Implementation of NGS for Foodborne and Environmental Isolates in FDA ORA ORS Laboratories

2018 GenomeTrakr Meeting
September 27, 2018
GenomeTrakr - Distribution

• Global Scale –
  GenomeTrakr - Distributed network of labs producing WGS data

• FDA Scale –
  Contributions to GenomeTrakr are also distributed
  – Center for Food Safety and Applied Nutrition (CFSAN)
    • GenomeTrakr – Genomics Coordination, Statistics/Bioinformatics, Research and Technical Consultation
  – Center for Veterinary Medicine (CVM)
    • National Antimicrobial Resistance Monitoring System (NARMS) – Implementation of ResistomeTracker
  – Office of Regulatory Affairs (ORA)
    • Regulatory food, animal feed and environmental sample collection and analysis
    • Repository of archive and real-time isolates
    • Confirm and subtype foodborne pathogens including by WGS
    • Research, PT and QAQC activities
WGS Implementation in ORA Timeline

- 2012 – Initial MiSeq instruments arrive (9 ORA labs)
- 2013 – Complete installation, training, begin sequencing archive collections (2000-2013)
- 2014 – ORA labs begin real-time WGS analysis of new isolates and continue with archive collections (2014-present)

OFFLO 7 Labs – Each equipped with 2 MiSeqs and QiaCube
MPTSLO 1 Lab – 1 MiSeq and QiaCube
Isolate Categories

* Compiled from 09-04-2018 ORA Isolate Report
Meta-Data Management

• FDA Sample Collection and Laboratory Analysis reports
  – Isolate number based on sample/sub or composite/pick
  – Genus/species/serotype
  – Collection date – sample collection
  – Collection source – detailed description
  – Location – Country and state
• GenomeTrakr – meta data registration
  – FDA Accession #
• ORA Labs and Isolate Status Reports
  - BioSample # and SRR #
  - Sequence QA/QC data
• NCBI Isolate Browser/Pathogen Detector/Rapid Reports
  – SNP Cluster
  – N50/Length/Contigs
• PulseNet Cluster Reports
  – Cluster or Outbreak codes

Meta-Data Harmonization Workgroup

Evaluating the use of ORADDS reports to query and pull data from different sources in custom reports
GenomeTrakr – Post Analytical

Isilon deposit
Automated sequence QA/QC

NIH/NCBI SRA
Local- Post Analytical

Center for Genetic Epidemiology
http://www.genomicsepidemiology.org/
  SeqSero
  SerotypeFinder
  VirulenceFinder
  Spades

GalaxyTrakr
https://galaxytrakr.org/
  SeqSero / SISTR
  Ectyper
  FASTQC
  Spades

CLC Genomics Workbench
  Assembly
  Sequence QC

BioNumerics ver 7.6
  PulseNet QA/QC
  wgMLST

WGS Analysis
  Molecular Serotype
  Virulence Profile
  Phylogeny
  Assembly
  QA/QC
PulseNet Participation

ORA ORS OFFLO PulseNet Labs: FNE/FSE/FAR/FDN/FSE/FSF/FNW
PFGE certified since 1999
Starting process WGS Certification
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