

## **Animal to Human Transmission of *Staphylococcus pseudintermedius* and other organisms: infection or colonization?**

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### ***Staphylococcus pseudintermedius***

- **Commensal bacteria of dogs**
  - Skin, oral cavity, anal
- **Opportunistic canine pathogen**
  - Skin, urinary tract, ear canal
- **Human diagnostic laboratories**
  - Sp. often misidentified as *Staphylococcus aureus*
  - MALDI-TOF, improved identification
- **Animal to human transmission**
  - Reported but mode of transmission unclear

# Specimens

Patients were identified by recovery of *S. pseudintermedius* from diagnostic specimen in human diagnostic laboratory

## HUMANS

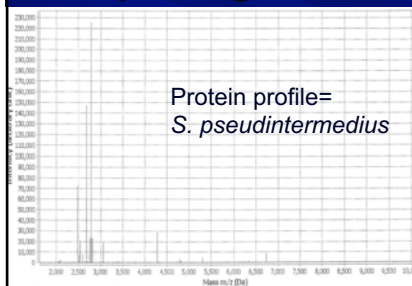
- Patient 1                      Blood culture
- Patient 2                      Drainage – seroma fluid  
Drainage – abdominal drain  
Drainage – tip
- Patient 3                      Hemocath exit site  
Hickman catheter tip

## PETS

- Pharyngeal and rectal swabs

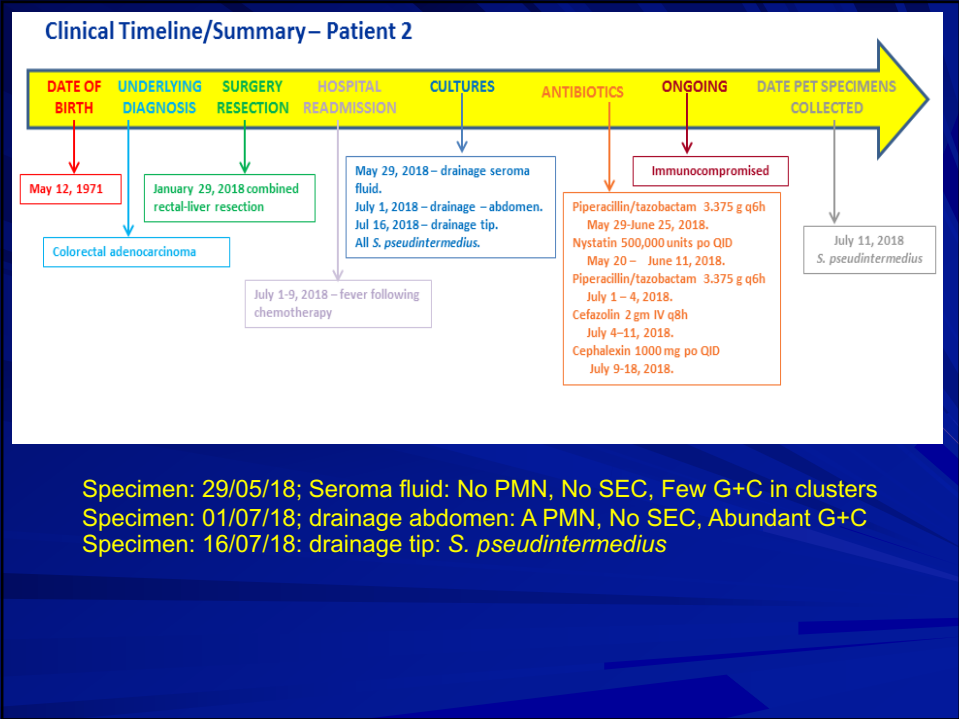
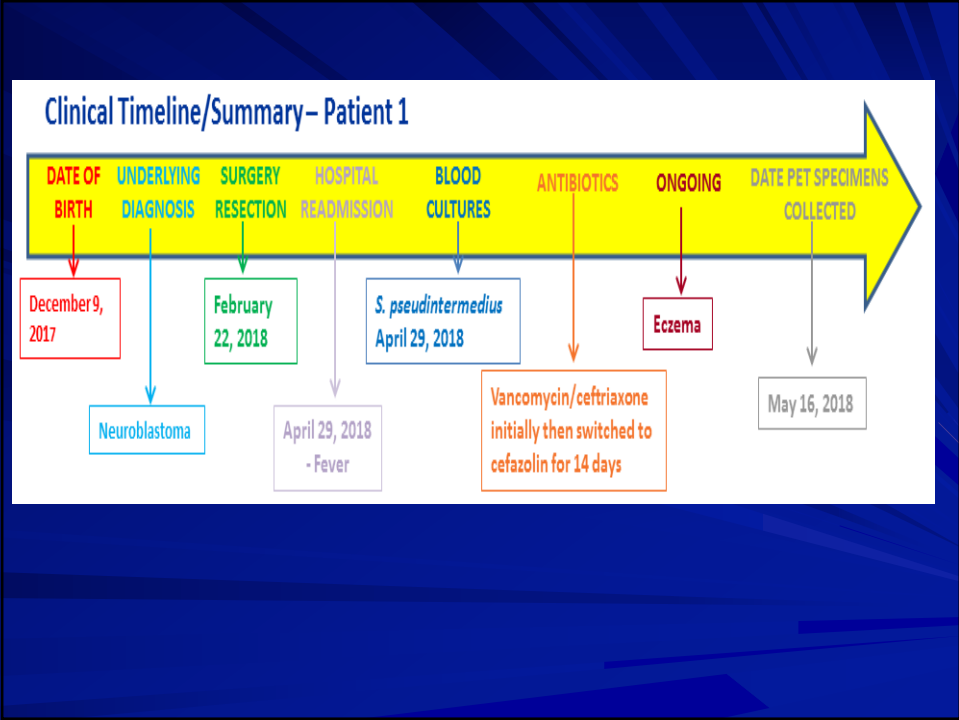
# Organism Identification

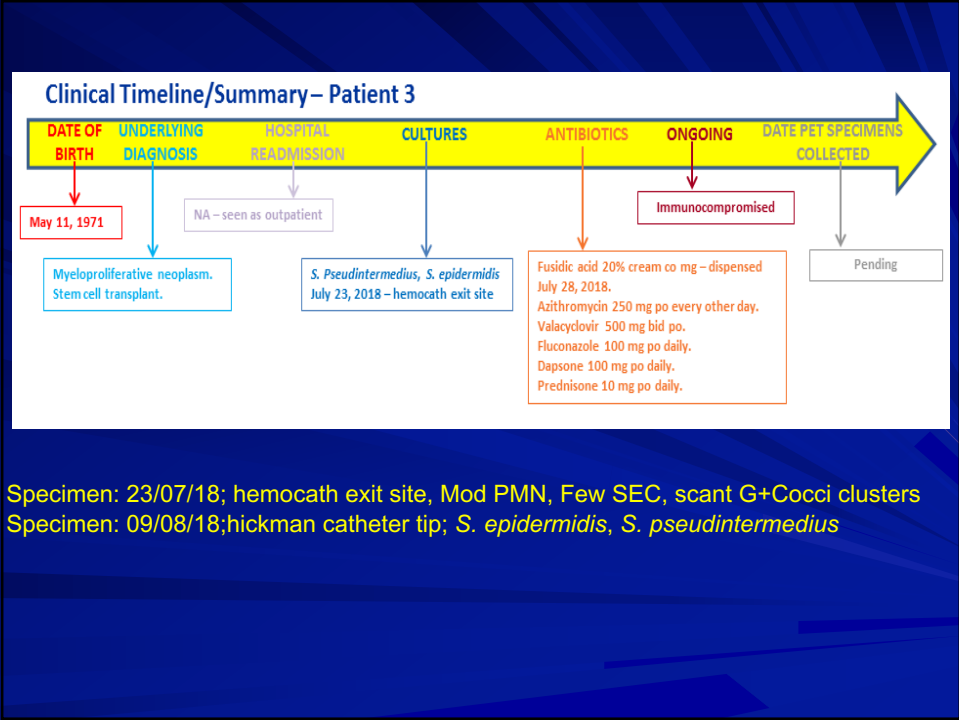
- Matrix Assisted Laser Desorption-Ionization-Time of Flight (MALDI-TOF), unique spectrograms



## Vitek II

- biochemical and carbohydrate profile
- compares profile to data bank of similar strains
- can also do antimicrobial susceptibility testing





**Table 1: Comparative *in vitro* susceptibility results of *S. pseudintermedius* strains received from oncology patients and family pets.**

Lab Number	Amp	Cipro	Clox	Enro	Erythro	Gent	Lin	Moxi	Oxycto	Prado	Ted	Vanco
<b>CASE STUDY 1</b>												
<b>Human</b>												
2	1	0.063	0.125	0.063	0.125	0.125	1	< 0.016	1	0.016	0.125	0.25
3	0.5	0.063	0.125	0.063	0.125	0.125	1	< 0.016	1	0.016	0.125	0.25
<b>Animal</b>												
CSI - 1	0.5	0.063	0.125	0.063	< 0.063	0.125	1	< 0.016	1	0.016	0.125	0.5
CSI - 2	0.25	0.063	0.125	0.063	< 0.063	0.125	1	< 0.016	1	0.016	0.125	0.5
CSI - 3	0.5	0.125	0.125	0.063	0.125	0.125	1	< 0.016	1	0.016	0.125	0.5
CSI - 7	0.5	0.063	0.125	0.063	0.125	0.125	1	< 0.016	1	0.016	0.125	0.5
CSI - 8	0.5	0.063	0.5	0.063	< 0.063	0.125	1	< 0.016	1	0.016	0.125	0.5
CSI - 9	0.5	0.063	0.125	0.063	0.125	0.125	1	< 0.016	1	0.016	0.125	0.5
<b>CASE STUDY 2</b>												
<b>Human</b>												
8	0.031	0.125	0.125	0.125	0.125	0.125	1	0.031	0.5	0.031	< 0.063	0.25
10	0.031	0.063	0.125	0.063	0.25	0.125	1	0.031	1	0.031	0.125	0.5
15	0.031	0.063	0.125	0.063	0.25	0.125	1	< 0.016	1	0.031	0.125	0.25
<b>Animal</b>												
CSM2 - a	0.031	0.125	0.125	0.125	0.125	0.125	1	0.031	1	0.031	0.125	0.25
CSM2 - b	0.031	0.125	0.125	0.125	0.125	0.125	1	0.031	0.5	0.031	0.125	0.25
CSM2 - c	0.031	0.125	0.125	0.063	0.125	0.125	1	< 0.016	1	0.031	0.125	0.5
CSR2 - a	0.031	0.25	0.125	0.125	0.125	0.125	1	< 0.016	0.5	0.031	0.125	0.5
CSR2 - b	0.031	0.125	0.125	0.063	0.25	0.125	1	0.031	0.5	0.031	0.125	0.5
CSR2 - c	0.031	0.125	0.125	0.063	0.125	0.125	1	< 0.016	1	0.031	0.125	0.5
<b>CASE STUDY 3</b>												
<b>Human</b>												
8	0.031	0.25	<0.031	>=64	0.25	1	<0.016	1	0.016	0.125	0.5	
8	0.25	0.5	0.063	>=64	0.125	2	<0.016	1	<0.008	0.125	0.5	

Amp=ampicillin; Cipro=ciprofloxacin; Clox=cloxacillin; Enro=enrofloxacin; Erythro=erythromycin; Gent=gentamycin; Lin=linezolid; Moxi=moxifloxacin; Oxycto=oxyclozanide; Prado=pradofloxacin; Ted=Tedizolid; Vanco=vancomycin.

# From child with bacteremia...

One strain from child blood culture  
 One strain from family pet

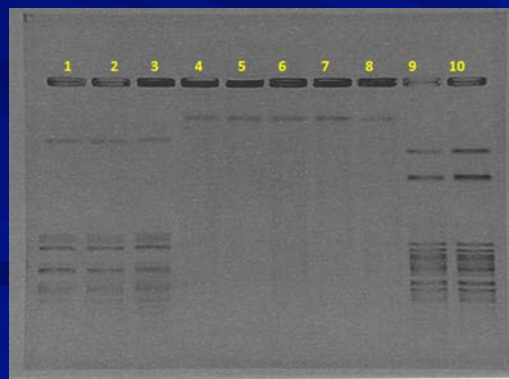
Table 2: Multi-locus sequence type analysis of epidemiologically related strains of *S. pseudintermedius*.

Isolate	Ack	Cpn	Fdh	Pta	Pur	Sar	Tub	Sequence Type
Dog	3	97	2	1	1	1	1	1346
Child	3	97	2	1	1	1	1	1346

New Sequence type

Key PFGE profiles.

Lane	Organism	Source
1	<i>S. pseudintermedius</i>	Pt 1 - blood, venopuncture left arm
2	<i>S. pseudintermedius</i>	Pt 1 - blood, venopuncture left arm
3	<i>S. pseudintermedius</i>	Dog mouth
4	<i>S. pseudintermedius</i>	Pt 2 - drainage seroma fluid
5	<i>S. pseudintermedius</i>	Pt 2 - drainage pre-exist abdomen drain
6	<i>S. pseudintermedius</i>	Pt 2 - drainage tip
7	<i>S. pseudintermedius</i>	Dog - mouth
8	<i>S. pseudintermedius</i>	Dog - rectal
9	<i>S. pseudintermedius</i>	Pt 3 - hemocath exit site (swab)
10	<i>S. pseudintermedius</i>	Pt 3 - Hickman cath tip



DNA Fingerprinting

Strains from each patient  
 identical to strain from family pet

## Discussion Points

### ■ Somayaji et al (2016)

- 24 cases of animal to human transmission
- Strain comparisons between human and pet isolates not done

### ■ Blondeau et al (2019) ECCMID

- Pediatric oncology patient with *S. pseudintermedius* bactremia strain identical to family pet strain
- Patient had eczema and dog licked patient

### ■ Blondeau et al (2019) ICOHAR

- 3 oncology patients, 2/3 (analyzed to date) with strains identical to strains from family pets.

## RESULTS/DISCUSSION/CONCLUSION

- *Staphylococcus pseudintermedius* strains from 2 patients were identical to strains recovered from their family pets by PFGE (Figure 2).
- One human isolate (patient 1) and one pet isolates were identical by multi-locus sequence typing and the strains were assigned a new sequence type (Table 2).
- The *S. pseudintermedius* strains collected from each of the 3 human cases were different from each other by PFGE (Figure 2).
- Susceptibility data for strains collected from humans and their pets were the same (Table 1).
- *S. pseudintermedius* may be an emerging pathogen in human patients with significant underlying medical conditions.
- Laboratories need to be diligent in isolating and identifying animal pathogens from human specimens.
- Therapy dogs may pose a threat to certain “at risk” patient populations.

**Thank you!**

