Empower research through comparative genomics & next-gen sequencing

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Empower research through comparative genomics & next-gen sequencing

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Disclosure

for Presentations at ACCME

- Accredited Conferences
DISCLOSURE

• I have no actual or potential conflict of interest in relation to this program or presentation.
Fusarium keratitis outbreak associated with contact lenses
Fusarium oxysporum – a fungus

- Macroconidia
- Microconidia
- Chlamydomospore

Fourie G. et al. 2011. Infection, Genetics and Evolution
An emerging human pathogen

- Localized skin or corneal infections
- Cause disseminated infections in immunocompromised patients
- Difficult to control (resistant to antifungals), often lethal outcome
Understand pathogenicity using genomics???
Wilt diseases caused by *F. oxysporum*
formae specialis – host specificity

- Each *forma specialis* consists of strains with ability to cause wilt on a unique host or a set of plant host species.

- More than 120 *formae speciales*. 
Genomic Structural Difference

<table>
<thead>
<tr>
<th>Species</th>
<th>Genome Size (Mb)</th>
<th>Number of Chromosomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>F. verticillioides</td>
<td>42</td>
<td>11</td>
</tr>
<tr>
<td>F. oxysporum f. sp. lycopersici</td>
<td>36</td>
<td>4</td>
</tr>
<tr>
<td>Nectria haematococca (F. solani)</td>
<td>52</td>
<td>17</td>
</tr>
</tbody>
</table>
Pairwise comparison revealed highly conservation genome structure
Pairwise comparison defines lineage-specific chromosomes in *F. oxysporum f. sp. lycopersici*
Linage specific chromosomes in *F. oxysporum f. sp. lycopersici* (Fol)

Uniquely present in Fol genome
Enriched for TE and repeats
Lack house keeping genes
Encode virulence factors
Horizontal transmission introduce disease

Ma et al 2010 Nature
Optical maps reveal unique sets of LS chromosomes in plant and human isolates.
Horizontal transfer of lineage-specific chromosomes determines pathogenicity
Tip of the iceberg

• Origin(s) of the LS chromosomes?

• Mechanisms of the transfer?

Many asexual fungal pathogens have variable karyotypes (Kistler 1992)
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