



# Interdisciplinary Infectious Disease Cluster (IIDC)

James Li, Chemistry

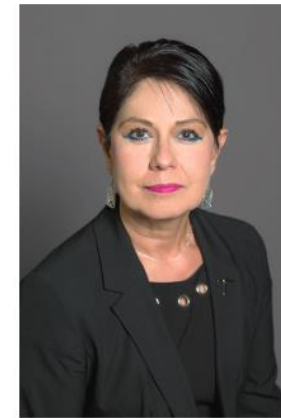
Delfina Dominguez, College of Health Sciences

Jianjun Sun, Biology

# Team Members

- Faculty

- **Dr. James Li**, Biotechnology, Department of Chemistry, COS
- **Dr. Delfina Dominguez**, Clinical Laboratory Science/Public Health Sciences, CHS
- **Dr. JianJun Sun**, Biology, CoS



- Others



**HAMED TAVAKOLI**  
PH.D. STUDENT



**WAN ZHOU**  
PH.D. STUDENT



**AMY NAVA**  
PH.D. STUDENT



**SHUCHEN CHEN**  
PH.D. STUDENT



**CYNTHIA BAUTISTA**  
UNDERGRADUATE STUDENT

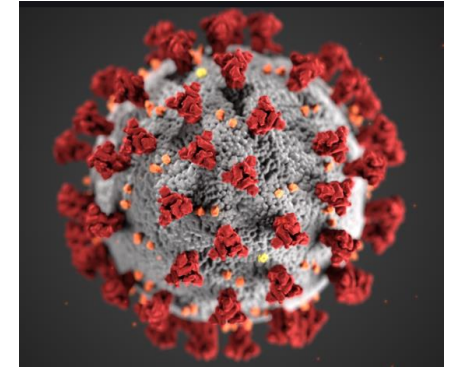


**DANIEL TERREROS**

Texas Tech Medical School, and the  
Medical, Director from El Paso Public  
Health Department

# Interdisciplinary Infectious Disease Cluster (IIDC)

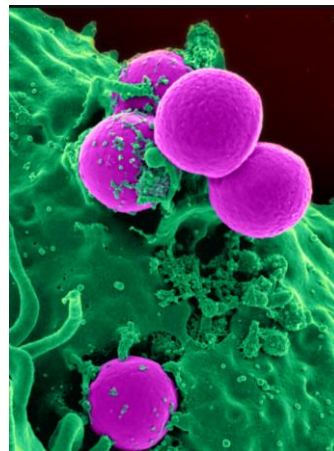
- Infectious disease, a big public health concern
  - Such as the recent coronavirus pandemic (SARS-CoV-2)
  - 42 M COVID-19 cases (USA 8.5 M), 10/22/2020
  - 1.2 M Deaths (225 K), 10/25/2020
  - ...
- **IIDC Goal:** Assembly of a distinguished interdisciplinary team to work collaboratively to address major problems in infectious disease to improve public health
  - Antimicrobial resistance (AMR)
  - COVID-19, and so on



# Proposal

- Problem & Significance

- Antimicrobial resistance (AMR) is an increasingly serious threat to global public health
- Methicillin-resistant *Staphylococcus aureus* (**MRSA**)
  - Life threatening
  - The number one cause of hospital-associated infections with a high percentage of these caused by MRSA.
  - 72,444 MRSA infections and 9,194 related deaths each year in the U.S. only
- Multidrug-Resistant TB (2018)
  - 450,000 MDR-TB
  - 170,000 deaths



# Multidrug Resistance (MDR) Bacteria efflux multiple drugs similar to MDR cancer cells

- MDR in cancer therapy, a major obstacle

*Anal. Chem.* 2008, 80, 4095–4102

## Same-Single-Cell Analysis for the Study of Drug Efflux Modulation of Multidrug Resistant Cells Using a Microfluidic Chip

XiuJun Li,<sup>†</sup> Victor Ling,<sup>‡</sup> and Paul C. H. Li<sup>\*,†</sup>

Department of Chemistry, Simon Fraser University, Burnaby, BC, V5A 1S6, Canada, and BC Cancer Research Center, 675 West 10th Avenue, Vancouver, BC, V5Z 1L3, Canada

Cite this: *Lab Chip*, 2011, 11, 1378

[www.rsc.org/loc](http://www.rsc.org/loc)

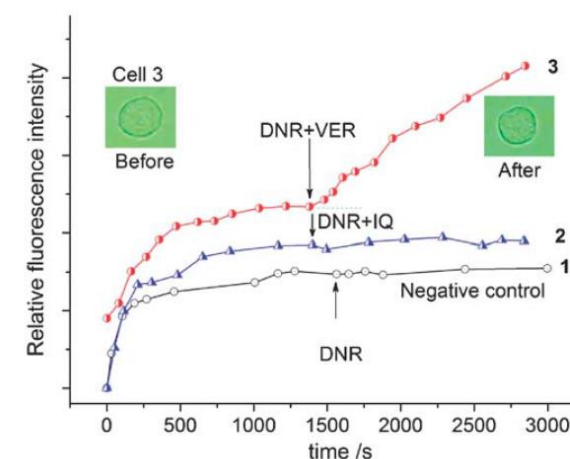
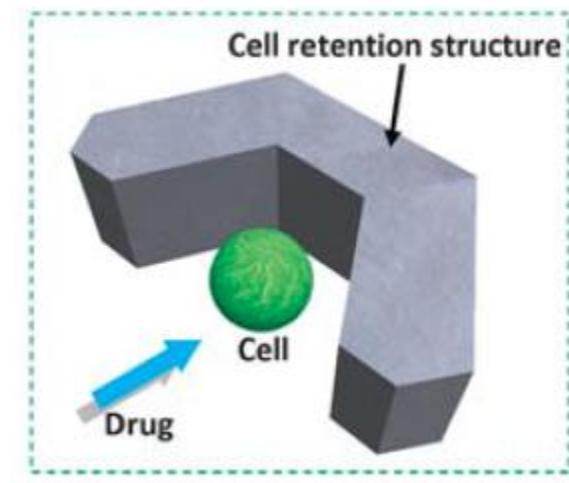
### TECHNICAL NOTE

A simple and fast microfluidic approach of same-single-cell analysis (SASCA) for the study of multidrug resistance modulation in cancer cells<sup>†</sup>

XiuJun Li,<sup>‡</sup> Yuchun Chen and Paul C. H. Li<sup>\*</sup>

Received 24th November 2010, Accepted 10th January 2011

DOI: 10.1039/c0lc00626b



# Objective:

- To develop a POC microfluidic device for the rapid detection of MRSA, through specific recognition by integrated aptasensors on the chip using
  - a low-cost common thermometer
  - Smartphone –based technique



# Plan: Proposal

- R01
- RFA-AI-20-001: Combating Antibiotic-Resistant Bacteria (CARB) Interdisciplinary Research Units (U19)
- TB resistance: R21 or R01

# Thank you!

- Thanks for the IDR support!