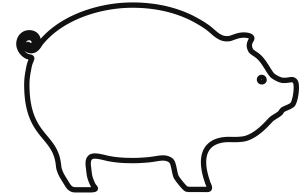
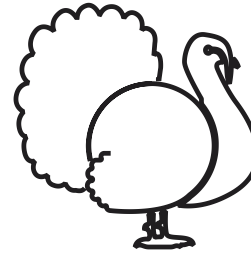
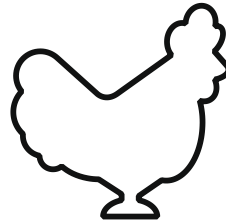
Hospitals: 1

Flagstaff, AZ
Sample Collection

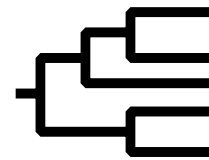




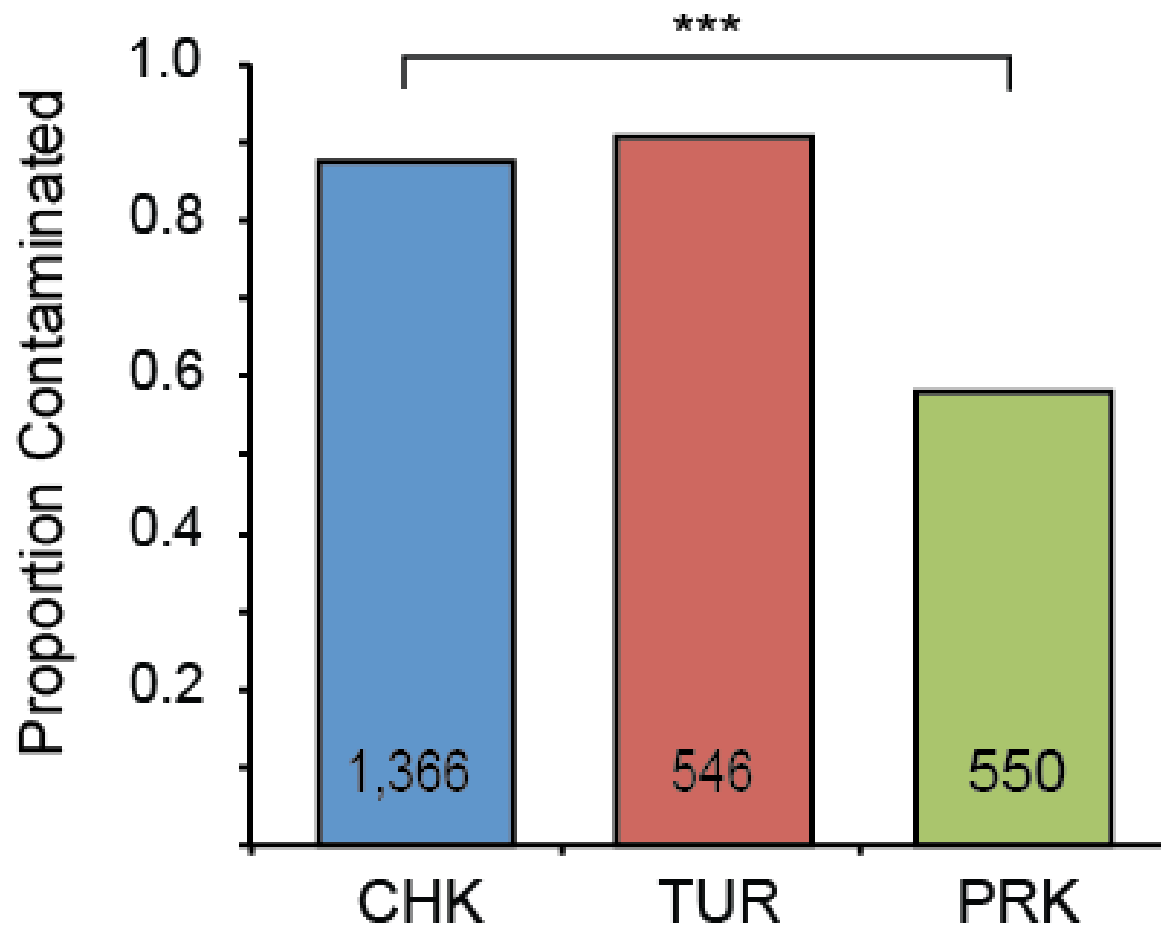
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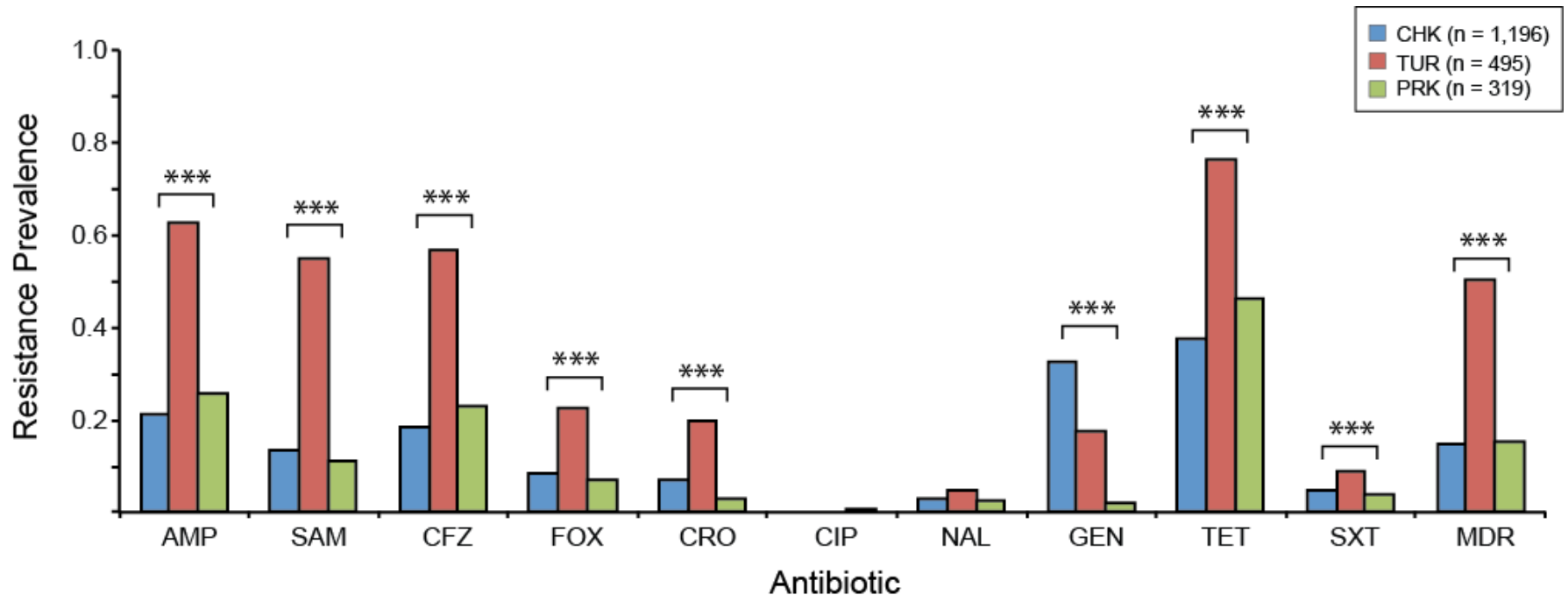
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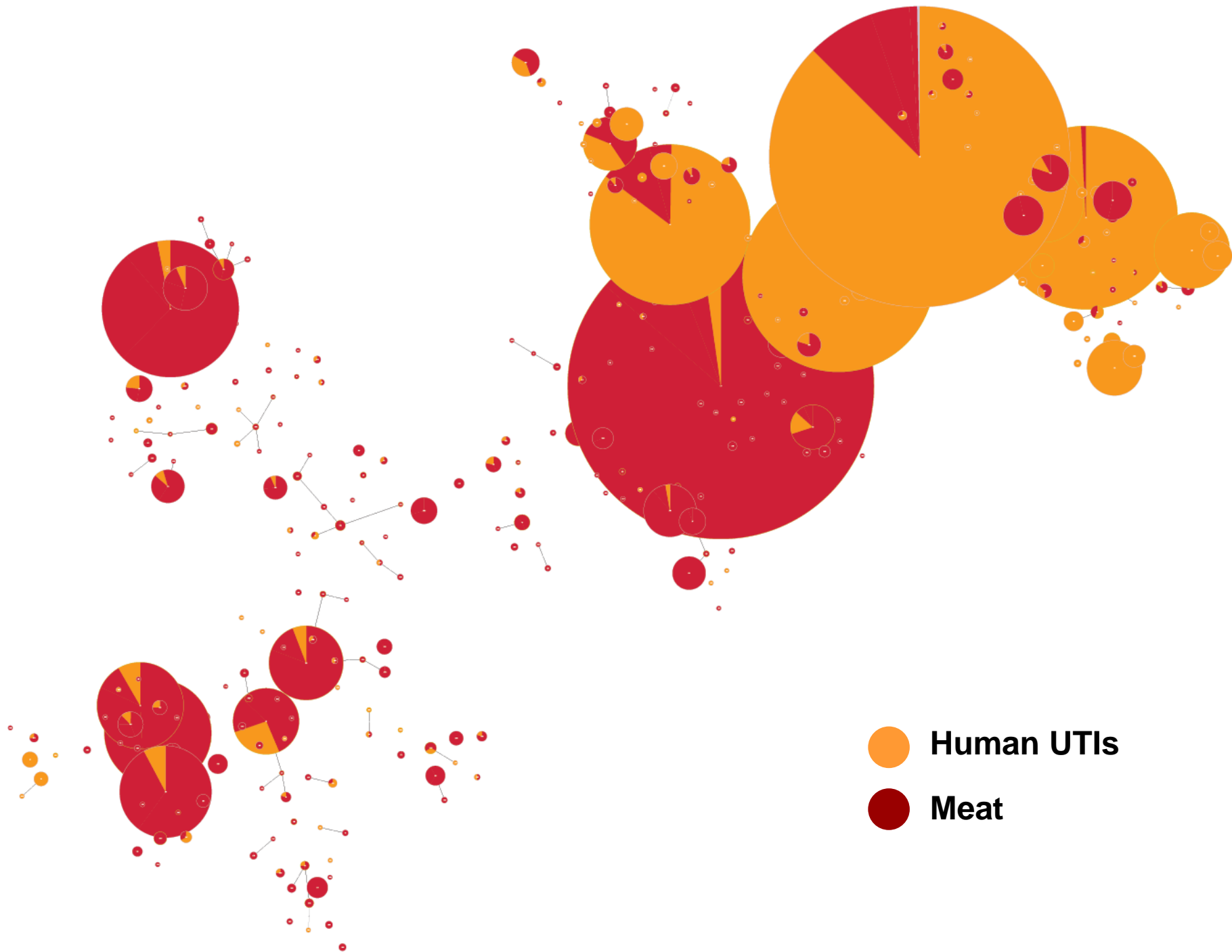


E. coli is a Common Contaminant of Retail Meats



Antibiotic Resistance is Common Among *E. coli* from Retail Meats





Colistin

Articles

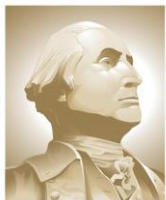


Emergence of plasmid-mediated colistin resistance mechanism MCR-1 in animals and human beings in China: a microbiological and molecular biological study



Yi-Yun Liu, Yang Wang*, Timothy R Walsh, Ling-Xian Yi, Rong Zhang, James Spencer, Yohei Doi, Guobao Tian, Baolei Dong, Xianhui Huang, Lin-Feng Yu, Danxia Gu, Hongwei Ren, Xiaojie Chen, Luchao Lv, Dandan He, Hongwei Zhou, Zisen Liang, Jian-Hua Liu, Jianzhong Shen*





THE GEORGE
WASHINGTON
UNIVERSITY

WASHINGTON, DC



Flagstaff
Medical Center



STATENS
SERUM
INSTITUT



The FUTI Team

Cindy Liu

Kara Waits

Maliha Aziz

Sanjeev Sariya

Lori Gauld

Lora Nordstrom

Gregg Davis

Sally Statham

Brett Weaver

Heidi Grande

Joseph Horwinski

Paul Keim

SSI

Marc Stegger

Paal Andersen

University of Minnesota

James R. Johnson

Tim Johnson

University of Washington

Evgeni Sokurenko

DTU

Frank Aarestrup

Henrik Hasman

Funding

DOD (W81XWH-11-1-0728)

Cowden Endowment (Keim)

ARAC

Laura Rogers

Nicole Tidwell