Vaginal microbiota & different aetiologies of preterm birth

- Vaginal *Lactobaccilli* - central to reproductive health
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  *O&G Specialist Registrar*
- Ascending vaginal infection - important cause of preterm birth

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**AIM:**
Assess interaction between cervical length and vaginal microbiome

*No interests to declare*

Methods

Recruitment in 2 groups

1. History of previous sPTB < 37w
   n=67

2. Excisional cervical treatment for CIN > 1cm
   n=66

Longitudinal follow up

Data collected

Vaginal microbiome
HVS for 16 sRNA sequencing

Cervical length
Transvaginal scan

Methods

Longitudinal follow up

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Analysis

Gestation at birth
Ultrasound data: cervical length

n=133
24% delivered preterm

Recruitment risk factor

- **Cervical treatment**, n=66
- **Previous PTB**, n=67

Preterm birth rates

- **Term birth**
- **Preterm birth <37w**

- 37% Preterm birth
- 15% Cervical treatment

Gestation at sampling (weeks)

Cervical treatment (CT) n=113
History of PTB (Hx) n=86

* Ultrasound data: cervical length
16s rRNA gene sequencing  n=395 samples

Species data classified into Community State Types (CSTs) (Ravel et al)

Vaginal dysbiosis & L. iners:

Implicated in
- Preterm birth (Petricevic 2014, DiGiulio 2015)
- HPV persistence, CIN severity (King 2011, Brotman 2014, Mitra 2015)
Microbiome & subsequent gestation at birth

12 weeks

- **L. crispatus**
- **L. jensenii**
- **L. iners**

Term, >37w  |  Preterm, 34-37w  |  28-34w  |  <28w
Microbiome & subsequent gestation at birth

Undelivered pregnancies (%) vs Gestation at birth (weeks)

- L. crispatus
- L. iners
- Dysbiosis

Percent survival:
- 100%
- 80%
- 60%
- 40%
- 20%
- 0%

Weeks Gestation at birth:
- 34 weeks
Species, Community state types

Previous preterm birth

Cervical CIN treatment

Gestation at screening (weeks)

Gestation at screening (weeks)

Percentage

<table>
<thead>
<tr>
<th>CST, species:</th>
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<tbody>
<tr>
<td>L. crispatus</td>
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<tr>
<td>L. gasseri</td>
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<tr>
<td>L. Iners</td>
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<td>Dybiosis</td>
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<td>L. jensenii</td>
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\[ P = 0.03; \text{ANOVA} \]

\[ P = 0.06; \text{ANOVA} \]
Vaginal microbiome

Cervical length <24w

Interaction

Gestation at birth (weeks)

Cervical length (mm)

Short cervix

L. crispatus

L. iners

37 weeks

Gestational age at birth

CST I  r=0.15
CST III  r=0.32*

* Spearman correlation

P<0.01
Risk of preterm birth

*L. iners* dominant microbiome <24 weeks....

**Previous PTB <37 weeks**
- RR 2.4 (95% CI 1.2 - 9.1)

**Cervical treatment**
- RR 1.2 (95% CI 0.8 – 5.1)

**CL measurements**

**Short cervix ≤25mm**
- *L. iners* RR 2.7 (95% CI 1.6 – 14.1)
- *L. crispatus* RR 1.94 (95% CI 1.4 – 1.1)

**Short cervix ≤25mm**
- *L. iners* RR 8.5 (95% CI 1.8 – 15.0)
- *L. crispatus* RR 0.92 (95% CI 0.6 – 1.9)
In summary

Interaction between the cervix and vaginal microbiome
...contributes to preterm birth risk

- L. iners - pathogenic
- L. crispatus - protective

Vaginal microbial profiles differ among prior preterm birth vs excisional CIN treatment
Vaginal microbiota, cervix and preterm birth

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  Translating research into patient benefits
Microbiome & subsequent gestation at birth

- Term, >37w
- Preterm, 34-37w
- 28-34w
- <28w

12 week sampling