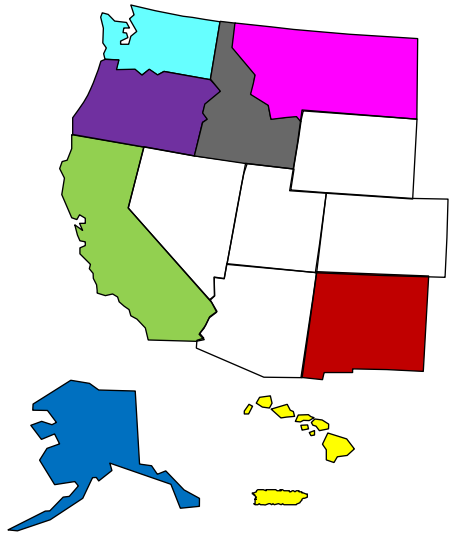
A New and Improved Surveillance System

"*Cryptococcus gattii* Pacific Northwest"



Emilio DeBess, DVM MPH
Oregon Health Authority

毒奶粉事件
虹膜与健康
传染病防治

今天指出，一种可能致命的霉菌株，正在美国西北部和加拿大卑诗省（British Columbia）人畜

Toxic Airborne Fungus From Oregon Spreading Across West Coast - Science - io9 - Microsoft Internet Explorer

Address http://io9.com/5520282/toxic-airborne-fungus-from-oregon-spr

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io9 WE COME FROM THE FUTURE

FAQ. Include # before tag:
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Toxic Airborne Fungus From Oregon Spreading Across West Coast

By Annalee Newitz

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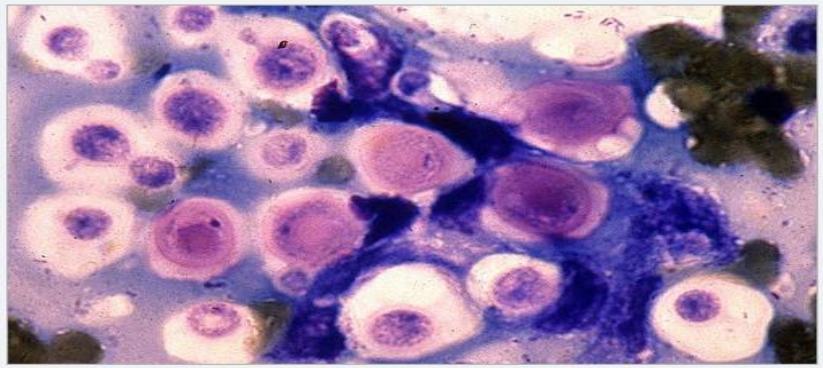
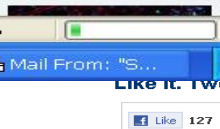
Apr 22, 2010 02:00 PM 72,856 216



Cryptococcus gattii is an airborne fungus usually found in the tropics. But researchers announced today that new, deadly strains are thriving in Oregon, and spreading. These strains kill 25% of people who come into contact with them.

more about #science

What Happens When Black Holes Combine?



The Secrets Of

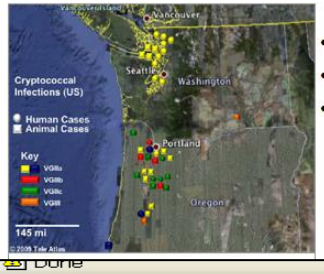
Opening page http://www.facebook.com/extern/login_status.php?api_key=d2d5292fb0eccf0dabe2f3817492525d&extern=0&channel=http%3A%

Internet

OREGON FUNGUS SPREADING SOUTH

A virulent, airborne fungus that infects both humans and animals is spr

By Larry O'Hanlon
Thu Apr 22, 2010 05:00 PM ET
7 Comments | Leave a Comment



THE GIST:

- Dogs, cats, humans and
- infected with a new strai
- So far very few people h
- fungus is evolving quickl
- The disease is treatable,
- veterinarians need to kn

A new extra virulent strain
infects humans and animal
Oregon -- and it is spreadi

Airborne
gattii can
April 26, 1:53 PM

Done

State of Orego... | Toxic Airborne... | C:\Documents... | Microsoft Pow... | Mail From: "S...

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Dr. Timothy Johnson on diet, fitness, sleep and more

Home » Health » ABC News OnCall+ Wellness Center

Fatal Fungus Cryptococcus Gattii: Experts Say Fears Overblown

Deadly Airborne Fungi Poses Rare Threat

By COURTNEY HUTCHISON

ABC NEWS

Apr. 23, 2010

31 comments

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It sounds like a plot straight out of a science fiction movie: A new strain of a deadly airborne fungusin Oregon is set to spread to California.

But there's no need to sound the alarm, doctors say.

The new strain of the well-known Cryptococcus gattii fungus is "worrisome"

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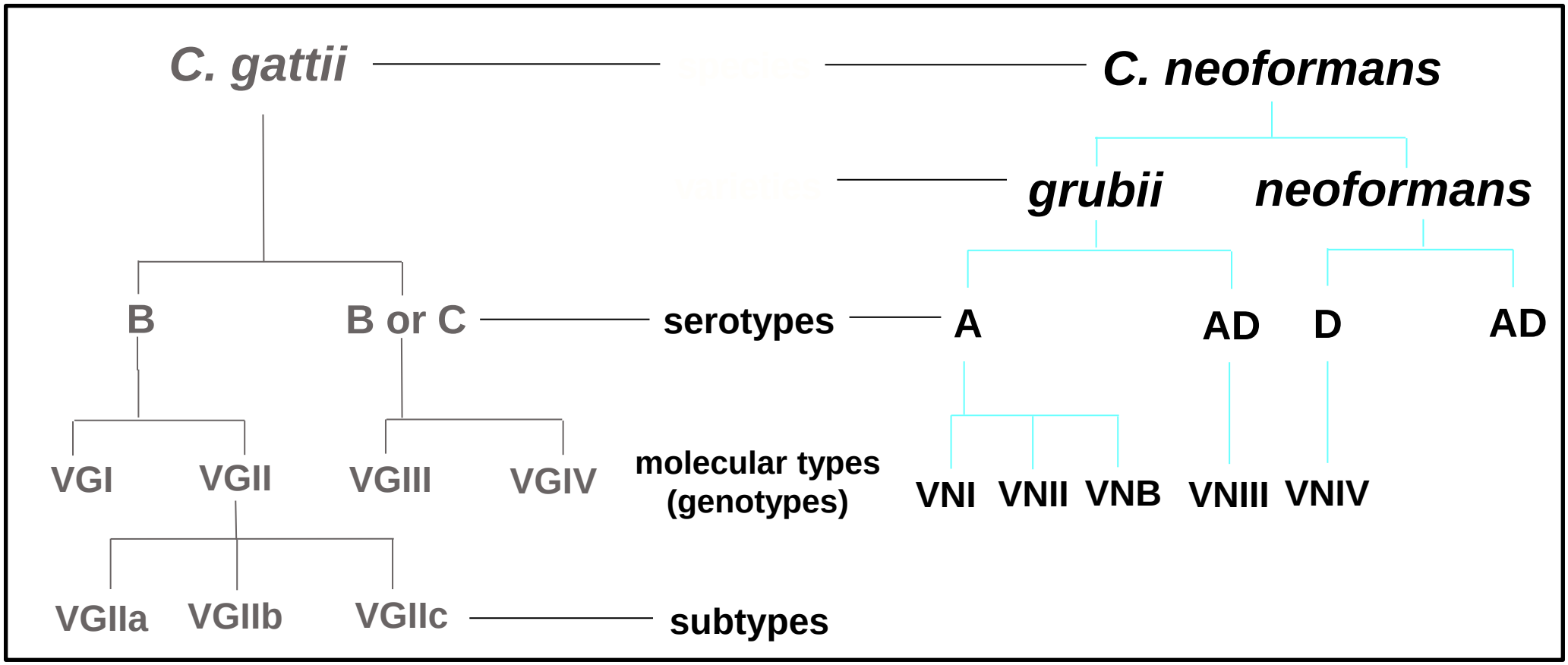
Internet

start | Novell GroupWise ... | State of Oregon: ... | Fatal Cryptococcu...

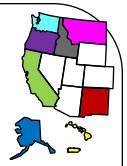
5:12 PM

Background

- ***Crypto* + *coccus* = 'Hidden Sphere'**
  - Two (*C. gattii* and *C. neoformans*) infect humans and animals



C. neoformans vs. *C. gattii*



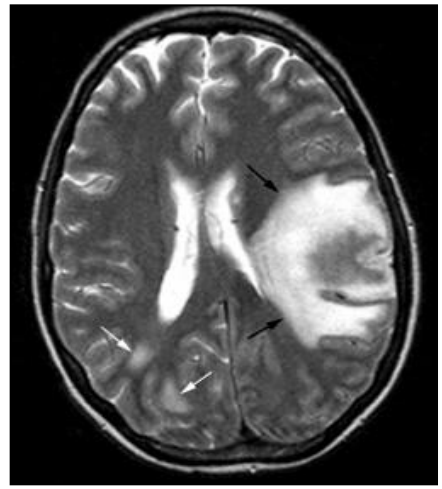
	C. neoformans	*C. gattii*
Distribution	• Ubiquitous, global, associated with pigeon guano-contaminated soil	• Until recently, only tropical and subtropical areas, associated with eucalyptus trees
Patients infected	• Severely immunocompromised (HIV, organ transplant) • In post-AIDS era, infections in immunocompetent are rare	• Endemic Australia and Papua New Guinea, other areas: Nearly all immunocompetent • BC, US Pacific Northwest: Mostly HIV-uninfected but many immunocompromised
Diagnosis	• Typically, Cryptococcal antigen test or India Ink	• Typically, Cryptococcal antigen test, India Ink • Distinction from *C. neoformans* requires plating on special media
Clinical course	• Usually presents as meningitis • Cryptococcomas (fungal growths in brain, lungs, muscle) are infrequent	• Presentation (meningitis vs pneumonia) appears to depend on strain, location, patient immune status • Cryptococcomas are common
Treatment	• If non-CNS: oral fluconazole • If CNS: IV amphotericin + flucytosine, 2 weeks; fluconazole, 6+ months	• IV amphotericin + flucytosine, 2+ months; fluconazole, 6+ months • May require brain or lung resections, shunts to drain CSF

Infection and pathogenesis of C. gattii

- **Inhalation of spores from environment (trees, organic matter, soil around trees)**
  - **Colonization of nasal cavity, sinuses**
  - **Incubation period ~6 mos (2-13 mos)**
- **Symptoms and clinical findings**
  - **Cough, dyspnea, chest pain, fever, headache, night sweats**
  - **Meningitis, pneumonia**
  - **Cryptococcomas (brain, lungs)**
- **Not transmissible between mammals**

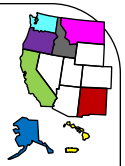
Brain cryptococcoma

Lung cryptococcoma



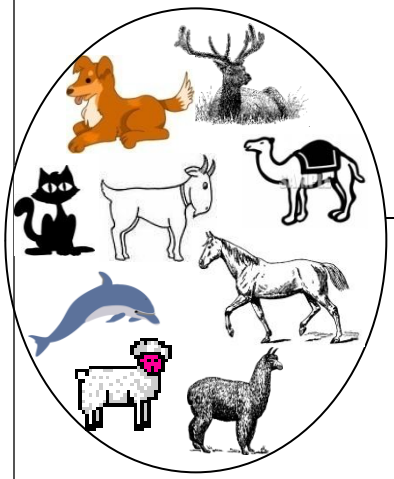
http://www.urmc.rochester.edu/smd/Rad/neurocases/MAY01/Fig1.jpg

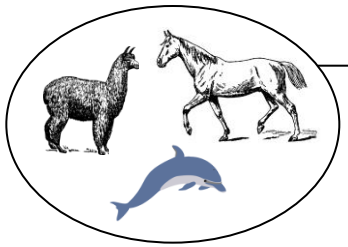
Distribution of C. gattii infections

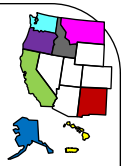


Before 1999	• Australia • Papua New Guinea • Southeast Asia • India • South and Central America • Southern California • Mostly type VGI, VGIII
1999-2003	• Began appearing in humans, animals in Vancouver Island and mainland BC, Canada • Also among persons who traveled to Vancouver Island • Mostly type VGIIa, some VGIIb
2004-2010	• Ongoing infections in BC • Humans and animals, mostly in Washington and Oregon, infected • Mostly type VGIIa and VGIIc, some VGIIb

C. gattii, US, 2004-2010







16

45

*

2

2

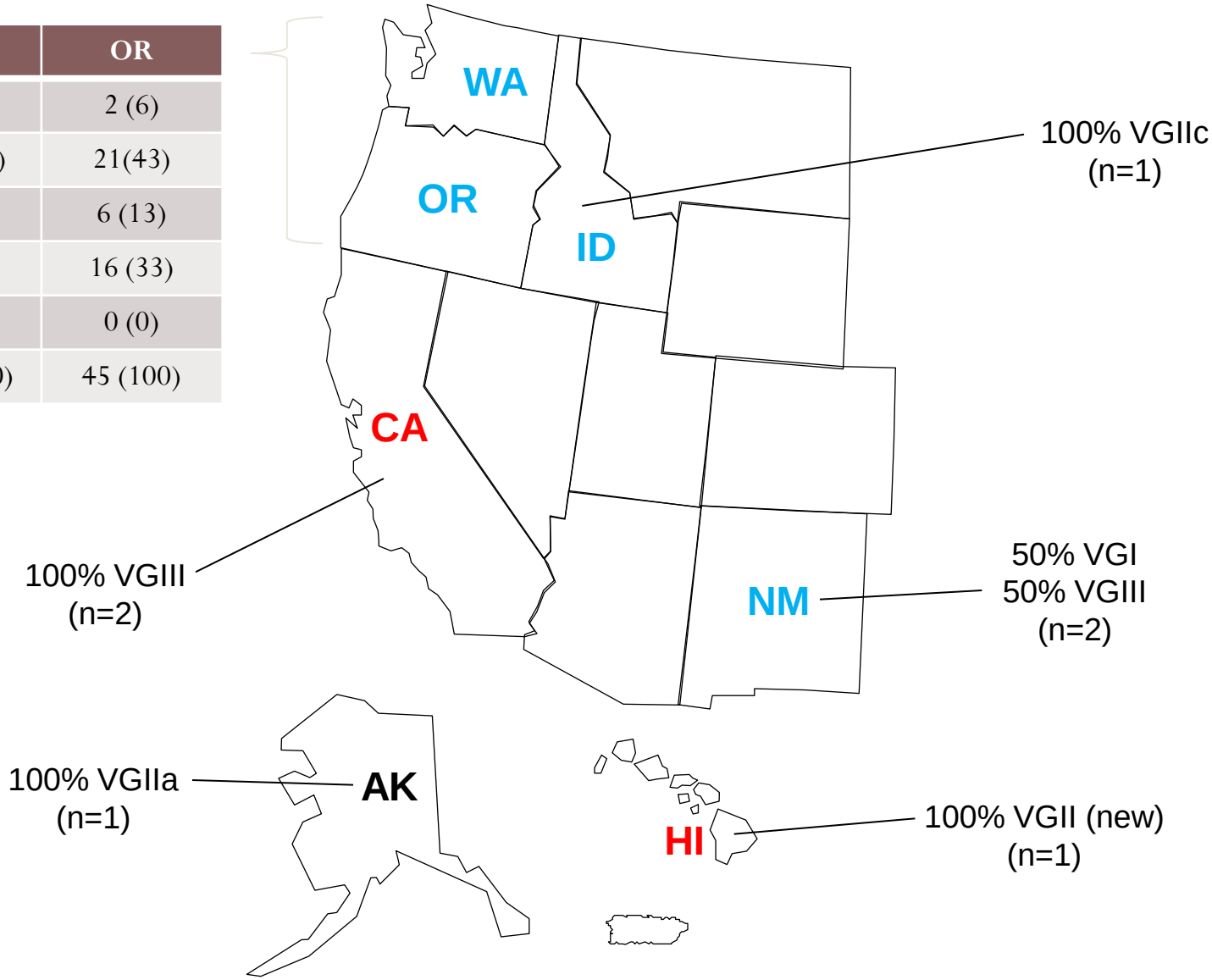
*

*Likely travel-associated (USPNW)

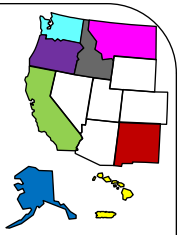
Positive environmental samples

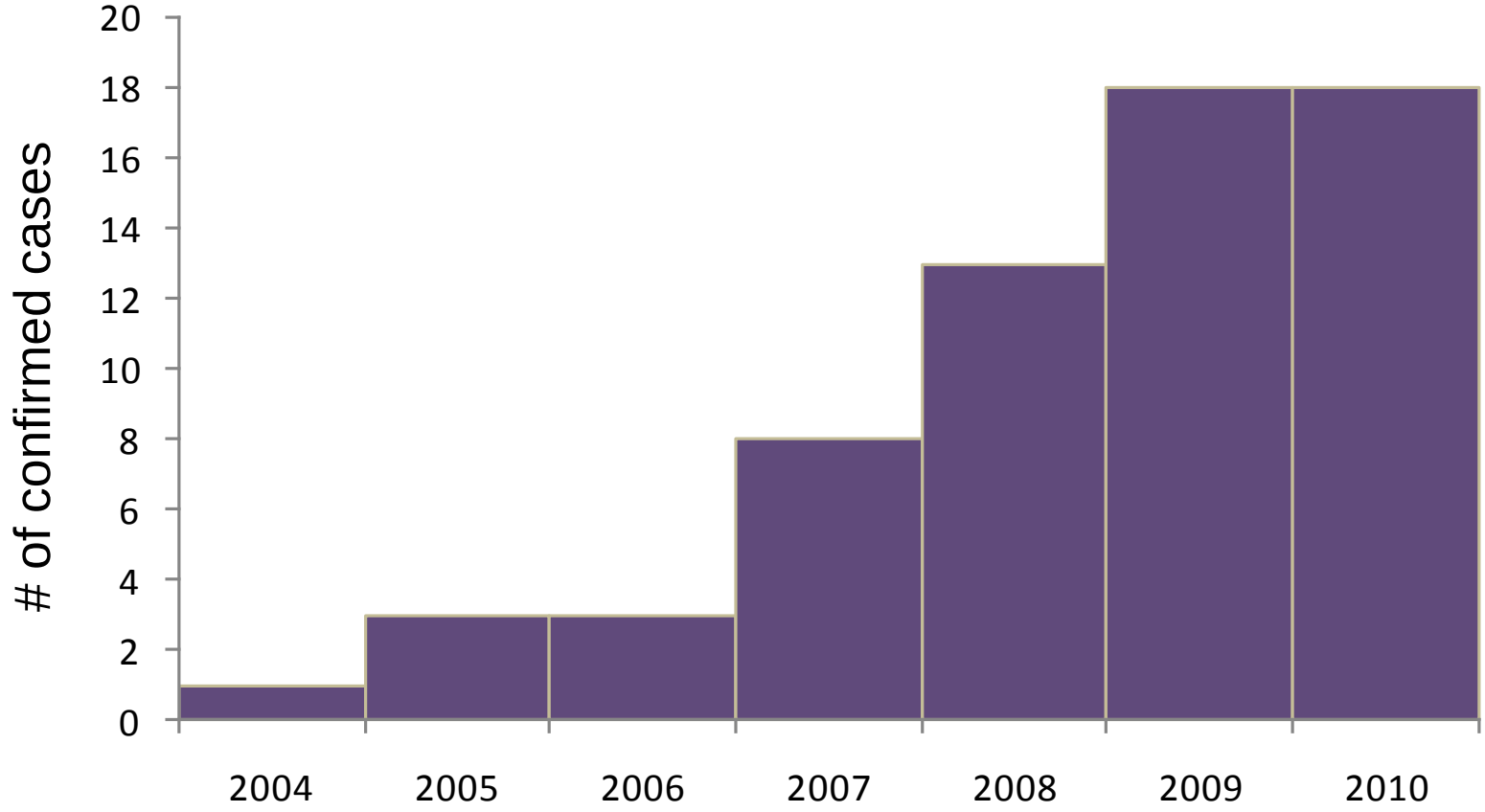
C. gattii: breakdown of genotypes, human infections, US, 2004-2010

Type	WA	OR
VGI	0 (0)	2 (6)
VGIIa	12 (80)	21(43)
VGIIb	0 (0)	6 (13)
VGIIc	2 (13)	16 (33)
VGIII	1 (7)	0 (0)
Total	15 (100)	45 (100)



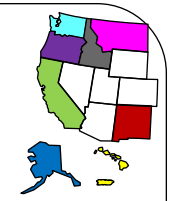
US human cases of *C. gattii*, illness onset (n=64*)





*Onset year is reported for 49 patients and is estimated by initial report year for 15 patients for whom onset date was not available. 2010 data is year-to-date; data are typically lagged by several months.

Characteristics of patients included in *C. gattii* surveillance in the United States, 2004-2010. Complete information was not available for all patients.

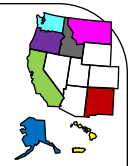


Patient characteristic	n (%)
Demographics	
Age (n=59) (mean, median, range)	53, 56 (15, 95)
% Male	32 (53)
% White (1 each of Asian, Native Hawaiian, and African-American)	29 (91)
Symptoms (most common)	
Headache	29 (58)
Cough	27 (52)
Nausea	23 (51)
Dyspnea	23 (48)
Weight loss	20 (43)
Fever	22 (42)
Clinical findings	
Pneumonia	26 (55)
Meningitis	23 (49)
Cryptococcoma: lung (n=45 with images)	14 (31)
Cryptococcoma: brain (n=18 with images)	5 (28)
Outcomes	
Hospitalized	48 (91)
Died of *C. gattii*	10 (20)
Died of or with *C. gattii*	16 (32)

Predisposing conditions of patients included in *C. gattii* surveillance in the United States, 2004-2010.

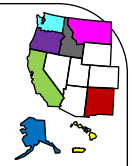
Predisposing conditions (patients with information)	(%)
Recent history of oral steroid use	50
Lung disease (not transplant; includes asthma, bronchitis, COPD, scarring)	33
History of cancer	25
Kidney disease (not transplant)	22
Solid organ transplant	20
Cardiovascular disease (not transplant)	19
Diabetes	19
Rheumatic condition	13
Liver disease (not transplant)	9
Connective tissue disorder	7
HIV	6
Stem cell transplant (any type)	0
No identifiable condition	25

Statistically meaningful associations between exposures and outcomes among patients included in *C. gattii* surveillance in the United States, 2004-2010.



Exposure	Outcome or presentation variable	RR	p
Age group (years)	**Death from or with *C. gattii***		
<18		4.25	0.30
18-29		0.88	1.00
30-49		REF	n/a
50-69		1.54	0.07
70+		2.05	0.03
Pre-existing condition vs none	**Pneumonia**	1.89	0.05
	Meningitis	0.48	0.02
	Headache	0.48	0.003
	Nausea	0.47	0.02
	Weight loss	0.38	0.005
	Loss of appetite	0.29	0.009
	Muscle pain	0.35	0.03
	Neck stiffness	0.30	0.02
	Night sweats	0.32	0.03
	Blurry vision	0.16	0.02
	Photophobia	0.01	0.04
Death from or with *C. gattii*	**Dyspnea**	2.00	0.03
	Nausea	0.17	0.05

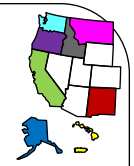
- **Patients >70 years old were more likely than younger patients to die of or with infection**
- **Having a pre-existing condition was positively associated with pneumonia at presentation, but negatively associated with many other signs and symptoms, including CNS signs**
- **Death was positively associated with dyspnea at presentation, but negatively associated with nausea**



Statistically meaningful associations between genotype or subtype of infection and presenting signs and symptoms of infection among patients included in *C. gattii* surveillance in the United States, 2004-2010.

Genotypes / subtypes	Presenting sign or symptom	RR	p
VGI infections vs [VGII, VGIII]	Seizure	40.0	0.05
VGII infections vs [VGI, VGIII]	Cough Dyspnea Neck stiffness Blurry vision	57.0 53.0 0.26 0.10	0.02 0.05 0.04 0.007
VGIIb infection vs all others	Nausea	0.02	0.02
VGIII infection vs [VGI, VGII]	Neck stiffness	4.78	0.05

- Genotype-specific differences found by presenting signs / symptoms
  - VGI and VGIII-type infections more likely to present with central nervous system signs; VGII-type infections were more likely to present as respiratory disease
- No associations found between genotype / subtype and:
  - Presence of cryptococcoma (lung or head)
  - Pneumonia or meningitis
  - Pre-existing condition
  - Death
- Small sample size may obscure – or enhance - associations



Comparisons between characteristics of US patients included in *C. gattii* surveillance in the United States, 2004-2010, and *C. gattii* patients in British Columbia, 1999-2007 (from Galanis *et al*, 2010).

Patient characteristic	US (n=70)	British Columbia (n=218)
Male	53%	56%
Infecting genotype		
VGI	6%	6%
VGIIa	51%	86%
VGIIb	9%	7%
VGIIc	27%	0%
VGIII	6%	0%
Age (years): mean, med (range)	53, 56 (15-95)	59, 62 (2-92)
<18	3%	2%
18-29	5%	6%
30-49	33%	19%
50-69	45%	38%
>70	14%	36%
Predisposing condition	75%*	38%
HIV-infected	7%	6%
Hospitalized	89%	61%
Died from *C. gattii*	21%	5%
Died from or with *C. gattii*	33%	9%
Mean age at death, range (yrs)	60, 15-95	68, 26-91

***When limited to pre-existing conditions considered in BC (Galanis *et al*, 2010), only 61% have a predisposing condition. Among seven patients excluded by the BC definition, 1 was diabetic; 1 had cardiovascular disease and asthma; 1 had a rheumatic condition; 2 had both cardiovascular and kidney disease; 1 had unspecified lung disease; 1 had Nocardia infection of the lungs.**

Veterinary Reporting

- Public health for veterinarians
  - Reporting forms and reports

DHS oregon department of human services **Oregon Veterinary "Zoonoses Reporting"**

Date: / /	Veterinarian:		Phone: ( ) -	
Disease (circle one):	Onset of illness: / /		Status (circle one):	
Bartonella Campylobacteriosis Giardiasis Leptospirosis	MRSA Plague Psittacosis Ringworm	Rabies Salmonellosis Toxoplasmosis	Clinical	Confirmed
			If Confirmed:	
Other disease of public health importance: (such as Cryptococcus)			Lab Name:	
			Type of Test:	
Species (circle one):	Breed:	Age:	Sex (circle one):	
			Male N / I	Female S / I
City:			Zip:	
Comments:				

Please fax completed information to 971-673-1100, Attn: Emilio DeBess, DVM in Collaboration with OVMA and PVMA

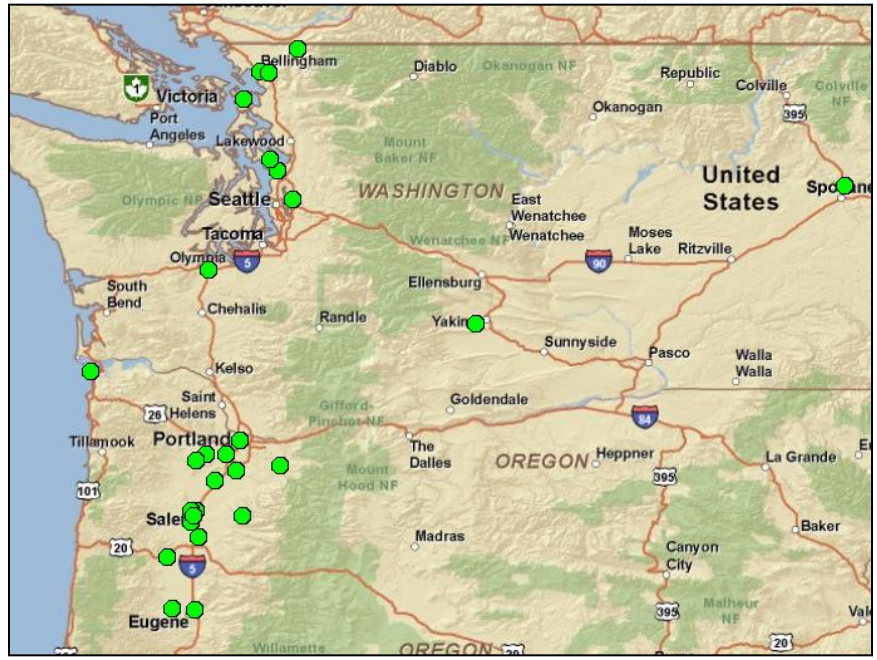
Veterinary cases

Animal type	N
Cats	25
Dogs	11
Llama/alpaca/camelids	6
Horse	2
Elk	2
Goat	2
Bird	1
Sheep	1
Dolphin / porpoise	5

State	N
OR	27
WA	23
CA	4
HI	1

Genotype	%
VGI	4
VGIIa	57
VGIIb	17
VGIIc	13
VGIII	6
VGIV	2

Locations of known veterinary cases

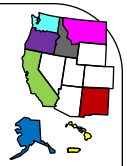


- **More VGIIb, less VGIIc among animals than humans**
- **Recent dropoff in reporting of animal cases**

Environmental:
Soil sample collection

- Samples were collected from 10 different sites
- 2 isolates were cultured
- VGI and VGIIa
- VGIIa matched that of the dog!

Conclusions



- *Cryptococcus gattii* is a serious, emerging infection in the US Pacific Northwest
- Patient profile differs from reports of infections in historically endemic areas (Australia, Papua New Guinea) and British Columbia for reasons that are not yet clear
- Risk factors for infection in US Pacific Northwest include being age 50-69 years, HIV-infected, otherwise immunocompromised
- *C. gattii* subtypes appear to correlate with presenting syndrome but not necessarily pre-existing patient condition
  - VGI, VGIII appear to cause more CNS disease, while VGII types cause more respiratory infections
  - However, sample size is small, particularly for VGI and VGIII types; true differences in patient tropism by strain genotype might be obscured
  - Genotype-specific treatment guidelines might be warranted; this should be sufficient incentive to continue surveilling
- Concerted continued epidemiologic surveillance is needed to determine best practices for patient care

Cryptococcus in the news

- http://www.youtube.com/watch?v=j0WqZ5F2eK8&NR=1&feature=fvwp