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Forensic Analytical Consulting Services

Biologics: Cannabis Processing and Mold
The Challenges of Identifying the Source(s) of Mold Contamination in a Cannabis Processing Facility

Presented by:

Jonathan Curtis

CIHC 2019
San Francisco, California – December 6, 2019

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CCR Title 16 Division 42 § 5270

- In California, the Bureau of Cannabis Control has prohibits the presence of particular pathogenic Aspergillus species in inhalable cannabis goods.

  - A. fumigatus
  - A. flavus
  - A. niger
  - A. terreus

BUREAU OF CANNABIS CONTROL
TEXT OF REGULATIONS

CALIFORNIA CODE OF REGULATIONS
TITLE 16
DIVISION 42. BUREAU OF CANNABIS CONTROL

(c) A laboratory is also required to test for the pathogenic Aspergillus species A. fumigatus, A. flavus, A. niger, and A. terreus in all medical cannabis goods intended for consumption by inhalation, including but not limited to dried flower, kief, hashish, oil, and waxes.

(1) For the purposes of pathogenic Aspergillus-species testing, the laboratory shall report that the sample "passed" if the concentrations of the following Aspergillus species are not detected:

(A) Aspergillus fumigatus: not detected in 1 gram;

(B) Aspergillus flavus: not detected in 1 gram;

(2) If a pathogenic Aspergillus species is detected in a sample under (c)(1), the sample fails microbiological-impurity testing, and the batch fails laboratory testing and may not be released for sale. The laboratory shall report the results in the certificate of analysis. (d) The laboratory may test for and provide test results for

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Aspergillus sp. are ubiquitous

- Commonly found both indoors and outdoors
- Who is responsible when Aspergillus sp. are found during testing?
- Potentially multiple people/companies involved in the growth, transport, and processing chain.
- Role of the building?

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Cannabis processor was concerned about their new facilities

- Processor was concerned about the presence of the four pathogenic Aspergillus sp. identified by the regulation.

- Requested assessments for three processing facilities in Northern California for building-related water damage and mold growth.

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Methods

- Used a combination of methods to inspect the buildings. Components of the inspection included:
  - Visual inspection
  - Interviews
  - Thermographic imagery
  - Handheld moisture meters
  - Collecting air samples for analysis by non-viable and qPCR methods.

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Challenges found

- Found an established industry trying to build the infrastructure for the new market while learning to operate under new laws and regulations.

- The old methods of processing cannabis flower were creating new challenges at larger scales.
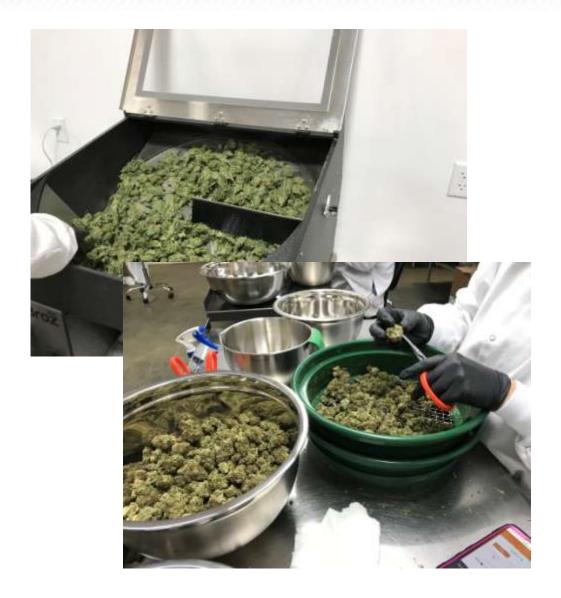
Cannabis plants

- Deliveries of cannabis with visible mold growth is not uncommon.

- Employees pull out and segregate visibly moldy flower during screening and trimming for disposal or re-use in other non-inhalable products.

- What about what the screeners can't see?

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Processes

- Trimming was performed by hand and/or machine.

- Mechanical trimming of cannabis after being screened for mold still produced potential exposures to more than 200,000 spores per cubic meter.

- All types of spores observed were known plant pathogens, but the samples were overloaded potentially hiding smaller spores, such as Aspergillus sp.

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Location	Processsing / Trimming - north, middle of trimmers				Processsing / Trimming - south, middle of trimmers (during mechanical trim)				Processsing / Trimming - south, SE of trimmers			
Sample Date	01/09/19				01/09/19				u01/09/19			
Volume	75.0 L				75.0 L				75.0 L			
Organism	Spores[+]	%	LOD	S/m³	Spores[+]	%	LOD	S/m³	Spores[+]	%	LOD	S/m³
Alternaria	ND	-	-	ND	30	0.2	13	400	ND	-	-	ND
Ascospores	6	1.8	32	190	78	1	32	2,500	9	3.3	32	290
Basidiospores	12	3.6	32	380	14	0.2	32	440	4	1.5	32	130
Chaetomium	ND	-	-	ND	ND	-	-	ND	ND	-	-	ND
Cladosporium	312	94.3	32	9,900	559	88.7	380	210,000	258	95	32	8,200
Curvularia	ND	-	-	ND	ND	-	-	ND	ND	-	-	ND
Oidium	ND	-	-	ND	1736	9.6	13	23,000	ND	-	-	ND
Rusts/smuts/myxomycetes	2	0.3	13	27	58	0.3	13	770	ND	-	-	ND
Stachybotrys	ND	-	-	ND	ND	-	-	ND	ND	-	-	ND
Ulocladium	ND	-	-	ND	ND	-	-	ND	1	0.2	13	13
Total	332			11,000	2,475			240,000	272			8,600
Particulate Density	Abundant				Overloaded				Major			
Particles	Number		LOD	P/m3	Number		LOD	P/m3	Number		LOD	P/m3
HYPHAL FRAGMENTS *	1	-	32	32	32	-	32	1,000	1	-	32	32
Comments					Sample overloaded. Actual concentrations may be higher than reported concentrations.							

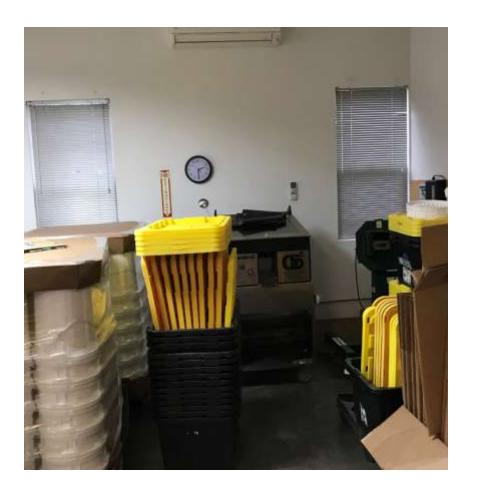Right People. Right Perspective. Right Now.

Facilities

- The facilities were old and new.

- No fresh air actively introduced to work areas.

- Temperature was controlled by wall-mounted re-circulating heating and cooling units.

- One facility attempted to supplement the local exhaust with an air purifier.

- Some facilities had dedicated exhaust that was underpowered and overloaded.

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Equipment

- Potentially contaminated equipment not contained.

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Findings of the Inspections

- Aspergillus was found in three locations between two buildings (Confirmed by qPCR). None in the processing areas.

- Utilizing pressured environments, local exhaust, and updated HVAC systems with fresh air would assist in controlling worker and environmental exposure to airborne mold spores.

Future Considerations?

- Potential impact Colorado's testing standards on the California cannabis industry. (Total Yeasts and Mold Count [TYMC])

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Thank You

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Today's Agenda

Background & History

Current Regulations

Challenges in *Legionella* Management

Value of the IH
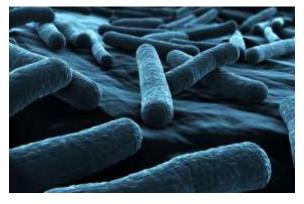
Further Resources

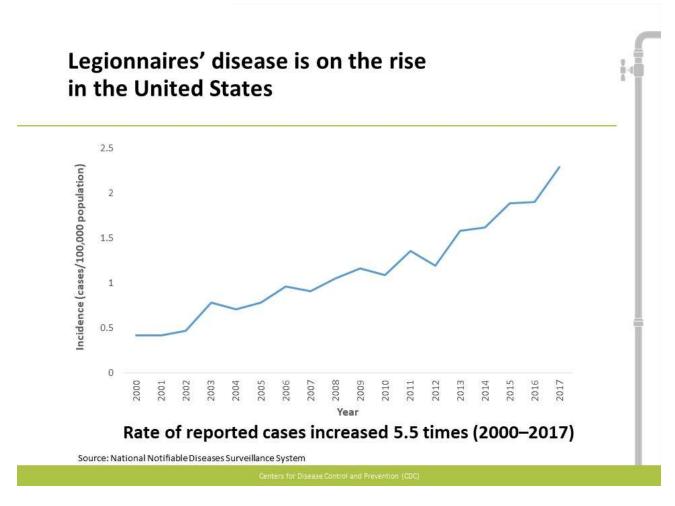**Right** People.   **Right** Perspective.   **Right** Now.

Legionella Basics

- First known outbreak in 1976

- Waterborne pathogen.

- Exposure: mists and aerosols, aspiration

- Legionnaire's Disease (pneumonia)

- Pontiac Fever (not an infection)

- 1-2% of all pneumonia cases

- Community acquired Legionnaire's Disease has ~10% mortality rate

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Legionnaires' disease is on the rise in the United States

Rate of reported cases increased 5.5 times (2000–2017)

Source: National Notifiable Diseases Surveillance System

Centers for Disease Control and Prevention (CDC)

CDC Legionella Website For Media Page December 5, 2019
https://www.cdc.gov/legionella/images/national-incidence.jpg

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General Risk Conditions

- Unstable/fluctuating/stratified temperature

- Inadequate or no disinfectant

- Lack of flow, water stagnation, dead-legs

- Scale, sediment, lack of maintenance

- Presence of biofilm

- Changes in water pressure, chemistry

- Water conservation measures

- Occupant or public exposure to aerosols
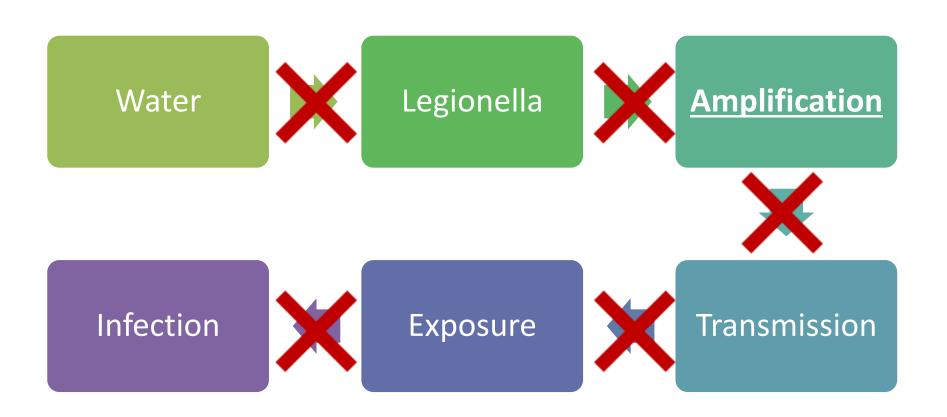
- At-risk populations exposed

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US Regulations

- No *Legionella*-Specific National Regulations

  - OSHA General Duty Clause

- CMS Memo Mandates Water Management Plans for Health Care Facilities

  - References ASHRAE-188 Standard & CDC Toolkit

- New York State & NYC - 2015 Regulations on broad categories of sites

- Allegheny County PA – Guidelines for infection prevention

- New Orleans – Requires CT Management Plan

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Managing Legionella Risk

- Risk Assessment
- Water Management Team
- Water Management Plans

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Technical Challenges

- Testing for *Legionella*
  - What do we test?
  - When do we test?
  - How do we interpret the results?
- Finding Qualified Laboratories
  - CDC Elite Certification
  - PCR Methods
- Treatment and Control Strategies
  - What methods are effective?
  - What vendors are qualified?

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Risk Management Challenges

- Identifying points of risk
  - Domestic plumbing?
  - Industrial processes?
  - Aerosol generating systems?

- Plan implementation challenges
  - Flushing programs?
  - Equipment upgrades?
  - Installation of treatment systems?

- Validation and verification
  - How do I know my plan is working?
  - How can I defend my facility from liability?

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Value of the IH Profession

- Known as technical experts
  - Can collect & interpret samples, provide data
- IH professionals can integrate data across disciplines & departments
  - Help IP speak engineering & vice versa
- Massive quantities of data to synthesize. IHs can interpret this data into a picture of building health & actionable items.
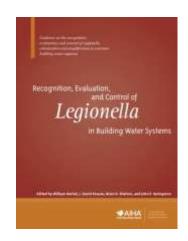
Generalist Expert

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Additional Resources

- CDC Developing a Water Management Plan Toolkit

- AIHA Guidance on Legionella
  - Non-regulatory, best practice
  - Practical guidance for risk assessment, sampling, remediation, and management

- ASHRAE 188-2018 Standard
- Reach out to local regulators, suppliers
- Collaborate across disciplines
- PDC at AIHCE – Practical Applications in Water Management

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Valley Fever Check-In

Presented by:

Ben Kollmeyer, MPH, CIH

12/6/19 (CIHC, San Francisco, CA)

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The Plan

- What is it?   *Valley Fever 101*
- What's new?   *AB 203*
- Where to worry?   *Epidemiology/habitat*
- What to do?   *Control measures*
- What else?   *Liability considerations*

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Valley Fever Basics
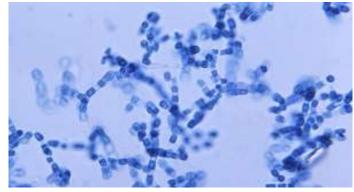
- ## The Illness:
  - Coccidioidomycosis (Valley Fever)

- ## The Agent:
  - *Coccidioides immitis* (CA)
  - *Coccidioides posadasii*
  - Grows in soil 2-3 inches to 1 foot down

- ## The History:
  - First case 1893 (Argentina)
  - Linked to San Joaquin Valley Fever in 1935

(Image: Centers for Disease Control)

September, 1937   VALLEY FEVER

ORIGINAL ARTICLES
___
"VALLEY FEVER" OF THE SAN JOAQUIN
VALLEY AND FUNGUS COCCIDIOIDES*

By ERNEST C. DICKSON, M.D.
San Francisco

(California and Western Medicine)

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Medical Aspects

- Infectious dose
  - 1-10 spores?
- Onset
  - 1 to 3 or 4 weeks after exposure
- Symptoms
  - Flu-like most common (fever, tiredness, aches, cough, chest pain, headaches, night sweats)
- Increased Risk
  - Age >60, pregnant, immune compromised, race (African American, Filipino, Hispanic)

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Disease Outcomes

- 60% = asymptomatic/mild flu-like
- 40% = more severe
- 30-35% = pneumonia-like
- 5-10% = chronic pulmonary issues
- 5% = skin rashes
- 3-4% = illness recurs (others = immunity)
- <1-5% = dissemination (other organs)

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What's New? AB 203

- Applies to:
    - "Construction employees"
    - Work in high incidence counties (11 listed & >20/100k)
    - "Where work activities disturb the soil, including, but not limited to, digging, grading, or other earth moving operations, or vehicle operation on dirt roads, or high winds"
    - Anticipated exposure to "substantial dust disturbance" (visible, for 1+ hours per day)
- Must (by 5/1/20):
    - Provide Valley Fever awareness training
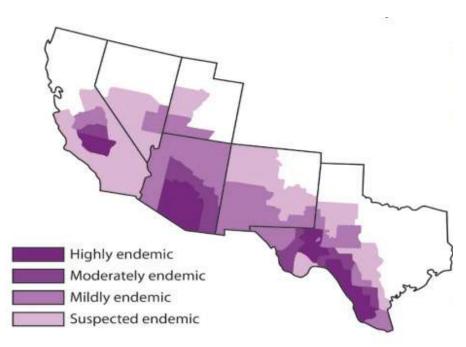   - Before work is done and annually

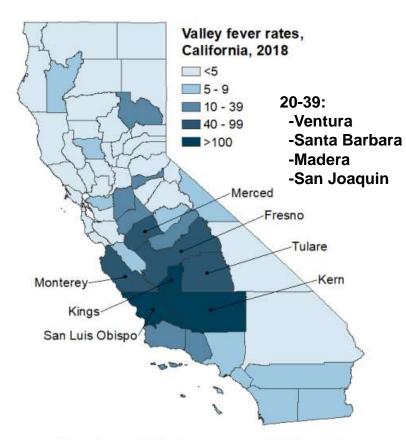**Right** People. **Right** Perspective. **Right** Now.

AB 203 Considerations

- Who to train & protect?
  - "Construction workers"…or all dust exposed?

- Determining "substantial dust disturbance"
  - Risk of non-visible & less than 1 hour exposures

- What locations to apply it?
  - Changing incidence rates & intra-county variability
  - Implications outside CA (southwest)

- What to do?
  - AB 203 says training…but training talks about control measures

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Where to Worry?

(Image: Centers for Disease Control)

Highly endemic
Moderately endemic
Mildly endemic
Suspected endemic

Valley fever rates, California, 2018

<5
5 - 9
10 - 39
40 - 99
>100

20-39:
-Ventura
-Santa Barbara
-Madera
-San Joaquin

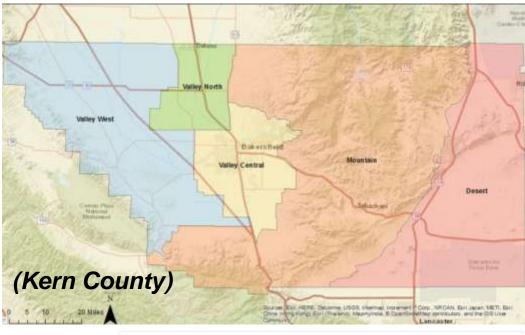Merced
Fresno
Tulare
Kern
Monterey
Kings
San Luis Obispo

Rates of reported Valley fever cases per 100,000 population.
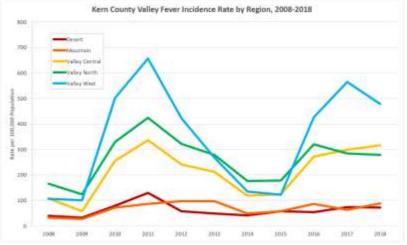Darkest colored counties had the highest rates of Valley fever.

(Image: CA Department of Public Health)

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Intra-County

(Kern County)

2017: 54.5

(L.A. County)

Location Risk Factors

- Land Use
  - Favorable = natural/native, undisturbed
  - Less favorable = urbanized, cultivated, disturbed
- Soil Type
  - Sandy loam common to outbreak sites
- Other Characteristics
  - Rodent burrows, Native American middens, arroyos
- History
  - Prior cases?

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What to Do?

- Cal/OSHA & CDPH (HESIS) Guidance
  - Reduce dust (e.g., wetting, tarping, stabilizers)
  - No work during heavy winds
  - HEPA filtered cabs on earth moving vehicles
  - Respirators (PAPR if its there…Das, 2012)
  - Reduce take-home dust (e.g., washing, changing)
  - Early reporting, healthcare provider awareness
- Other Suggested
  - Screening at risk-workers (e.g., race, medical, immunity)
  - Car travel…windows up and on recirc.
  - Indoor air filtration

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What to Else?

- Litigation
  - Claims against employers
  - Claims against land owners (warning/disclosure)
  - Claims against entities creating dust
  - Claims against prisons (duty to prisoners)

- Issues
  - Where did it come from?
  - What should have been done to control it?
  - Could it have been prevented?

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Thank You!

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