Amoxicillin Water Treatment for a Corynebacterium bovis Outbreak

It Takes a Team!

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What happened?

Following 7 years of effort, Corynebacterium bovis was eliminated from the CU Anschutz Medical Campus. Five months after our C. bovis surveillance program detected 3 cases of C. bovis positive immunodeficient mice. These were located in a housing room that had recently been sterilized using VHP. The room contained 27 mice. We selected amoxicillin treatment over decontamination for all immunodeficient mice considered infected. Immunocompetent mice were left untreated.

The goal of this poster is to demonstrate the teamwork needed to pull off a large scale and spontaneous prophylactic antibiotic treatment plan to contain a C. bovis outbreak. So, why did we treat exposed immunodeficient mice with antibiotics?

Corynebacterium bovis

Corynebacterium bovis is an opportunistic bacterial pathogen that infects the skin of immunodeficient mice. Immunocompetent mice are rarely impacted by C. bovis.

- C. bovis has a negative impact on cancer mouse models
- 55% (38/69) of NCI’s Cancer Centers have C. bovis infected mice
- 57% (28/50) of the top 50 NIH Funded academic institutions have C. bovis
- C. bovis is spread by equipment, supplies, and even frozen tumor tissue
- Infected mice create lots of bacteria that contaminate the vivarium environment
- C. bovis can survive on surfaces for >2.5 months
- Infected mice can look either normal, scaly, or very scruffy and sick

How much time did water bottle management take per week?

Did the number of cages on antibiotics impact the work hours per week?

How quickly did the 85 cages of C. bovis exposed immuno-deficient mice go away?

Antibiotics can be used to prevent C. bovis infections following exposure. Antibiotics cannot be used to cure mice already infected with C. bovis.

Making Amoxicillin Water

Generic Amoxicillin for Oral Suspension ($0.04/water bottle)

Cost and availability of a generic powder for oral suspension resulting in significant savings without sacrificing efficacy, against C. bovis for this outbreak.

Clavamox® (amoxicillin & clavulanic acid; $1.55/water bottle)

Historically the antibiotic of choice for the treatment of rodents by OLAR. Challenges with availability required reassessment. Concentration: ~0.375 mg/mL, or 75 mg/kg/day for a mouse.

Carboy

Carboy (4 gallon or 15 L). Add 75 mL of amoxicillin oral suspension (35 mg/mL) to 15 L of distilled water to get a final concentration of 0.25 mg/mL.

Bottle

Bottle (375 mL). Add 1 gram (~1 tea-spoon) of amoxicillin oral suspension powder to 375 mL of distilled water for a final concentration of 0.26 mg/mL.

Cage Wash

- Obtain and sanitize water bottles and carboys weekly for delivery

Carboys

Filling Carboys

Filling Lines = 375 mL

Chronics

Carboy Water Treatment for a Corynebacterium bovis Outbreak

Antibiotics can be used to prevent C. bovis infections following exposure. Antibiotics cannot be used to cure mice already infected with C. bovis.

C. bovis colonies are on a 5% sheep blood agar plate after 72 hr.

Athymic nude mice naturally infected with C. bovis at CU Anschutz campus.

Valve removed

Moving Lots of Water and Water Bottles

- Water is heavy: 1 gal = 3.83 lbs
- Using 8 gal / week = 30 lbs
- Sterile, empty bottles provide in sanitized trash can
- Expired bottles with remaining antibiotic water were put into trash cans to roll to cage wash

Summary and The Future

- It worked at containing the outbreak!
- No animal deaths due to dehydration or amoxicillin water complications
- Prophylactic amoxicillin and environmental decontamination were 100% effective at preventing infection spread
- Time requirements: average of 8.3 hr/wk by the end of the project, 4.5 min/bottle for 2 staff members that were efficient at the task
- After 53 weeks, the last case of immunodeficient mouse exposed to C. bovis and on antibiotics was euthanized.

Medicated Water Positives

- It is effective and can be rapidly implemented within ~1 wk of lead time
- Ordering special manufactured amoxicillin food will take ~5 weeks of lead time which will include novel order delay, manufacturing, and shipping
- Amoxicillin water has less upfront costs than medicated feed

Medicated Water Negatives

- Time and labor intensive, significant coordination with the team, potential for human error resulting in animal death

Overall, the amoxicillin water project was effective and efficient and can be used in future C. bovis outbreaks for quick containment, and medicated feed should be considered based on the size of the outbreak. The source of C. bovis was traced back to new arrival, vendor-sourced immunodeficient mice.

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