NCI/NIH
Workshop on Circulating DNA in Clinical Cancer Research
Shady Grove
September 29, 2016

EFIRM Liquid Biopsy

Personalized/Precision Medicine for Cancer Detection

UCLA

David Wong, DMD, DMSc

Salivaomics Knowledge Base

Scientific Foundations

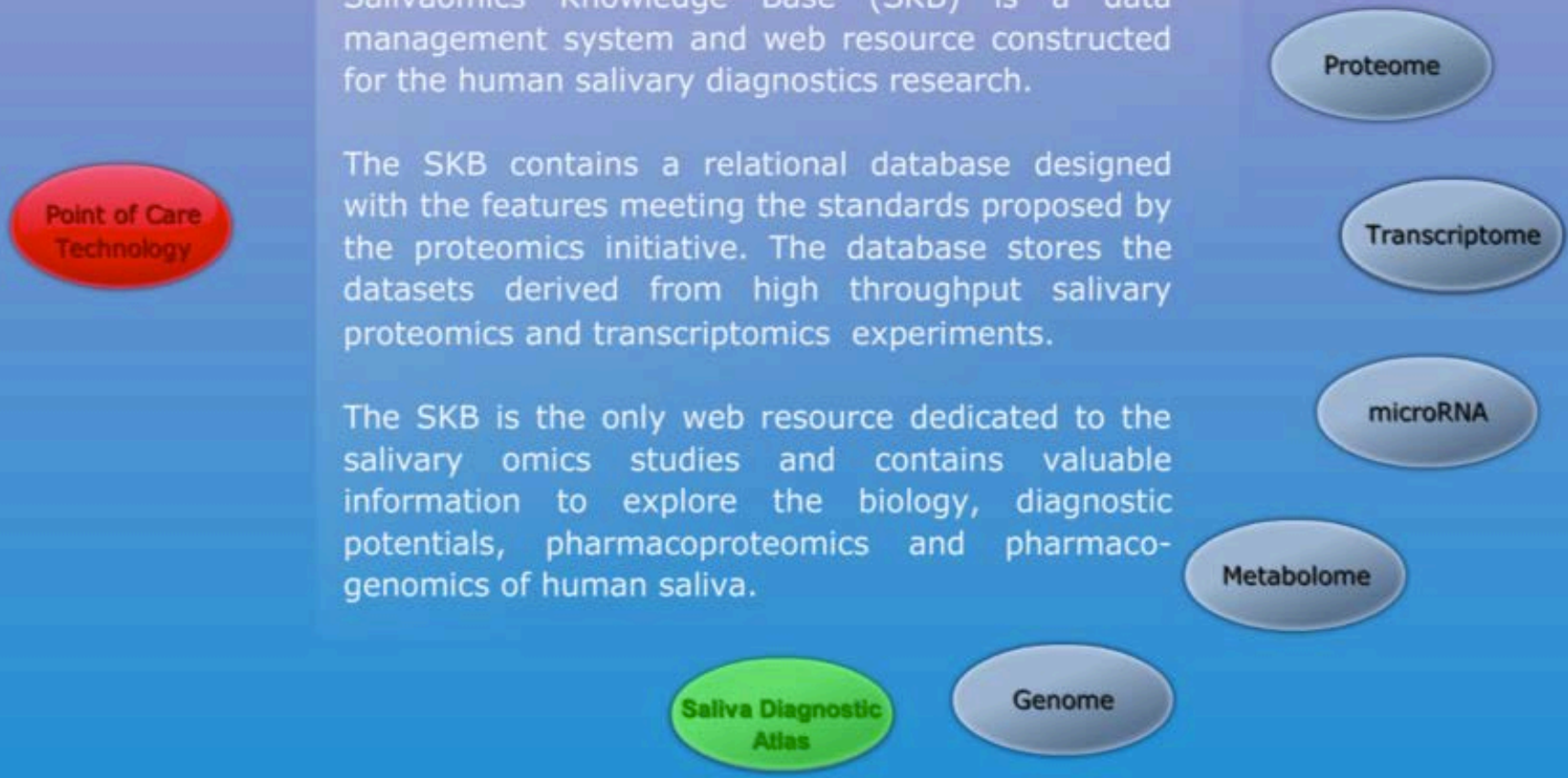
Saliva Ontology

Welcome to SKB

Salivaomics Knowledge Base (SKB) is a data management system and web resource constructed for the human salivary diagnostics research.

The SKB contains a relational database designed with the features meeting the standards proposed by the proteomics initiative. The database stores the datasets derived from high throughput salivary proteomics and transcriptomics experiments.

The SKB is the only web resource dedicated to the salivary omics studies and contains valuable information to explore the biology, diagnostic potentials, pharmacoproteomics and pharmaco-genomics of human saliva.



http://www.skb.ucla.edu

The Wong Lab

At the UCLA School of Dentistry, Dental Research Institute

Program Snapshot

Once thought to exist only within cells, RNA is now known to be exported from cells and play a role in newly discovered mechanisms of cell-to-cell communication. The Common Fund's Extracellular RNA Communication (ERC) program aims to discover fundamental biological principles about the mechanisms of extracellular RNA (exRNA) generation, secretion, and transport; to identify and develop a catalogue of exRNA in normal human body fluids; and to investigate the potential for using exRNAs as therapeutic molecules or biomarkers of disease.

Read more

Program Highlights

Insights into Potential exRNA Biomarkers for Breast Cancer

Researchers supported by the Common Fund's Extracellular RNA Communication program are gaining new insight into the potential for some types of extracellular RNA called microRNA (miRNA) to influence cancer progression.

Read about exRNAs as biomarkers.

Extracellular RNA Researcher Discovers "Treasure in Saliva"

Extracellular RNA research is laying the foundation for using exRNA in saliva to diagnose a variety of diseases, such as cancer, diabetes, autoimmune disorders, and potentially many more.

Read about exRNAs in saliva.

Extracellular RNA Shows Promise in Treating Multiple Sclerosis and Other Neurological Conditions

Dr. Richard Kraig and colleagues are exploring how extracellular microRNAs could be used as novel therapeutic for multiple sclerosis and other demyelinating diseases.

Read more...

ExRNA Research Portal Launched!

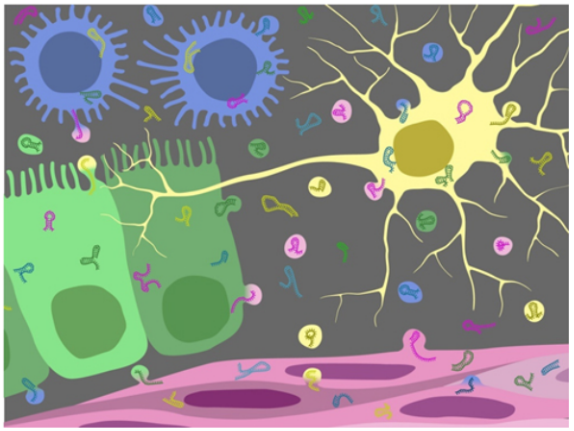
The ExRNA Communication Consortium has launched the ExRNA Research Portal. This website contains information about the program, funded research, publications, resources, upcoming events, and a blog about the latest advances in exRNA research. Visit this site at exrna.org, and be sure to check back often as new content is added!

Videos on Extracellular RNA

Learn more about Unlocking the Mysteries of Extracellular RNA Communication here

Watch a mini documentary series on Exosomes by Life TechnologiesCorp, featuring several ExRNA Communication grantees and Working Group members!

Part 1: What is an Exosome?
Part 2: The History and Promise of Exosomes
Part 3: Exosomes in Cancer Research
Part 4: Curiosity and a Passion for Science
Part 5: Collaboration - The Key to Scientific Success
Part 6: Exosomes - The Next Small Thing



THE WHITE HOUSE
Office of the Vice President

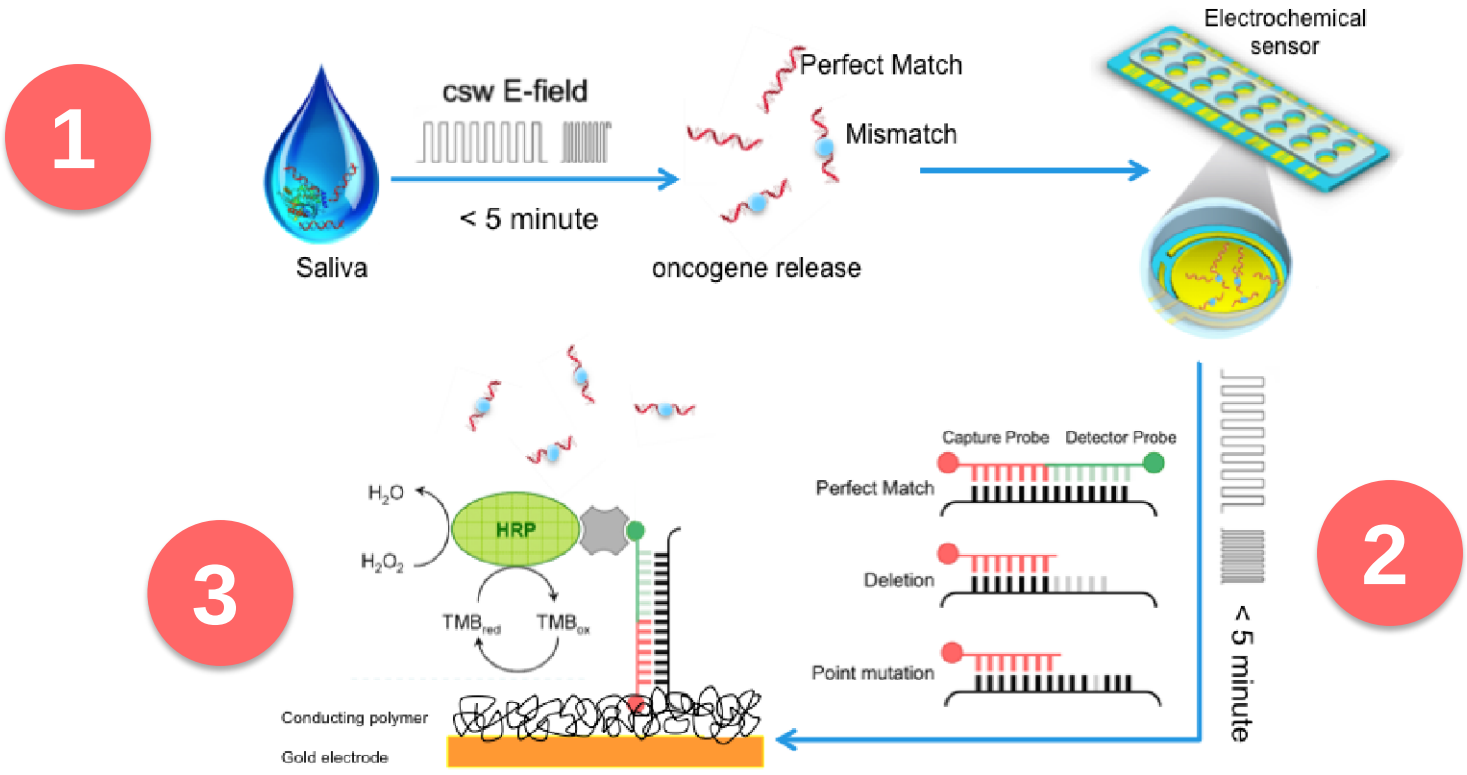
FOR IMMEDIATE RELEASE
February 1, 2016

FACT SHEET: Investing in the National Cancer Moonshot

- **Early Cancer Detection:** Recent advances in genomic and proteomic technologies have greatly increased the sensitivity of methods to detect markers of cancer - raising the possibility of using such methods for screening and early detection of cancer. NIH will invest in the development and evaluation of minimally invasive screening assays to enable more sensitive diagnostic tests for cancer.

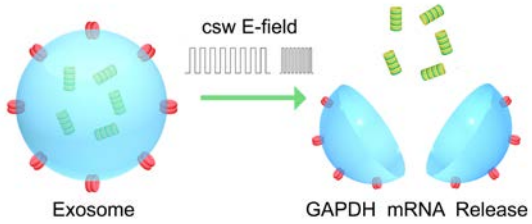
Technology

- EFIRM:
  - Electric field induced release and measurement

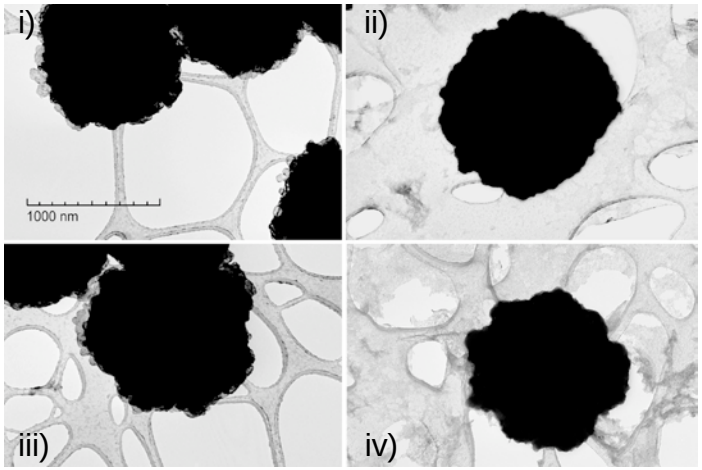


EFGR mutation detection from saliva with electric field

a)



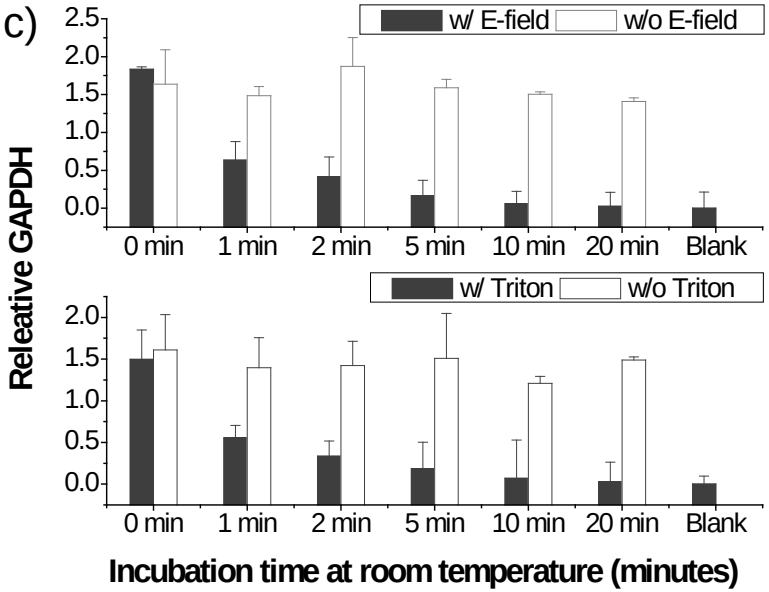
b)



E-field induced release

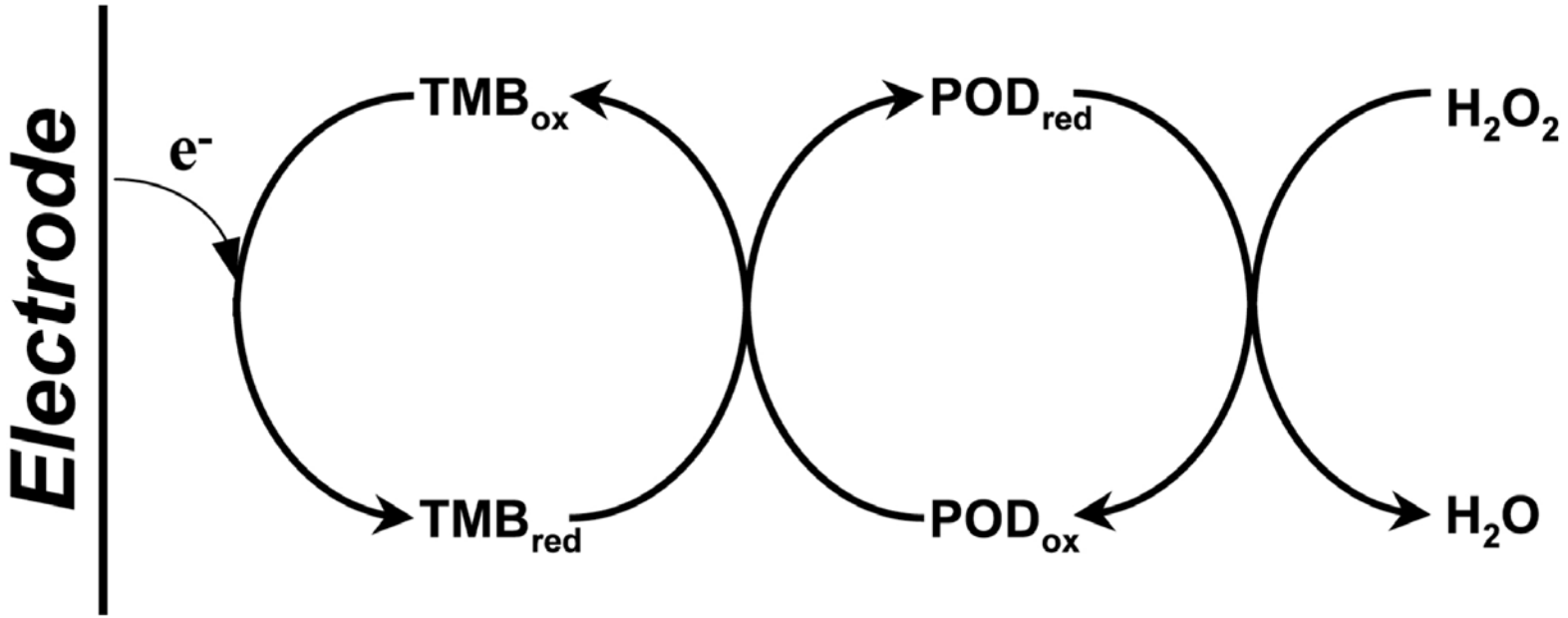
Detergent induced release

c)



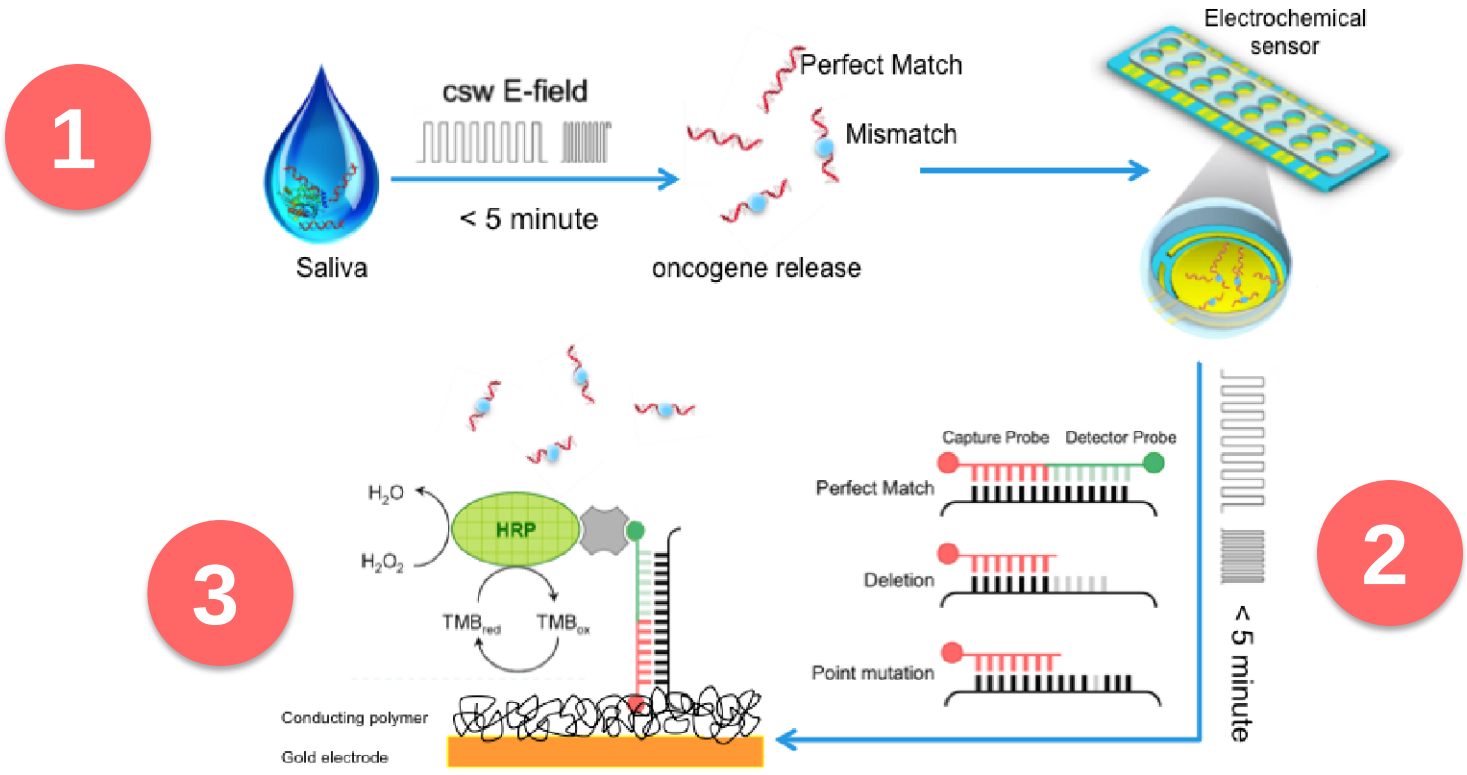
Park, N.J., Li, Y., Yu, T., Brinkman, B.M., and Wong, D.T. (2006). Characterization of RNA in saliva. Clin Chem 52, 988-994.

Wei, F., Yang, J., and Wong, D.T. (2013). Detection of exosomal biomarker by electric field-induced release and measurement (EFIRM). Biosens Bioelectron 44, 115-121.


Electrode
e-
TMBox
TMBred
PODred
PODox
H2O2
H2O

Technology

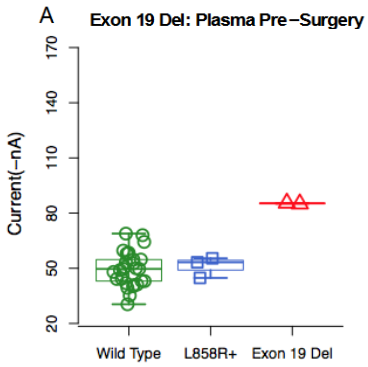
- EFIRM:
  - Electric field induced release and measurement

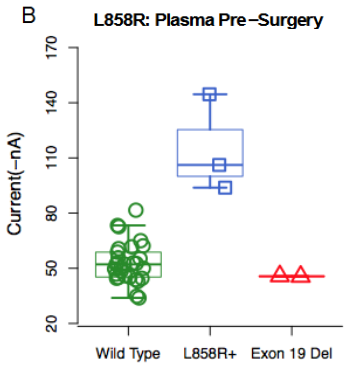


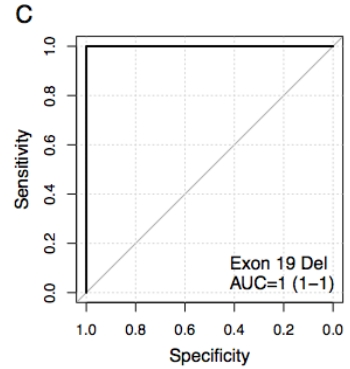
EFGR mutation detection from saliva with electric field

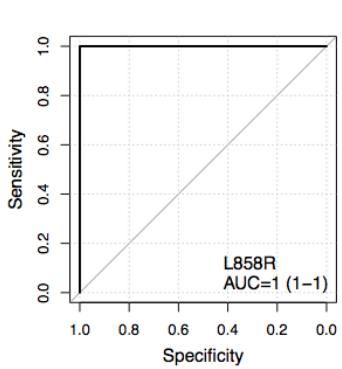
Plasma

Plasma: Pre-Surgery

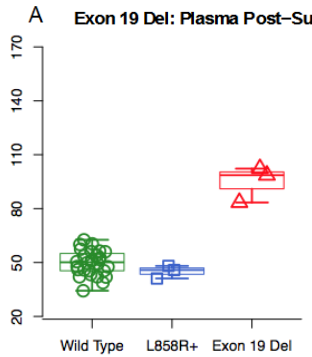


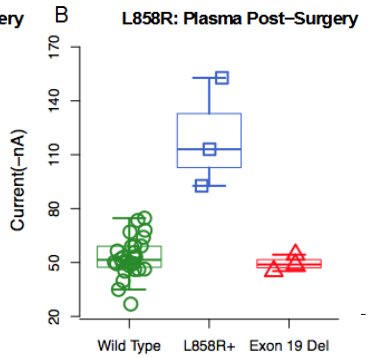


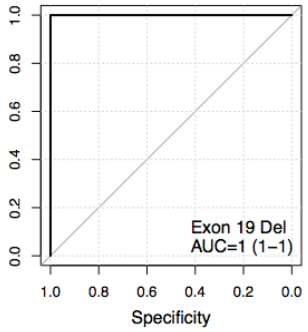


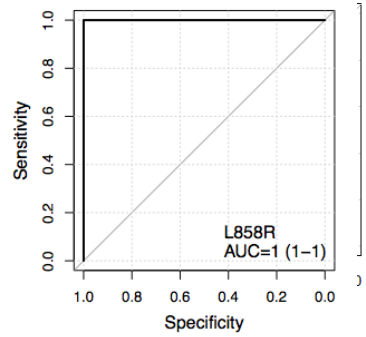


Plasma-Post-Surgery









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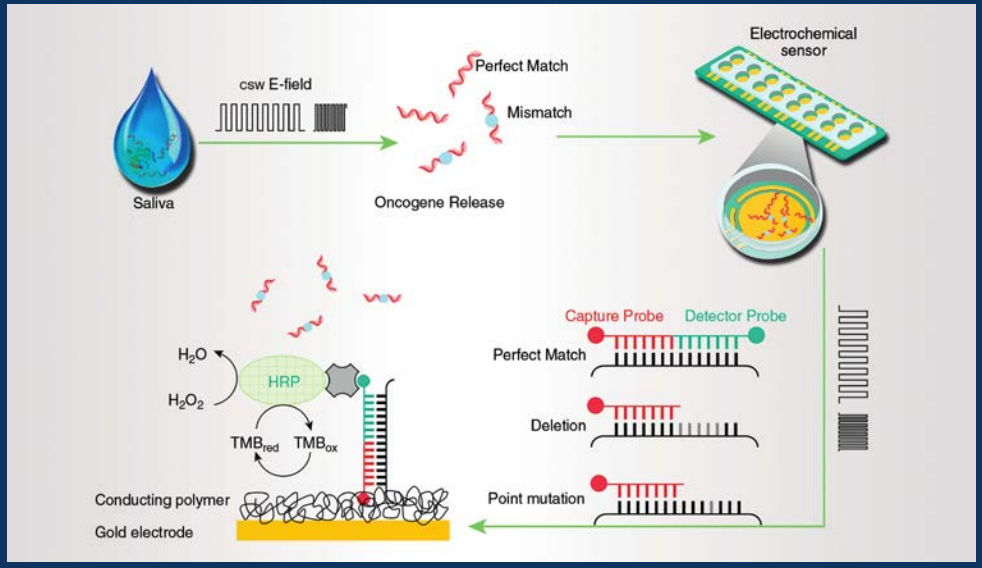


IN THIS ISSUE

ORIGINAL ARTICLES

Procalcitonin Algorithm in Critically Ill Adults with Undifferentiated Infection or Suspected Sepsis: A Randomized Controlled Trial *(See page 1102)*

Early Respiratory Infection Is Associated with Reduced Spirometry in Children with Cystic Fibrosis *(See page 1111)*

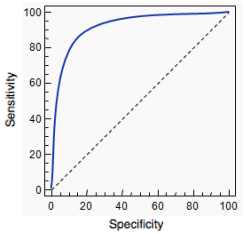
Noninvasive Saliva-based *EGFR* Gene Mutation Detection in Patients with Lung Cancer *(See page 1117)*

α-Hemolysin Activity of Methicillin-Susceptible *Staphylococcus aureus* Predicts Ventilator-associated Pneumonia *(See page 1139)*

Risk Assessment of Tuberculosis in Immunocompromised Patients: A TBNET Study *(See page 1168)*

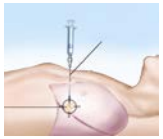
- ***Fast Readout (10min)***
- ***Multiplex***
- ***High sensitivity & specificity***
- ***Very low sample volume***

Intended use



AUC=0.8
Concordance
~80%

Current Clinical Practice

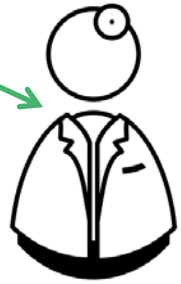


Biopsy

Several days
$ 2000

Mutation Analysis

2 weeks
$450



Doctor

Patient

eLB

Saliva Collection

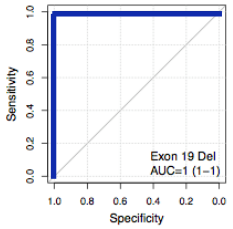
1-10 minutes
$2

Detection

~10 minutes
$20

Wireless Data

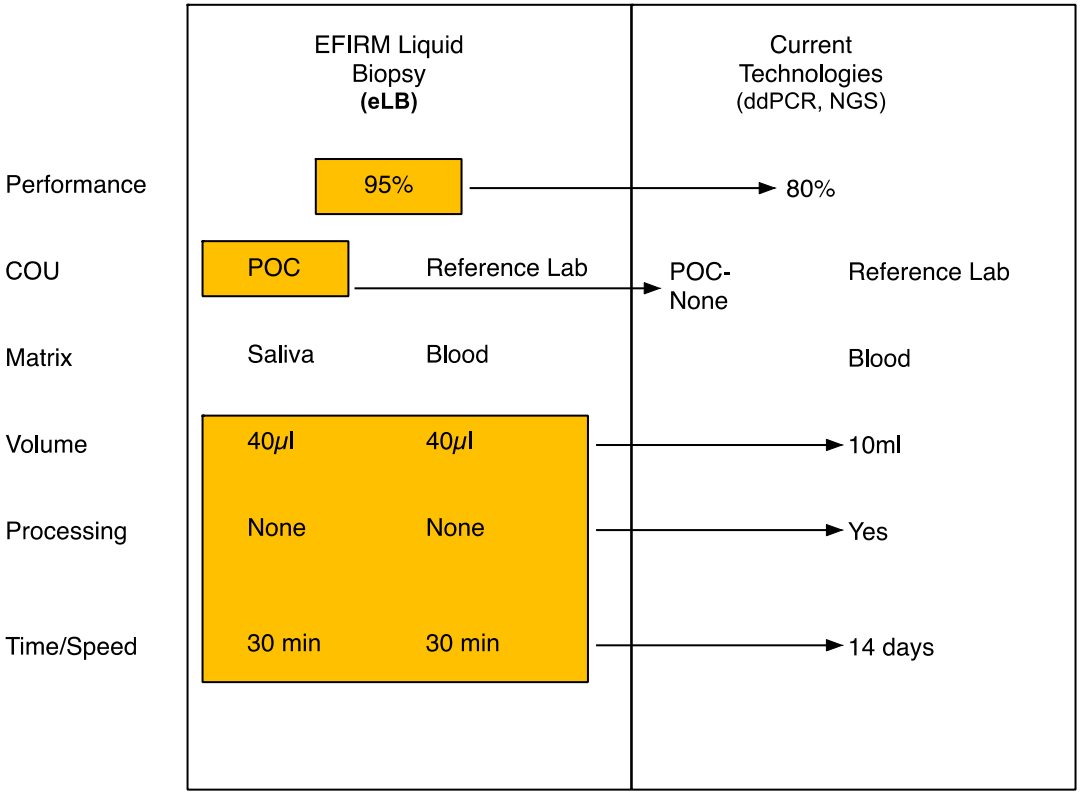
< seconds



AUC=0.95
Concordance
95%

- Early detection of cancer
- 95% sensitivity
- Non/minimally invasive
- Minimal volume (40µl), real time, inexpensive
- Multiplexible
- Actionable mutations
- Secondary resistance mutations
- Personalized medicine/Precision medicine
- Point-of-care
- High-throughput reference lab
- Low resource settings (LMIC)
- Know now

Liquid Biopsy



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