



22nd Annual Chicago Infection Control Conference

June 9, 2017

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Learning Objectives

At the conclusion of this course participants will be able to

- **Enable the learner to gain knowledge of emerging healthcare-associated infections pathogens.**
- **Identify effective infection control strategies to mitigate spread of multi-drug resistant organisms.**
- **Raise awareness of emerging disease threats and identify appropriate diagnostic testing, reporting and prevention methods.**
- **Raise awareness of local public health issues including opioid epidemic and immigrant health.**

To obtain credit you must:

- **Be present for the entire session**
- **Complete an evaluation form**
- **Return the evaluation form to staff**

Certificate will be sent to you by e-mail upon request.

In support of improving patient care, [Insert name of Joint Accredited Provider] is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

Rush University Medical Center designates this live activity for a maximum of 6.25 AMA PRA Category 1 Credit(s)[™]. Physicians should claim only credit commensurate with the extent of their participation in the activity.

ANCC Credit Designation – Nurses

The maximum number of hours awarded for this CE activity is 6.25 contact hours.

Rush University designates this live activity for 6.25 Continuing Education credit(s).

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Rush University is an approved provider for physical therapy (216.000272), occupational therapy, respiratory therapy, social work (159.001203), nutrition, speech-audiology, and psychology by the Illinois Department of Professional Regulation.



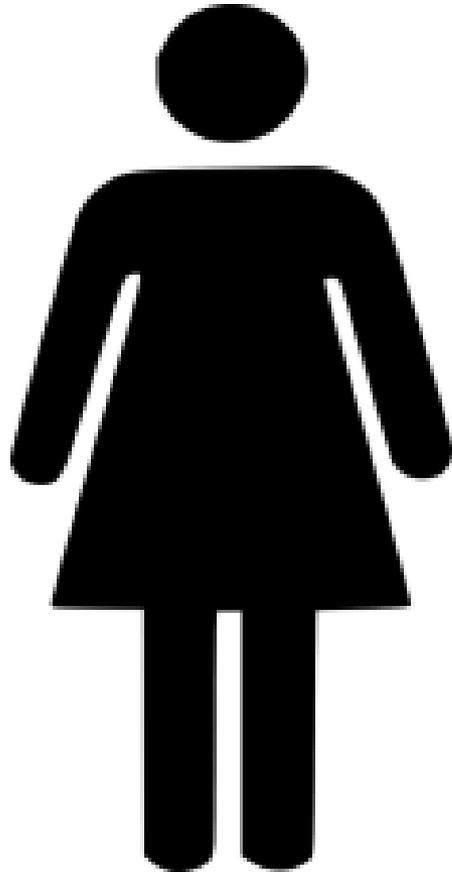
Seoul Searching:

Outbreak of Seoul Virus among Ratteries and Pet Owners — Illinois, 2017



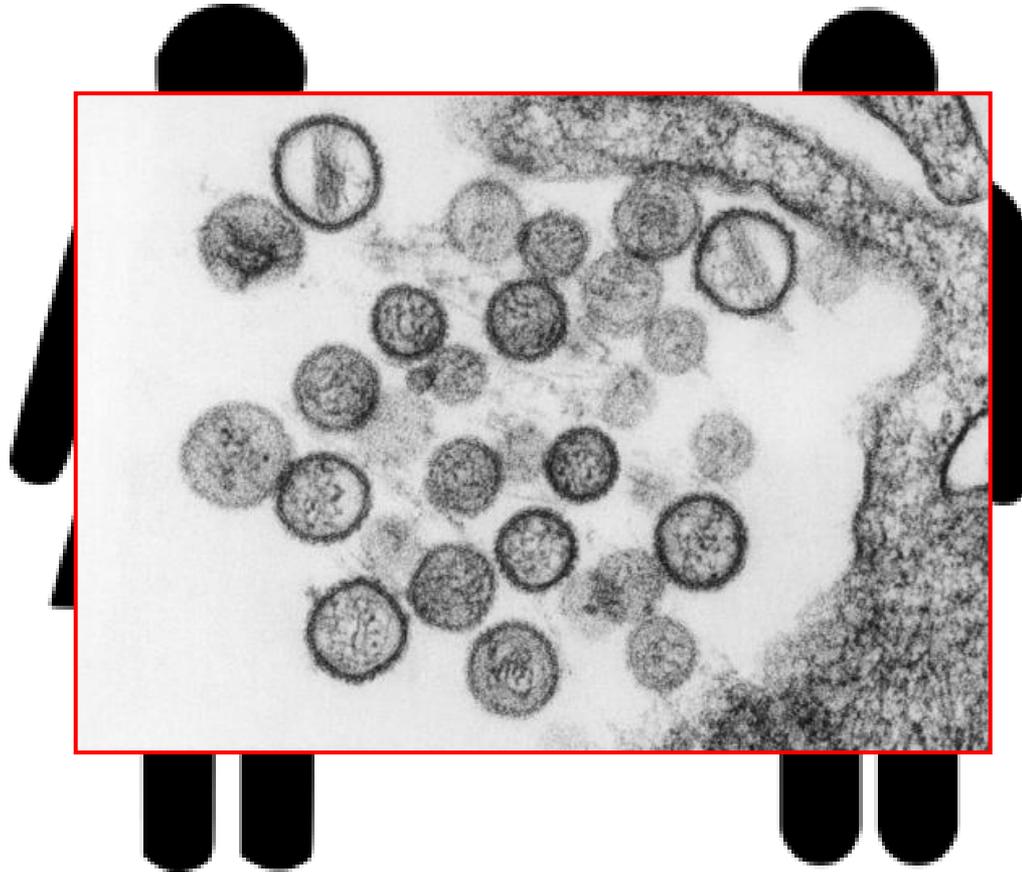
Janna Kerins, VMD, MPH
6/9/2017

A History of Seoul

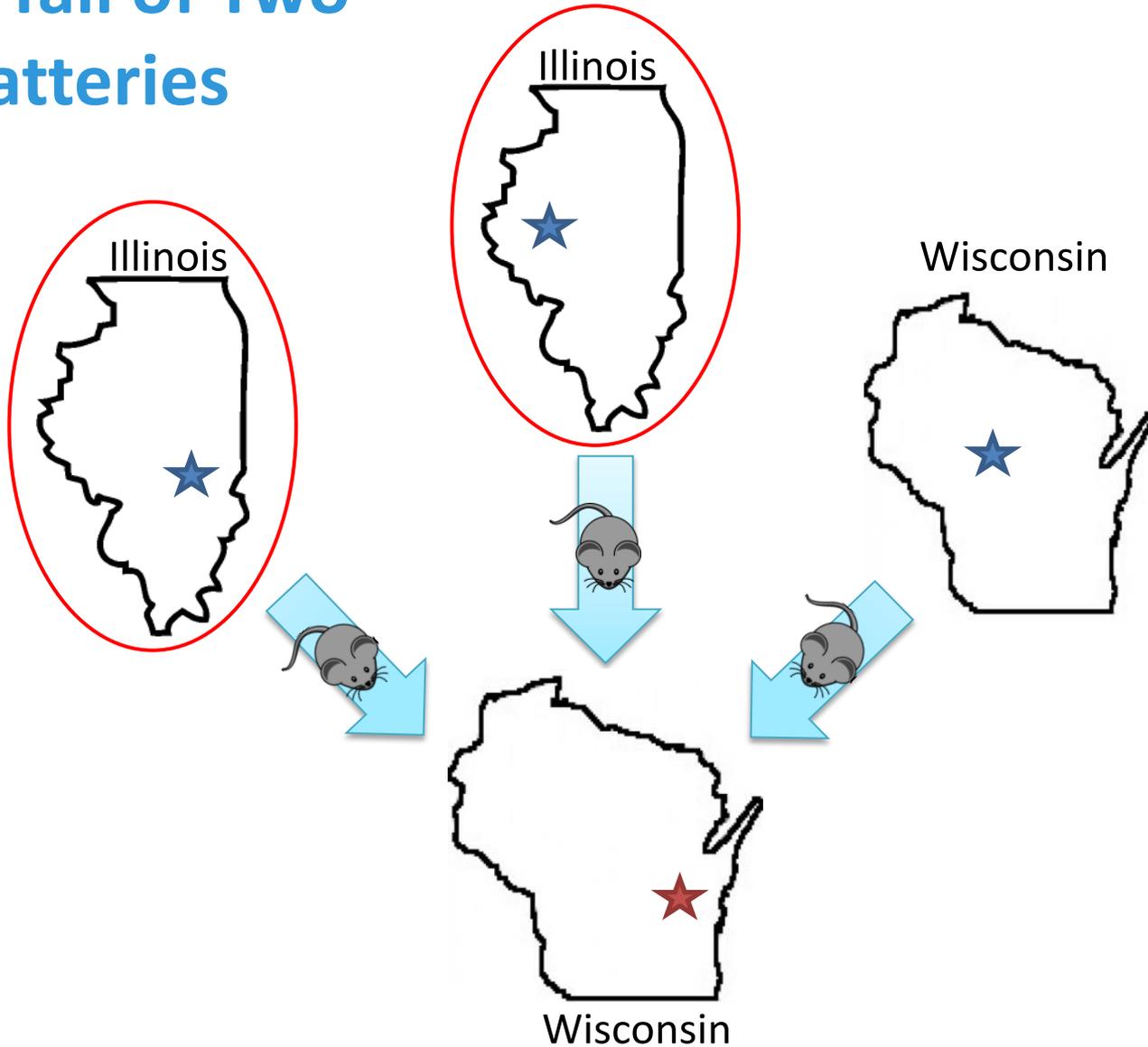




Seoul-Mates

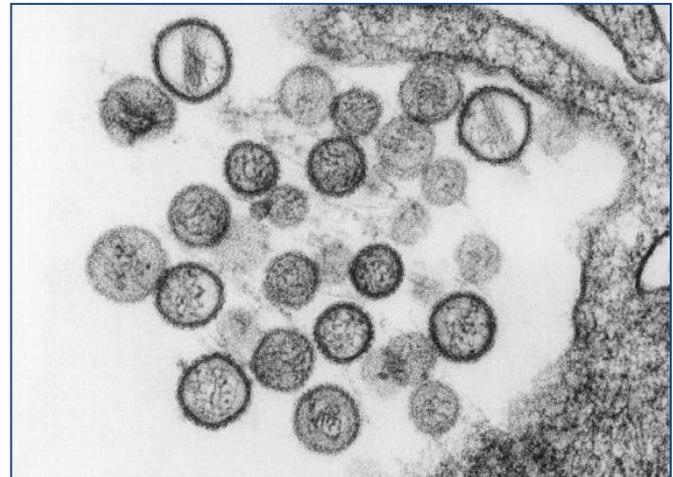
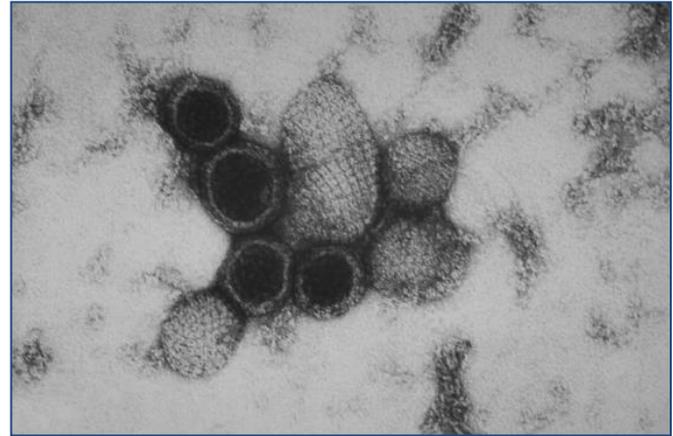


A Tail of Two Ratteries



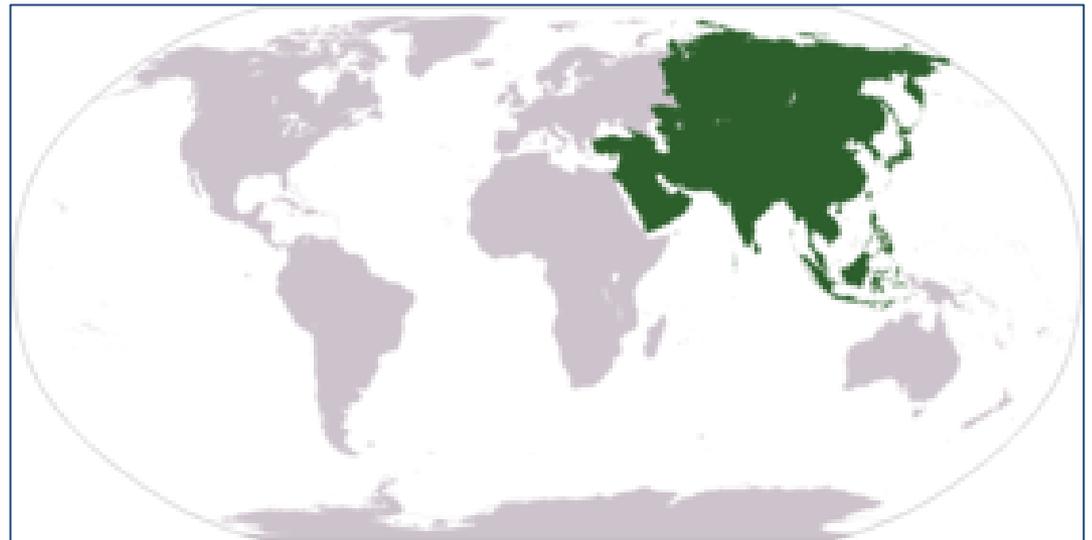
All About Seoul

- Old World hantavirus
- Family *Bunyaviridae*
- Negative-sense RNA virus



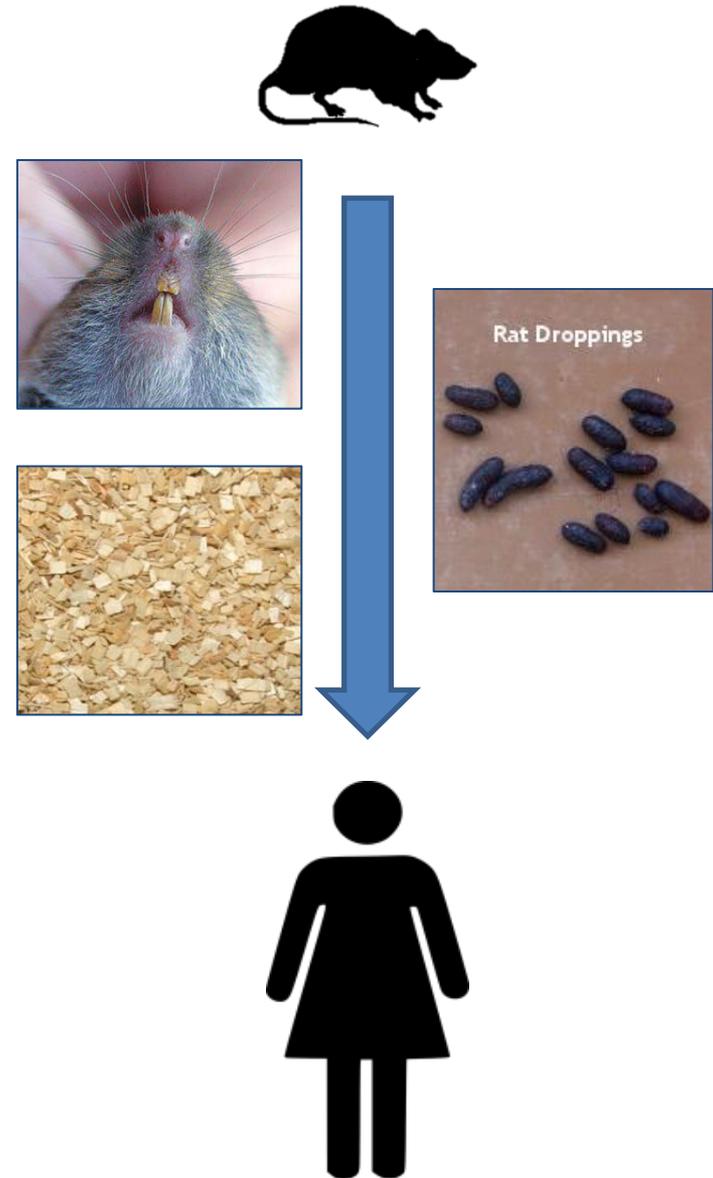
The Life of Seoul

- Old World hantavirus
- Family Bunyaviridae
- Negative-sense RNA virus
- Natural host: Domestic rat
- Distribution



Fuel for the Seoul

- Old World hantavirus
- Family *Bunyaviridae*
- Natural host: Domestic rat
- Distribution: Global
- Transmission
- Incubation period
 - Little as 1-2 weeks
 - Much as 8 weeks



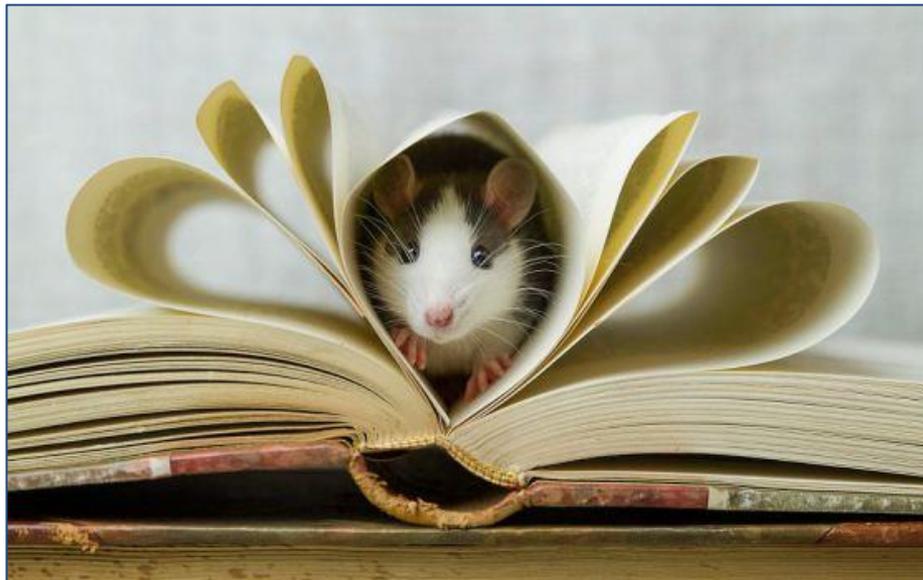
What Will Save Your Seoul?

- Old World hantavirus
- Family *Bunyaviridae*
- Natural host: Domestic rat
- Distribution: Global
- Transmission
- Incubation period
 - Little as 1-2 weeks
 - Much as 8 weeks
- Symptoms
- Diagnosis: IgG/IgM/PCR
- Treatment: Supportive care

Symptoms of SEOV Infection	
<ul style="list-style-type: none">• Fever• Headache• Back/abdominal pain• Chills• Nausea	<ul style="list-style-type: none">• Blurred vision• Flushing of the face• Redness of the eyes• Rash• Hemorrhagic fever with renal syndrome

Seoul Goals

- Identify additional cases of human and rat Seoul virus infections
- Determine risk factors for Seoul virus infection



The Meaning of Seoul

- Facility
 - Rattery
 - Pet Home
- Confirmed Facility
 - **HUMAN** or **RAT** with a positive test
- Suspected Facility
 - Contained rats that lived at a confirmed facility
 - Sent rats to a confirmed facility



Baring One's Seoul



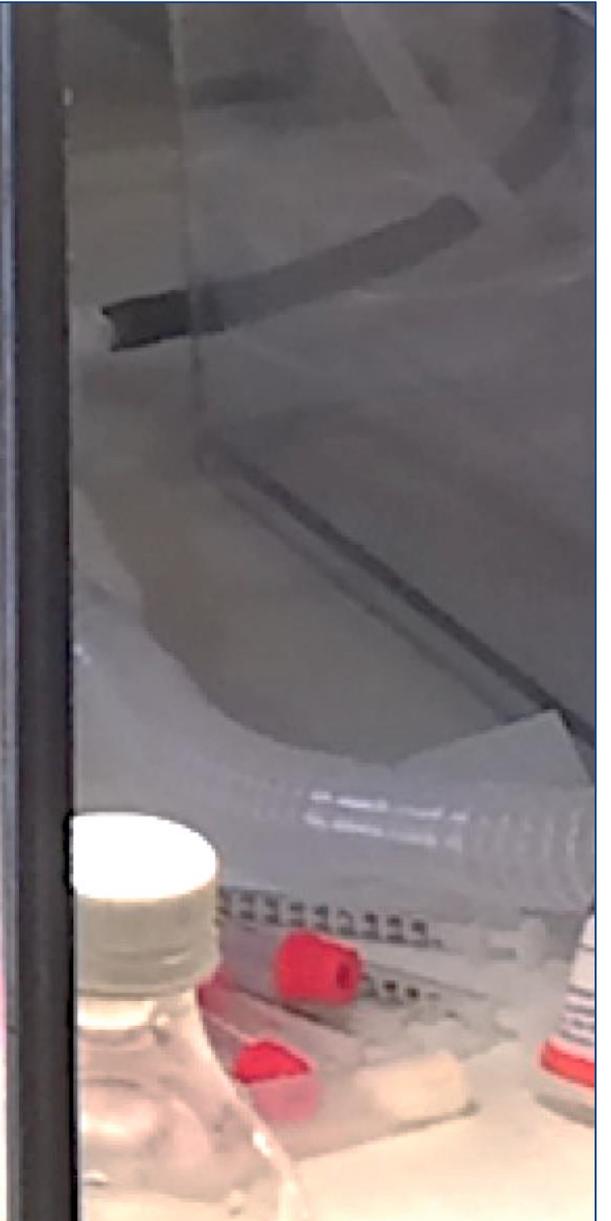
Seoul Searching

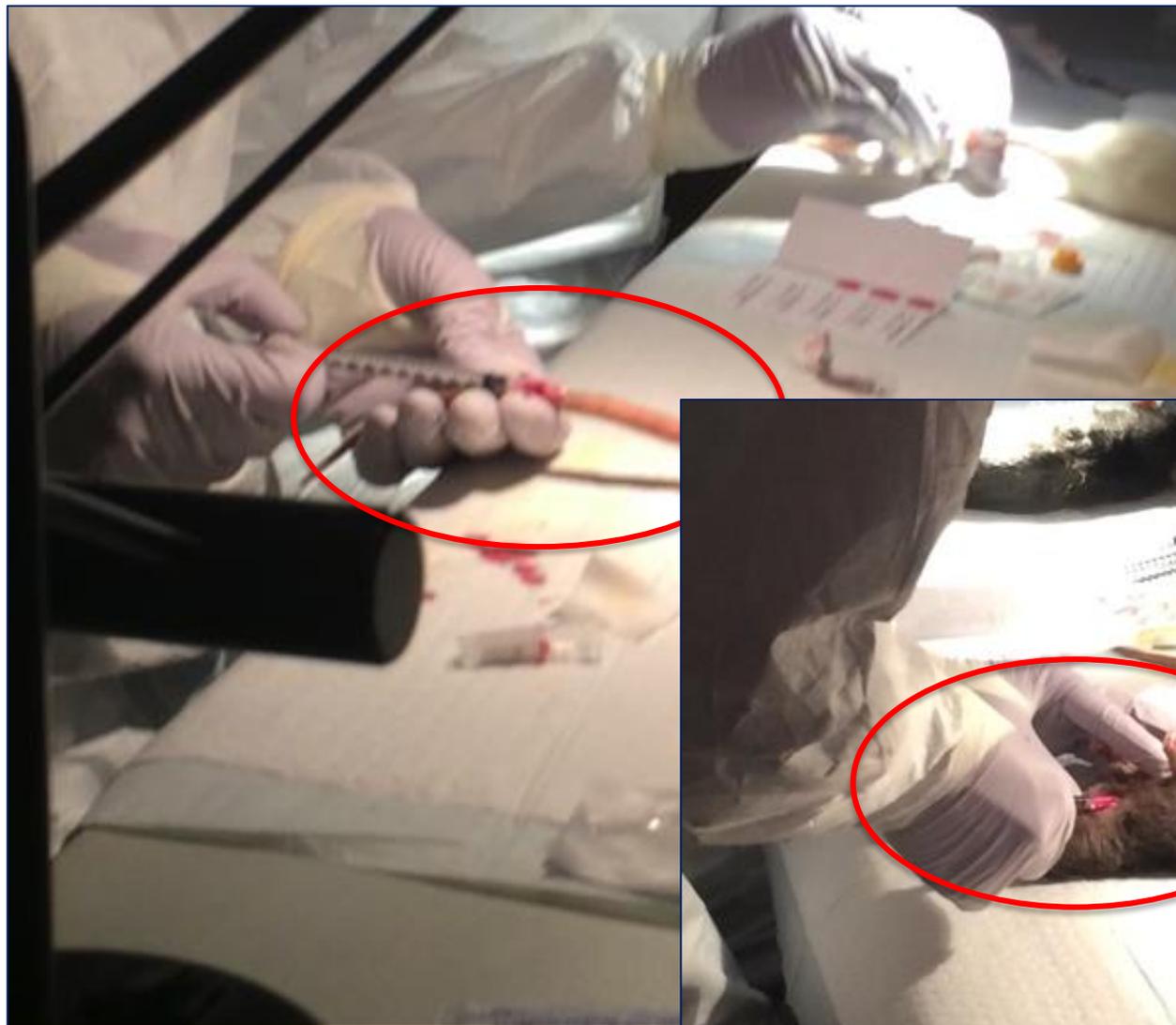


PCR, IgG/IgM



PCR, IgG





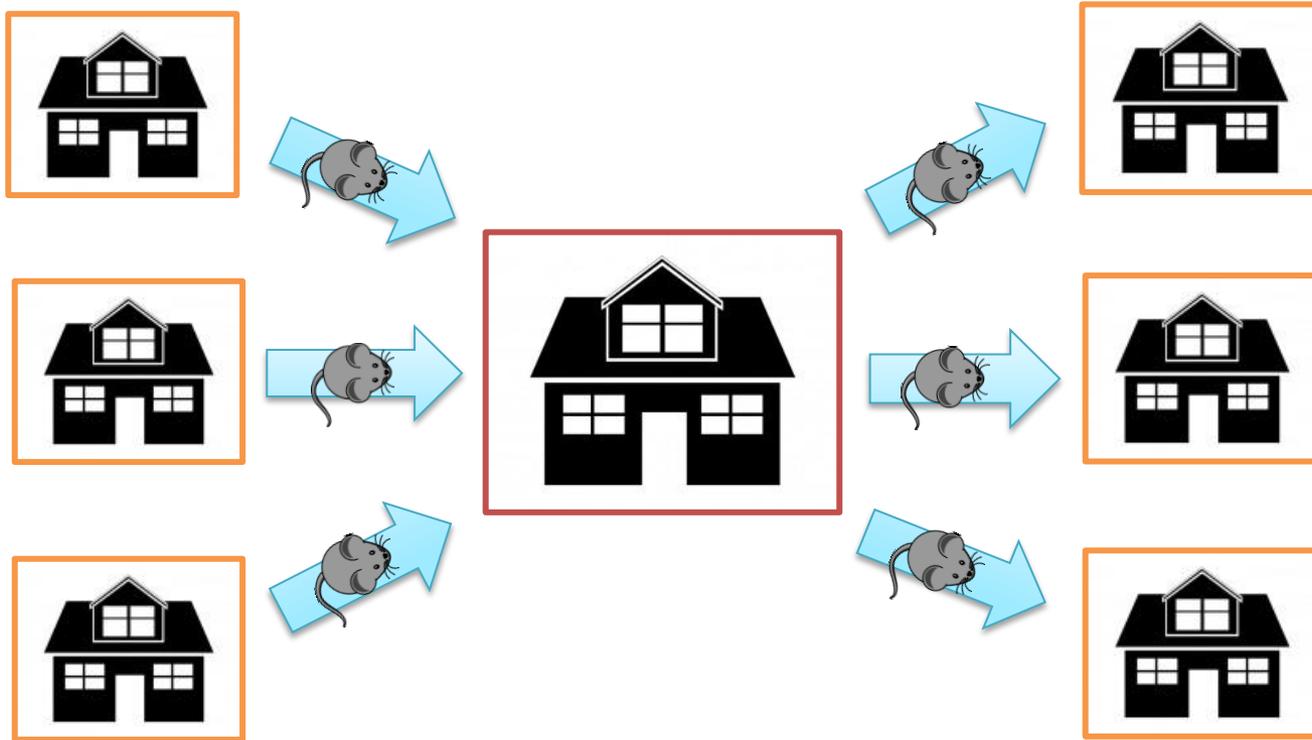
Tail vein sampling



Jugular vein sampling

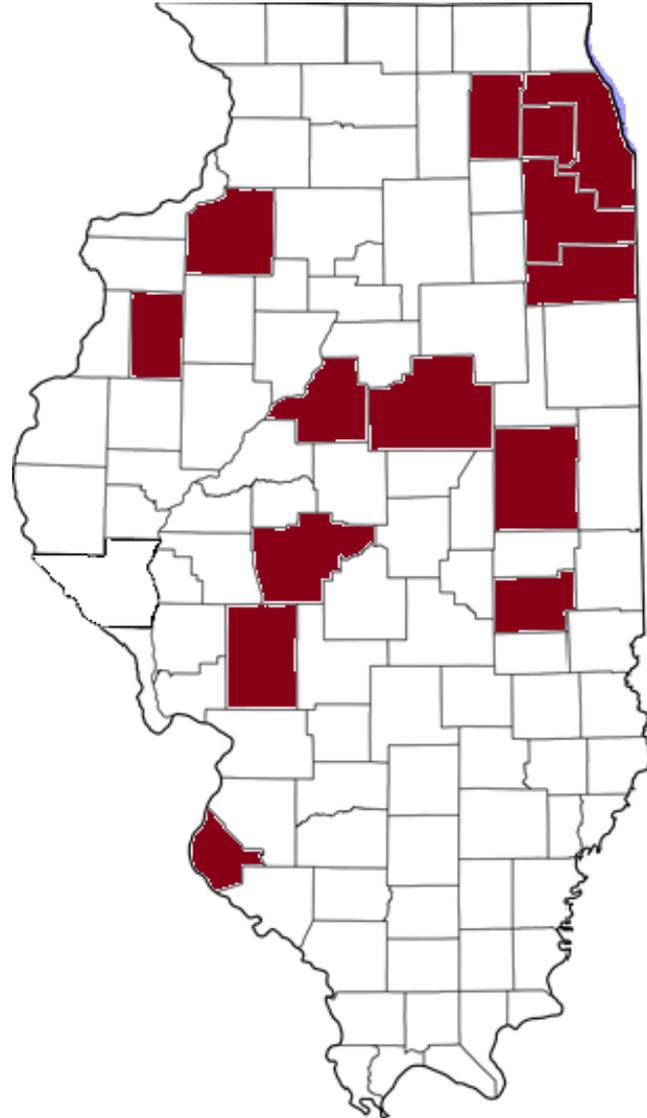


Seoul-ful Connections



The Seoul Train

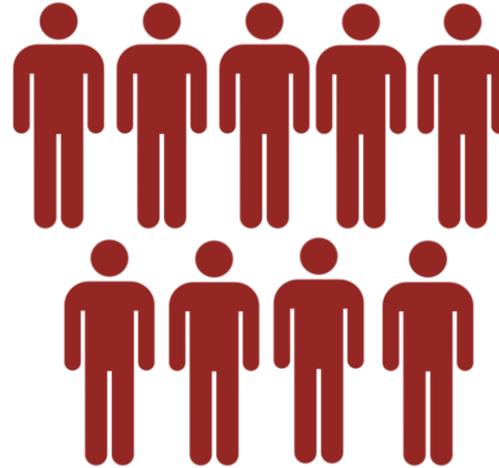
- Total tested:
 - 68 humans
 - 355 rats
- 70 suspected facilities identified
 - 13 states
 - Canada
 - 45 Illinois facilities



I Got Seoul

68

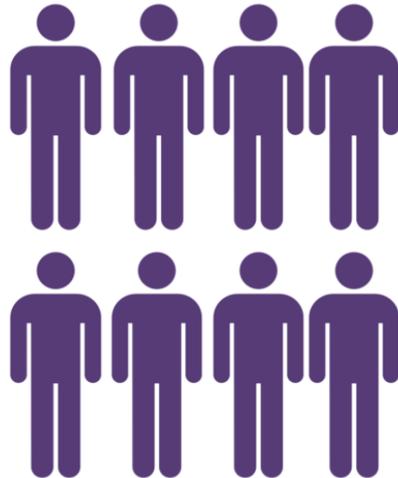
Human Blood
Samples Tested
in Illinois



Human
Samples
Positive
(n=9, 13%)



Rattery-
Associated
(n=8, 100%)



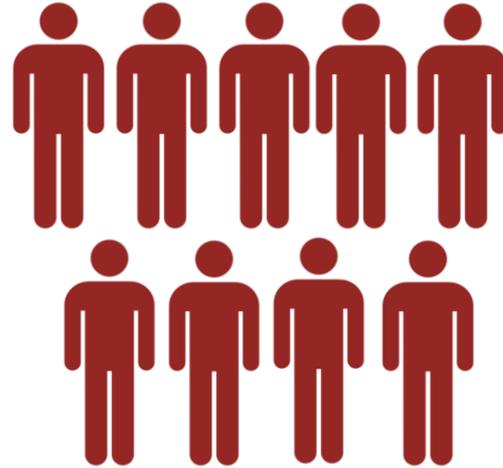
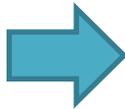
Pet Home-
Associated
(n=1, 2%)



I Got Seoul Too

68

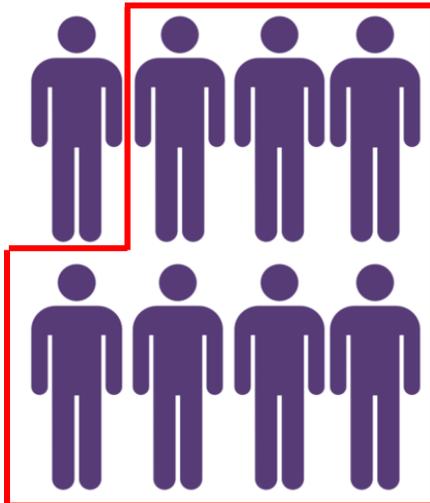
Human Blood
Samples Tested
in Illinois



Human
Samples
Positive
(n=9, 13%)



Rattery-
Associated
(n=8, 100%)



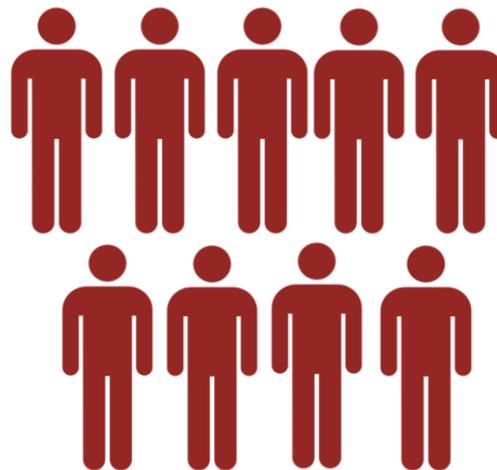
Pet Home-
Associated
(n=1, 2%)



Seoul Survivors

68

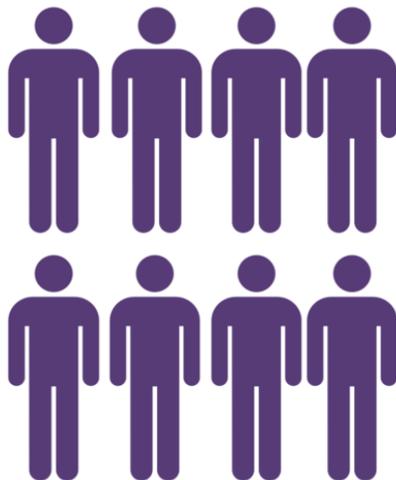
Human Blood
Samples Tested
in Illinois



Human
Samples
Positive
(n=9, 13%)



Rattery-
Associated
(n=8, 100%)



Pet Home-
Associated
(n=1, 2%)



A Rat's Tale

355 

Rat Blood Samples
and Cadavers Tested
in Illinois



115

(32%)

Rat
Samples
Positive

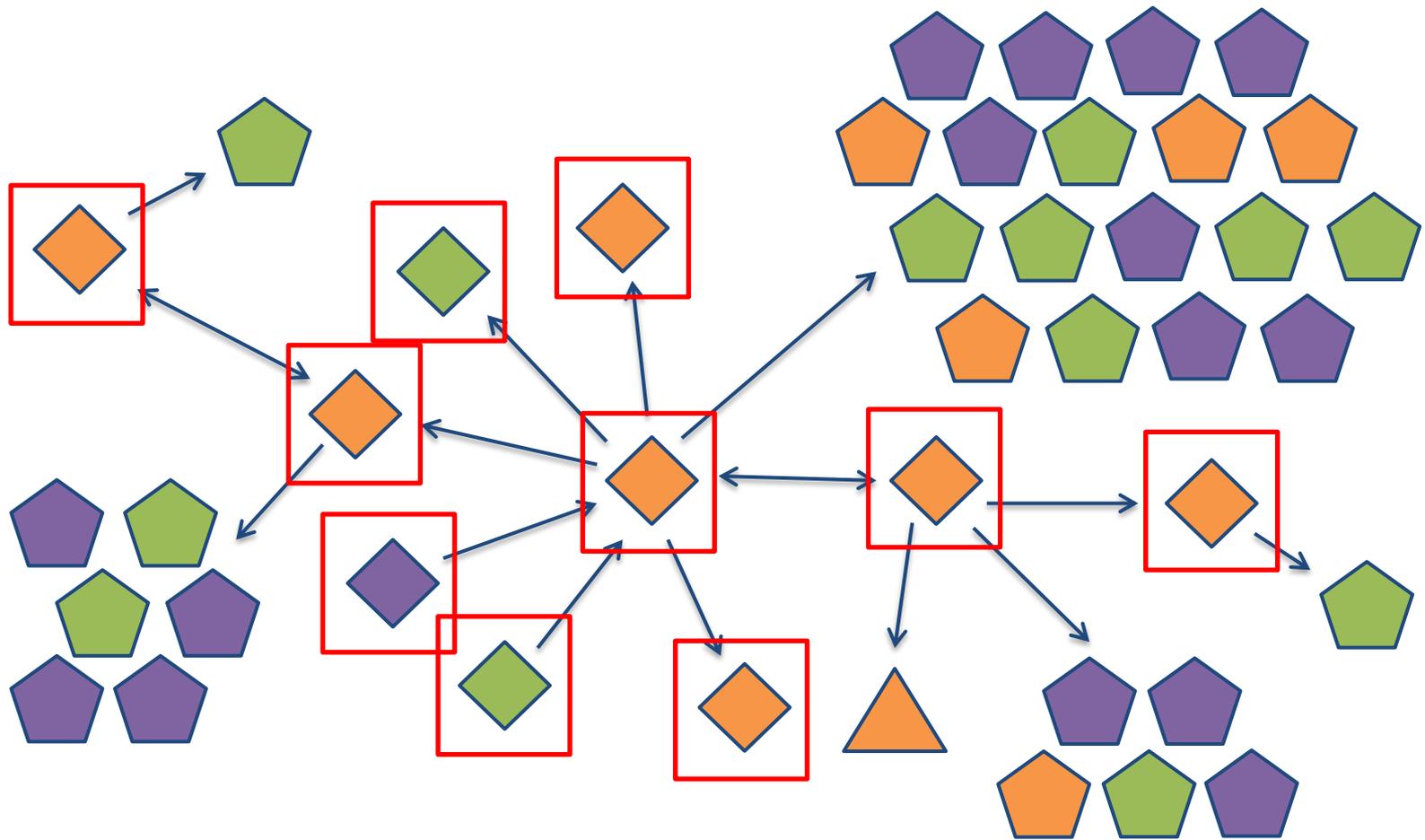


105

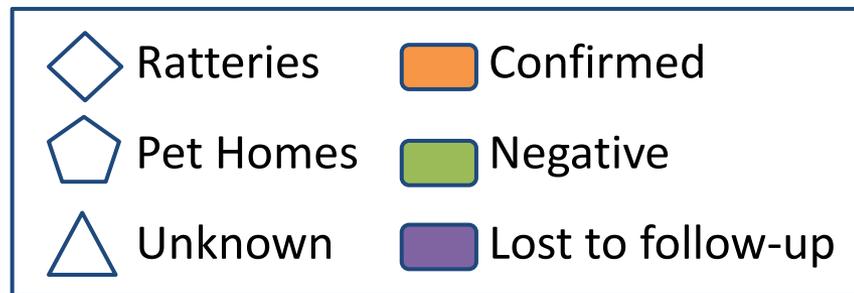
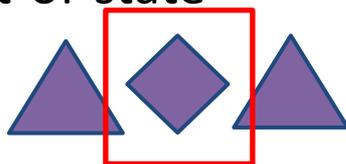
Rattery-
Associated
(40%)

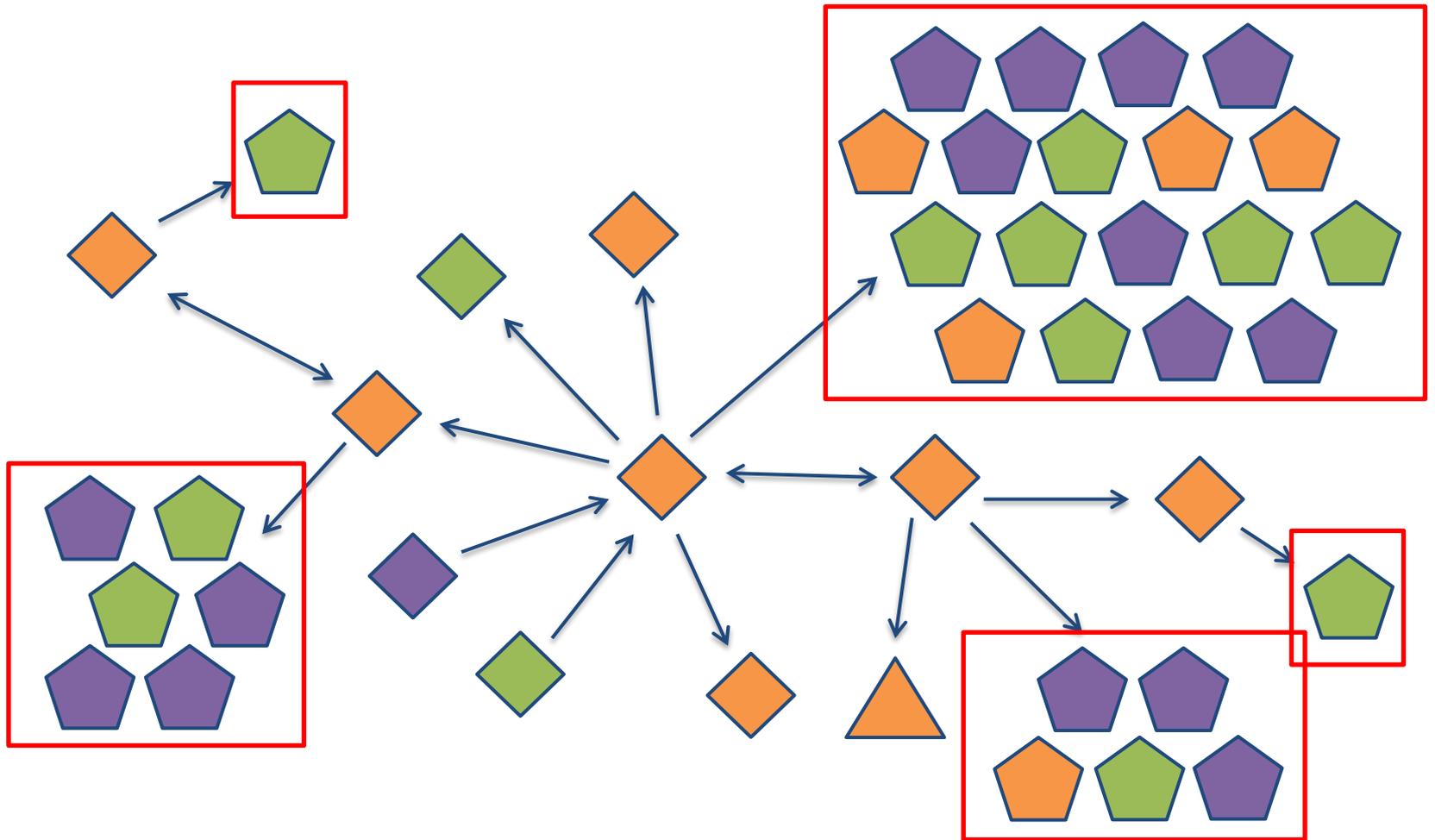
10

Pet Home-
Associated
(11%)



Implicated by out-of-state investigations

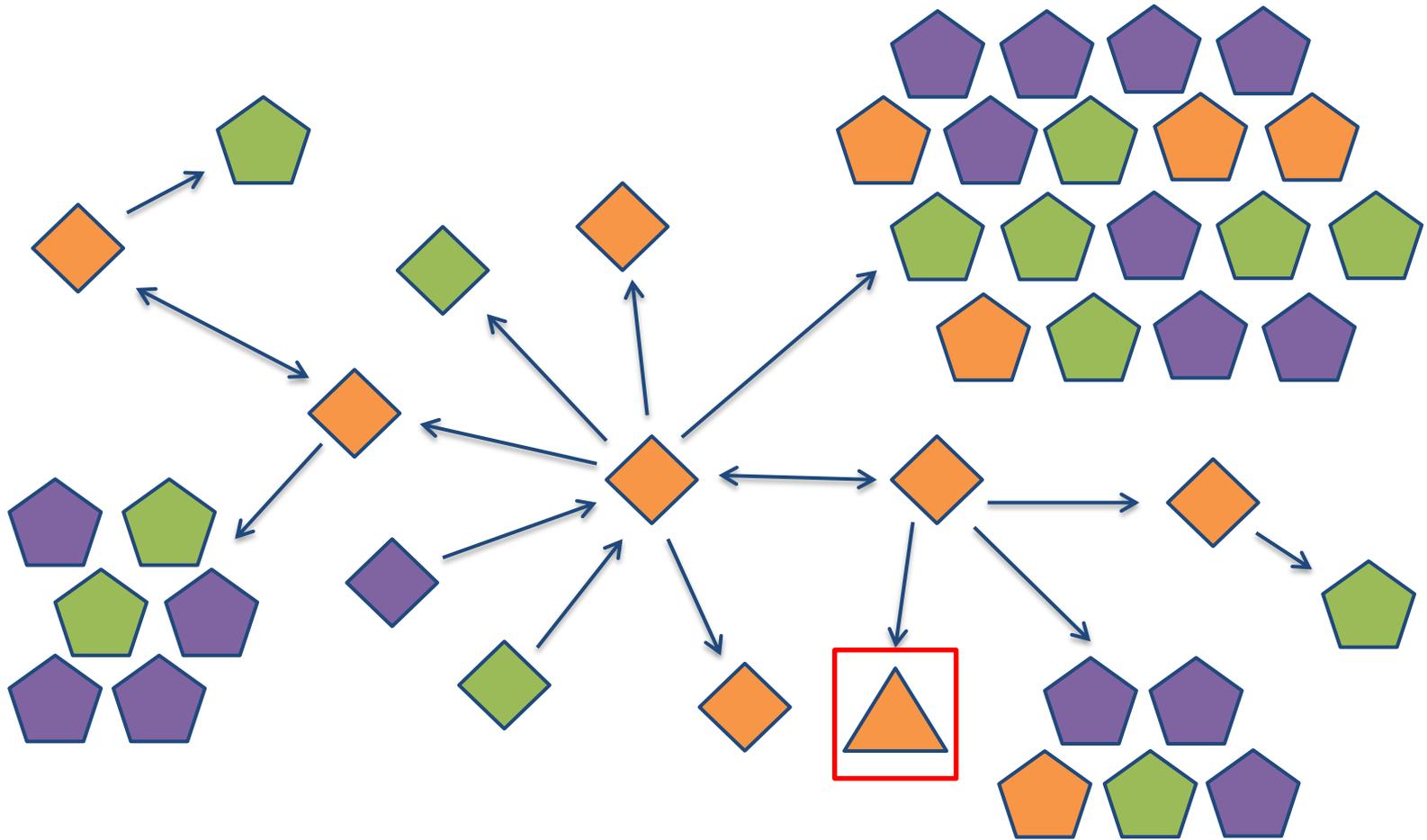




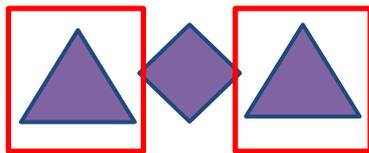
Implicated by out-of-state investigations



	Ratteries		Confirmed
	Pet Homes		Negative
	Unknown		Lost to follow-up



Implicated by out-of-state investigations



I Know You've Got Seoul

Distribution of facility characteristics by facility type

Facility Characteristic	Rattery (n=11)	Pet Home (n=31)
Confirmed status	7 (64%)	5 (16%)
Median number of rats	26	2
Had human contacts tested	6 (55%)	19 (61%)
Had rats tested	9 (82%)	16 (52%)
Median number of rats tested	26	2
Transferred rats out-of-state	5 (45%)	0
Median rat purchase date from confirmed facility	August 31, 2016	December 11, 2016

Oh My Seoul

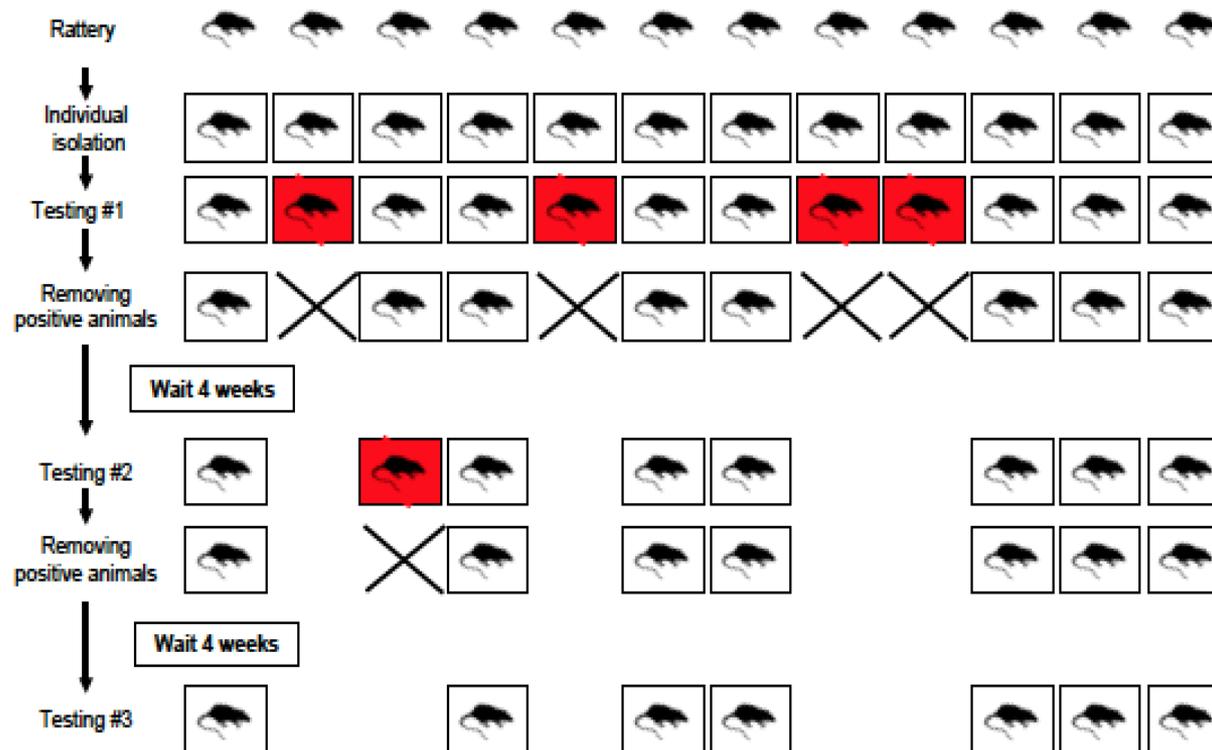
- Odds of being a confirmed facility were **8x greater** in ratteries than pet homes
- All other significant factors were also associated with being a rattery
 - Number of rats
 - Number of rat transfers in/out
 - Out-of-state transfers
- Rat purchase date was not associated with being a confirmed facility

Lost Seouls

- Initial Recommendation = Euthanasia
 - Depopulation of confirmed facilities
 - Repopulation allowed after thorough cleaning



TIMELINE



Animal permanently identified, isolated, no co-mingling, no show, no release, no introduction, no sale. Owners should use PPE, wash their hands between animal, no visitor touching the rats

Animal sampling scheme determined based on number of rats & comingling- each group should be separately sampled.

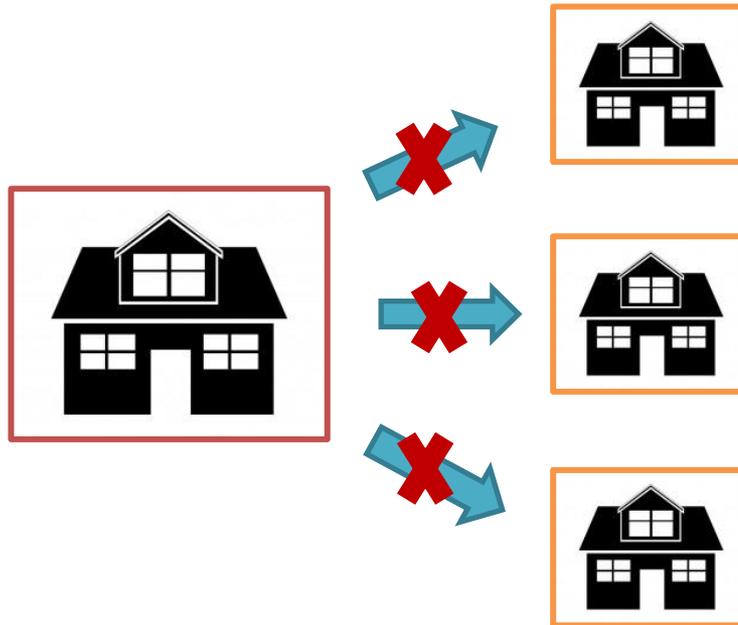
Rat blood or carcasses can be used for animal testing

Before new introduction, animals should be tested negative for Seoul virus, left in quarantine 4 weeks, retested and accepted only when negative results are obtained. If rat became positive during quarantine, it should be removed as soon as possible

 Seoul virus Ab & PCR negative  Seoul virus Ab &/or PCR positive

Don't Sell Your Seoul

- Euthanasia
- Test and Cull
- Quarantine
 - No rat movement
 - Minimal contact with people



Ain't Got No Seoul

1. Wash hands thoroughly with soap and water immediately after handling:
 - Rodents
 - Bedding
 - Caging
2. Cover breaks in the skin before handling
3. Clean and disinfect any bite/scratch wounds immediately
4. Supervise any children handling rodents
5. Do not kiss rodents
6. Clean rodent cages in a well-ventilated area
 - Use gloves and mask when available
 - Dampen bedding (with 10% bleach)
 - Let sit for 5 minutes
 - No sweeping or vacuuming



Seoul What?

- Human Seoul virus infections are very rare in the United States
 - 2017: 8 Illinois residents had evidence of recent infection
- By some estimates, nearly 500,000 households in the United States own pet rats
 - First time in the United States that pet rats have been implicated in Seoul virus transmission
- Confirmed facilities were more likely to be ratteries
 - In rattery environments, there may be an increased risk of Seoul virus infection

Wouldn't Tell a Seoul

- Highly connected via social media
 - Well-informed community
 - Misinformation spread quickly → fear & mistrust
- Reluctance to test
 - Human contacts
 - Belief that Seoul virus isn't a serious disease
 - Fear of confirming their facility
 - Rats within the facility
 - Fear of positive test
 - Need to depopulate



Body & Seoul

- Veterinary Community
 - Lack of knowledge of Seoul virus
 - Concern for bringing Seoul virus into the clinic
 - No established line of communication with public health
- Medical Community
 - Little experience with Seoul virus
 - Paperwork
 - Coordination with LHDs
 - Specimen transport



The Rat Race

- Larger number of facilities with pet rats and more rat transfers than expected
- Different resources among jurisdictions
 - Veterinary staff
 - PPE
 - Facilities
- Scheduling



Collaboration is Good for the Seoul

- Lessons Learned
 - Consistency
 - Collaboration
 - Lab animal
 - University
 - Local
 - State



You're My Seoul & Inspiration

IDPH

Connie Austin
Jennifer Layden
Shana Altman
Lori Saathoff
Gina Swehla
Judy Kauerauf
Joe Ramos

UI Vet Med

Julie Whittington
Jennifer Criley

Rat Puns

Linda Kerins (aka Mom)

Many LHDs in IL and WI

CDPH

Usha Samala
Allison Arwady
Sarah Kemble

WIDPH

Jim Kazmierczak
Sarah Koske
Suzanne Gibbons-
Burgener
Deby Weiss
Jordan Dieckman

Jennifer McQuiston

Annabelle de St. Maurice

Mary Choi

Trevor Shoemaker

Stuart Nichol

Elizabeth Ervin

John Klena

Pierre Rollin

Sarah Genzer

Anne Straily

Gregg Langham

Eddie Jackson

Cassandra Tansey

Seoul Long!



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