Biofilm in Chronic Suppurative Otitis Media

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Definition – one of them…

- *”A coherent cluster of bacterial cells embedded in a matrix, which is more tolerant of most antimicrobials and host defences compared with planktonic bacterial cells”.*

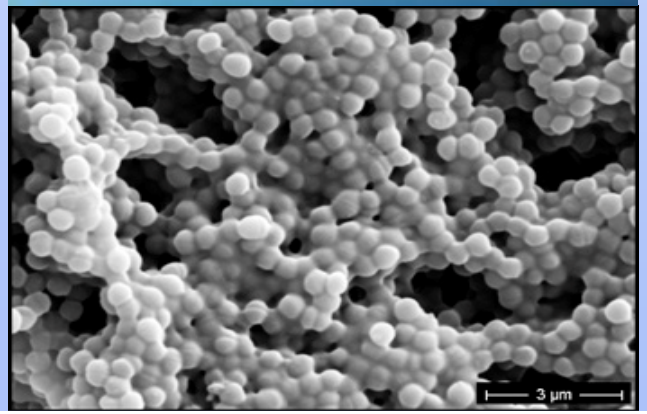
Biofilm

<u>Biofilm:</u> – Groups of bacteria living in slime

– Dormant state, protected by the slime layer– Communication (quorom sensing).

– Resistant to antibiotics, efflux pumps.

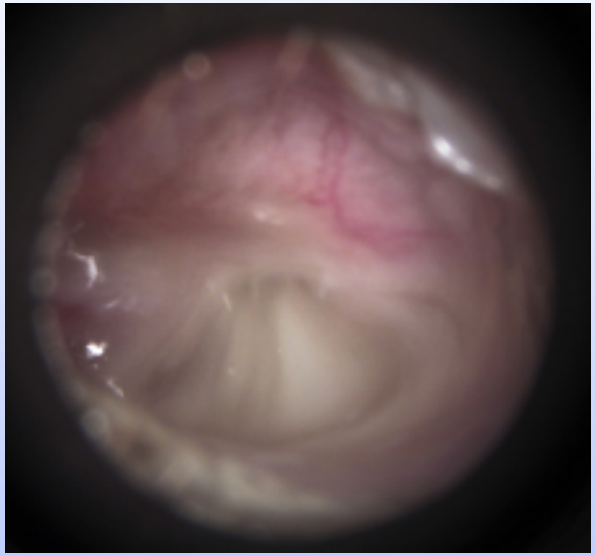
Bacteria are dispersed form the biofilm:
- New infection, new symptoms
(chronic infections, recurrent infections,)



The study

Included:

Persons with untreated otorrhea > 14 days in primary healthcare clinic, Nuuk, Greenland.



Otorrhea aspirated from external ear canal

Participants were treated with syringing of the ear and topical ciprofloxacine

Bacteria identified at laboratory in Nuuk and Copenhagen. Culturing, PCR, 16s RNA gene sequensing.

Biofilm identified using microscopy and PNA-FISH

CSOM + Biofilm

ID no	
1	•
2	
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4	•
5	•
7	
8	-
9	
10	
11	•
12	•
13	•
14	•
15	•
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22	

22 participants, Gender: 9 girls, 14 boys
Age: Median 1½ years, range (0-28)

70% (14/20) had biofilm in samples of otorrhea,
2 were not assesed

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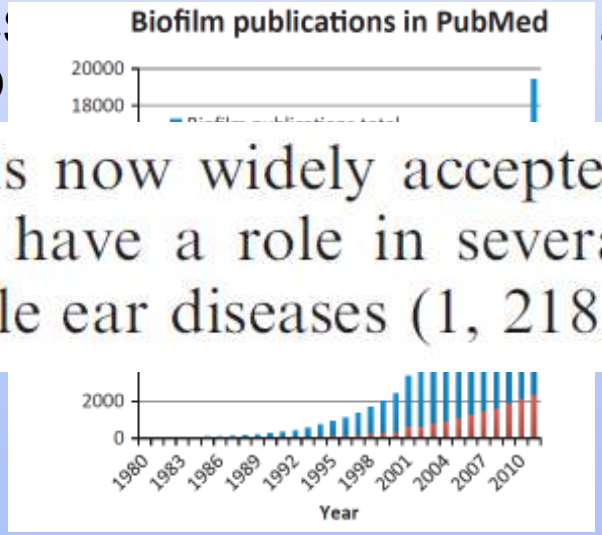
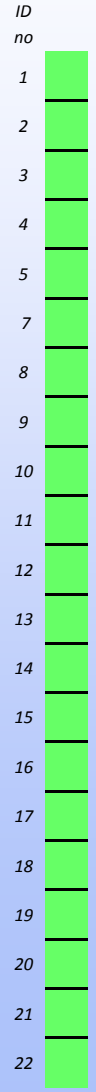


Number Year
31 2012
24 2011
23 2010
30 2009

It is now widely accepted that bacterial biofilms have a role in several chronic infectious middle ear diseases (1, 218, 274–278).

4 2002
2 2001
1 2000
1 1999
3 1998

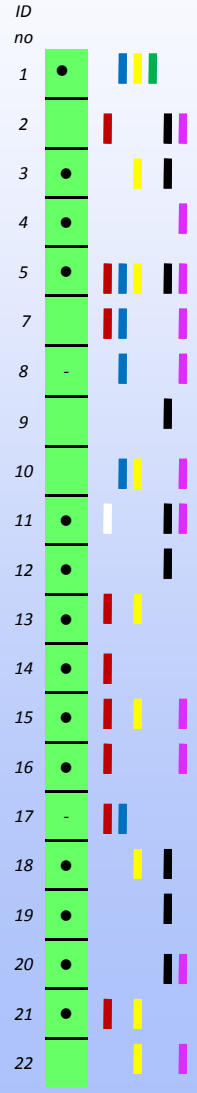
CSOM + Bugs



S. Aureus
P. Aeruginosa
S. Pneumoniae
H. Influenza
M. Catarrhalis

Anaerobic
Other aerobic

CSOM + Biofilm + Bugs



16%	*S. Aureus*
1%	*P. Aeruginosa*
12%	*S. Pneumoniae*
18%	*H. Influenza*
1%	*M. Catarrhalis*
	Anaerobic
(~50%)	*Other aerobic*

…We have confirmed CSOM seems to be associated with the presence of ***biofilm.***

CSOM is associated with multispecies infections

CSOM + Biofilm + Bugs

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A lot of studies
A lot of biofilm
A lot of bugs

- Causality?

<u>Study hypothesis:</u>

The recurrence of otorrhea in CSOM is due to the dispersion of free floating bacteria from a biofilm in the middle ear.

CSOM + Biofilm + Time

T	1	2	3	4	5	6	7	8	9	Months
ID no										
1	●									
2										
3	●									
4	●									
5	●									
7										
8	-									
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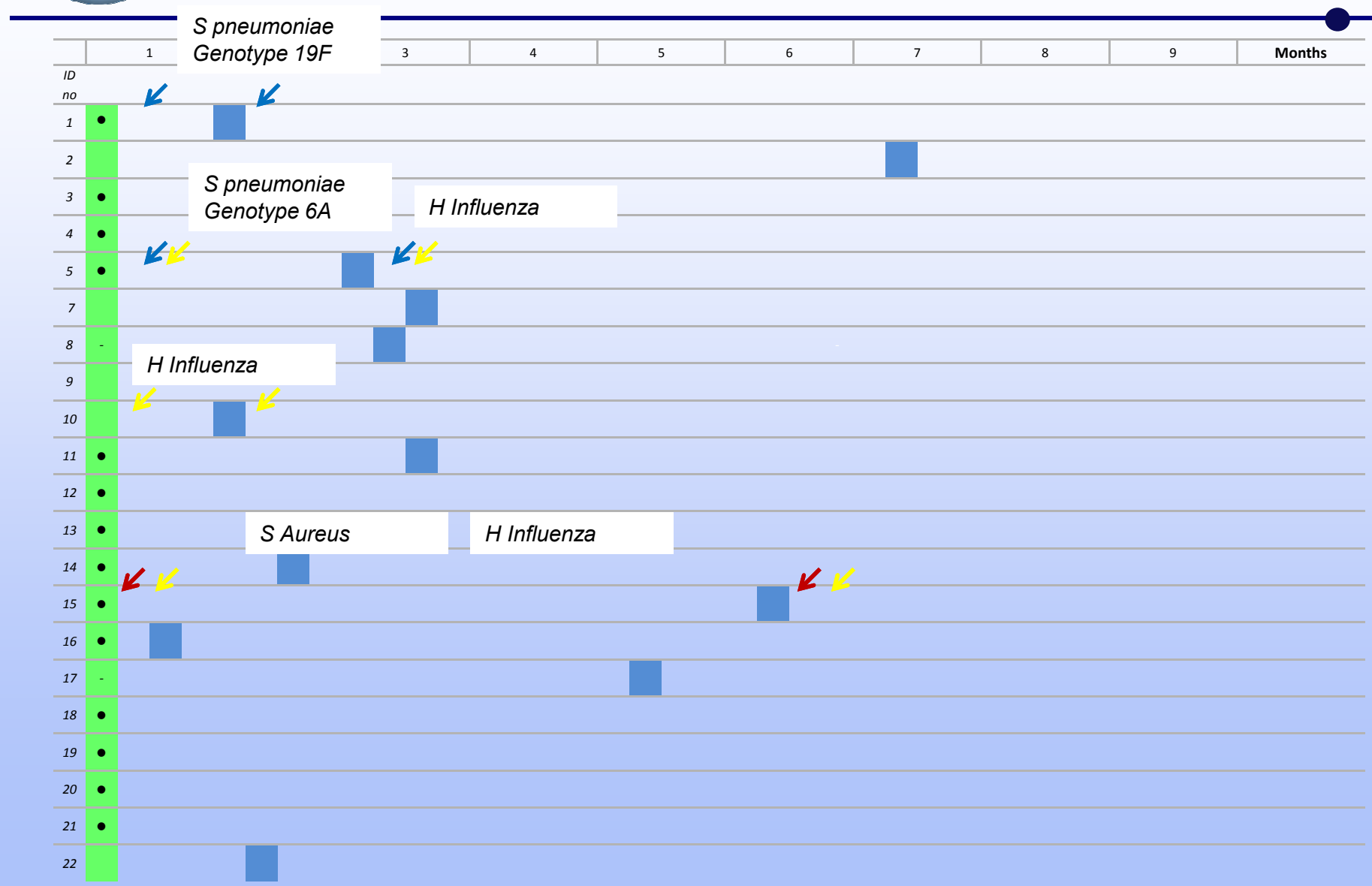
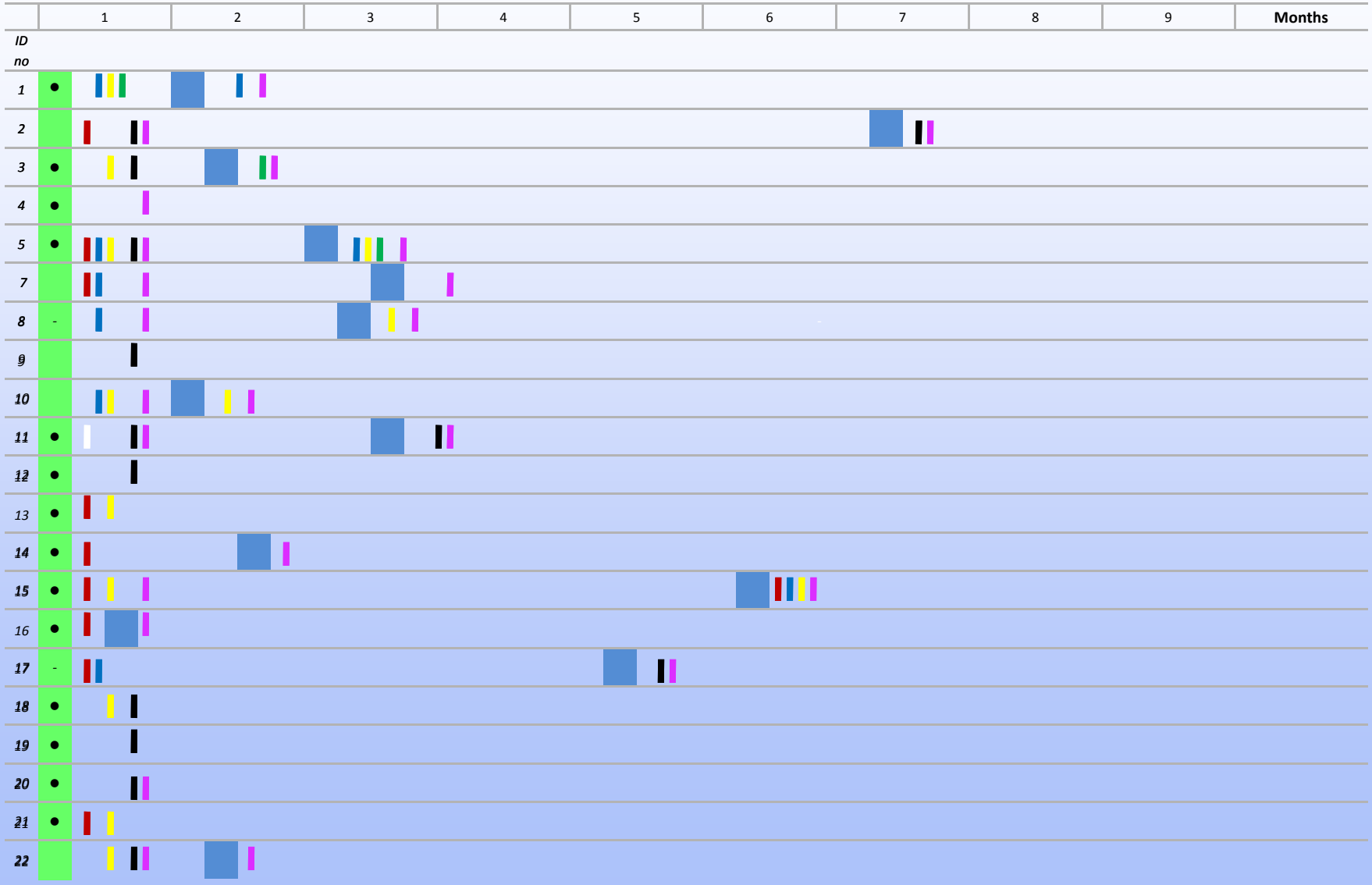
14	●									
15	●									
16	●									
17	-									
18	●									
19	●									
20	●									
21	●									
22										

CSOM + Biofilm + Time

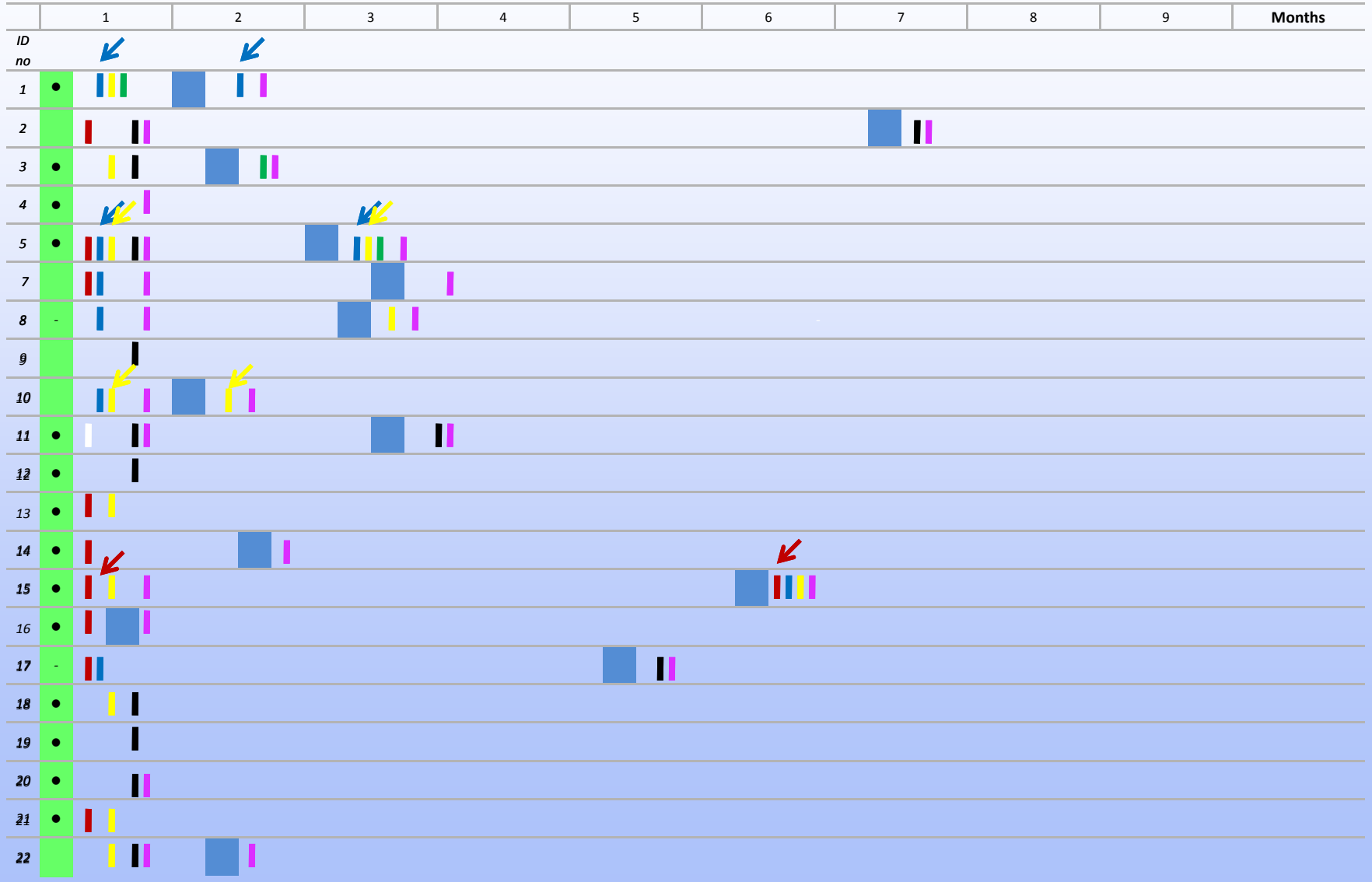
Identical phenotypes



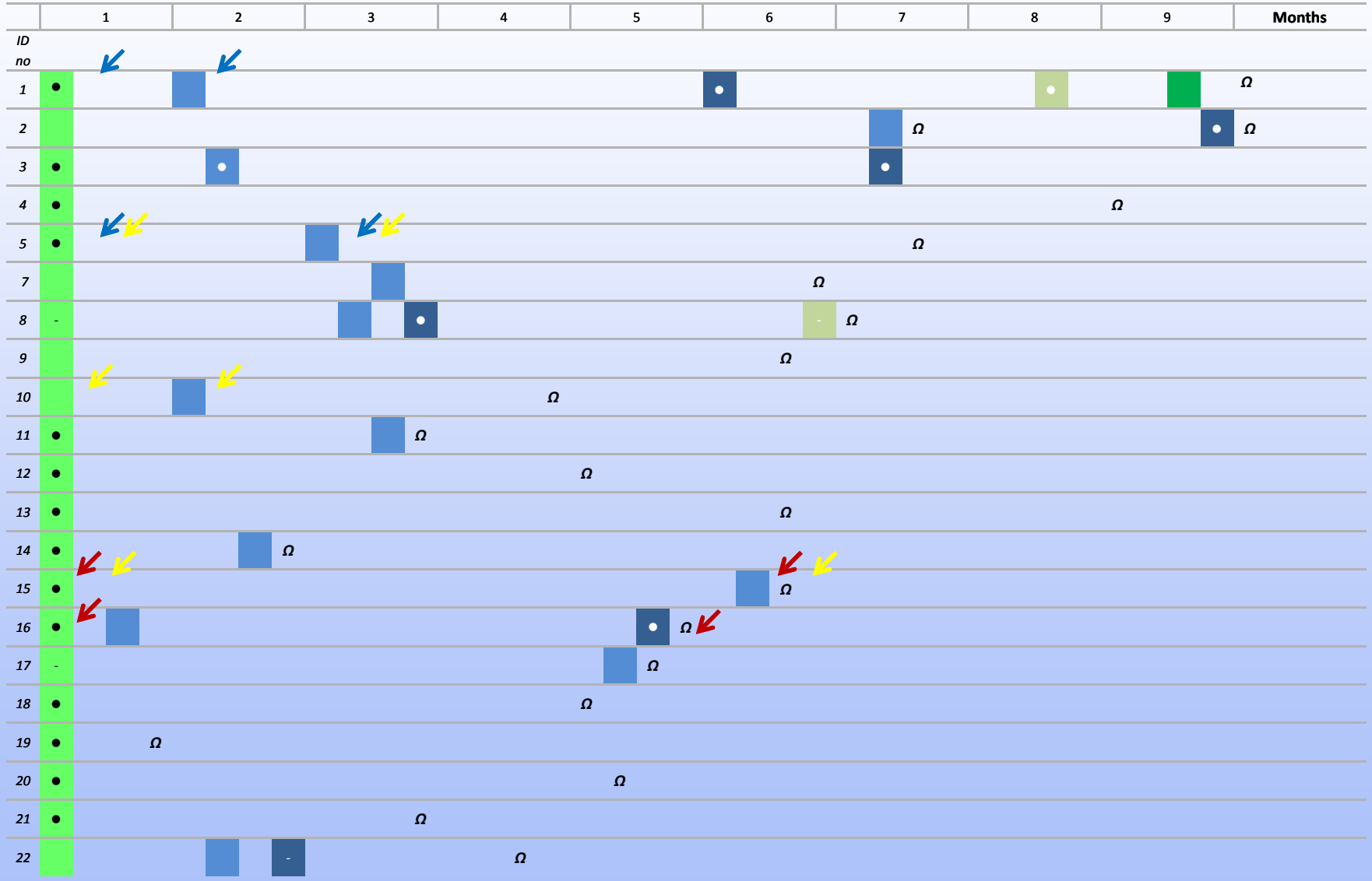
CSOM + Biofilm + Time + Bugs



CSOM + Biofilm + Time + Bugs



Total observation period



Conclusion

- CSOM in Greenland is dominated by multispecies infections with common respiratory tract pathogens, *S. Aureus and anaerobic bacteria.*
- Biofilm is often present, but does not seem to ”hide” bacteria.
- Exacerbations of CSOM with otorrhea is most likely due invasion of new pathogens
- The presence of biofilm has limited clinical significance, and treatment should be focused on elimination of multispecies infections rather than erradication of biofilm

Thank you for your attention…