



Department  
of Health &  
Social Care

# Critical care



Precision AMR



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# Critical care



- A major hospital location for infection/sepsis
- Sepsis = dysregulated host response to infection leading to life-threatening organ dysfunction
- Infection can be community/hospital/ICU-acquired
- Heterogenous patient populations:
  - young/old
  - medical/surgical
  - immunosuppressed/immunocompetent
- Heterogenous infections
  - Varied sites (lung, abdomen, urogenital, brain, SSTI, bone..)
  - Resistance patterns



# Challenges

- Time-pressured to make correct diagnosis and institute correct Rx
- Patients often sedated/ventilated → unable to give symptoms
- Multiple sepsis mimics (drug/blood reactions, autoimmune, HLH..)
- Current infection biomarkers reasonably sensitive but poorly specific



# Relevant UCLH/UCL critical care research

- Health informatics
- Clinical projects
- Translational projects



# Health informatics

- CC-HIC (NIHR Health Informatics Collaborative - Critical Care theme)
- EMAP



# CC-HIC

- Collect critical care data from 12 ICUs in 5 BRC University Hospitals (UCLH, GSTT, Imperia, Oxford, Cambridge) into UCL 'Safe Haven'
- To date ... >50,000 ICU patients and >250 million datapoints
- Long-term follow-up through NHS Digital

## **The Association between Supraphysiologic Arterial Oxygen Levels and Mortality in Critically Ill Patients**

### **A Multicenter Observational Cohort Study**

Edward Palmer<sup>1,2</sup>, Benjamin Post<sup>2,3</sup>, Roman Klapaukh<sup>2,4</sup>, Giampiero Marra<sup>5</sup>, Niall S. MacCallum<sup>1,2,6</sup>, David Brealey<sup>1,2,6</sup>, Ari Ercole<sup>7</sup>, Andrew Jones<sup>8</sup>, Simon Ashworth<sup>9</sup>, Peter Watkinson<sup>10</sup>, Richard Beale<sup>8,11</sup>, Stephen J. Brett<sup>12</sup>, J. Duncan Young<sup>10</sup>, Claire Black<sup>2,13</sup>, Aasiyah Rashan<sup>2</sup>, Daniel Martin<sup>14,15</sup>, Mervyn Singer<sup>1,6</sup>, and Steve Harris<sup>1,2,6</sup>

Am J Respir Crit Care Med Vol 200, Iss 11, pp 1373–1380, Dec 1, 2019



# EMAP

- Since April 2019, UCLH has gone 'EPIC' fully computerized electronic health record system (EPIC)

***EpIc***

- Good news: amazing repository of clinical, lab and imaging data
- Not-so-good: very hard to extract data for research purposes
- EMAP (funded by grant from UCLH Charity)
- = sophisticated means of extracting *any* data, even in real-time
- major utility for clinical trial recruitment, research, audit ...



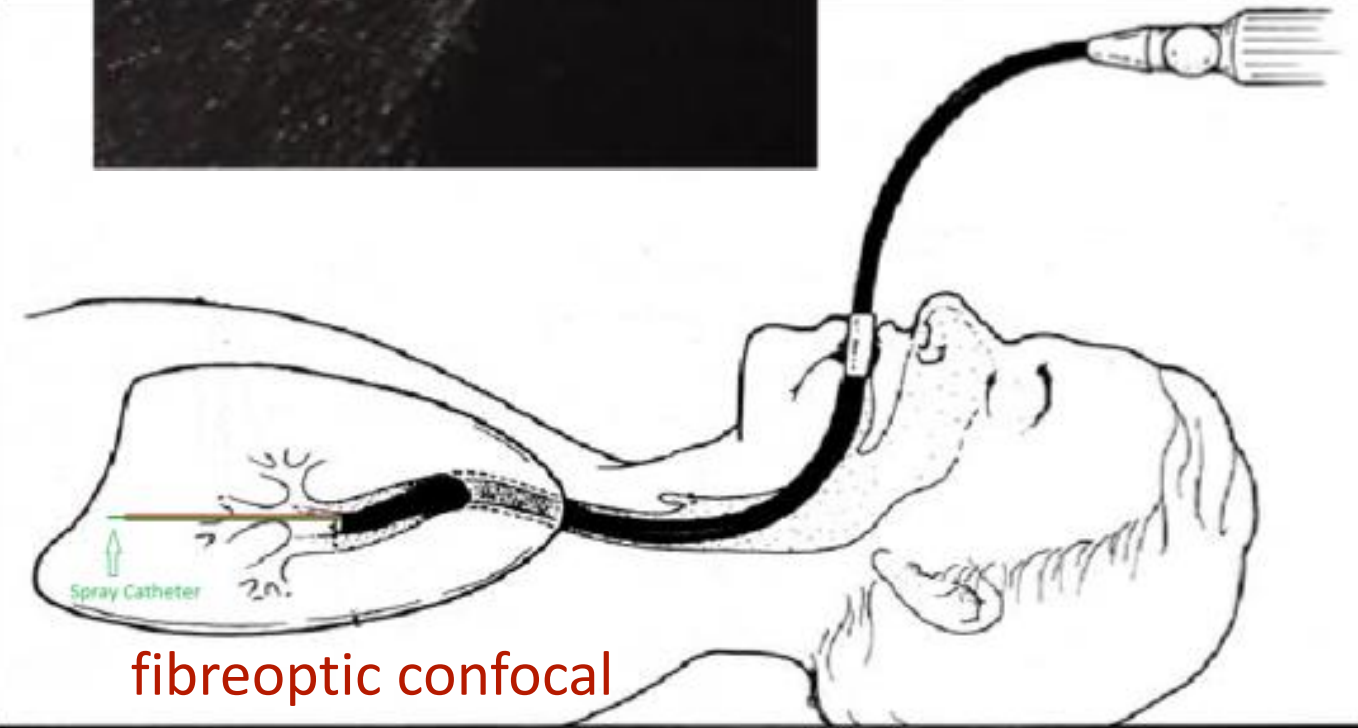
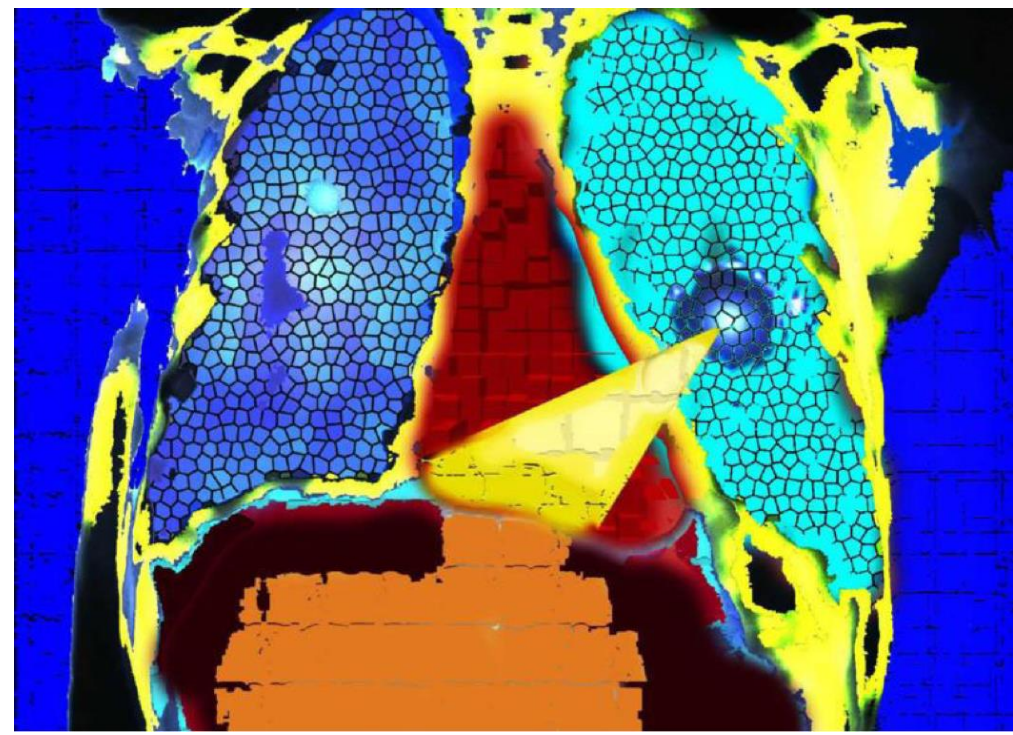
# Clinical projects (academic + industry)

- Novel infection diagnostics
  - PoC diagnostics, lab diagnostics (Biomerieux, Abbott, Safeguard...)
- Novel sepsis diagnostics
  - Mologic, DSTL, Gentian, Radox
- Novel therapies for sepsis, ARDS
  - stem cells, interferon-beta, IVIg A+M, beta-blockade, etc ..
- Human factors





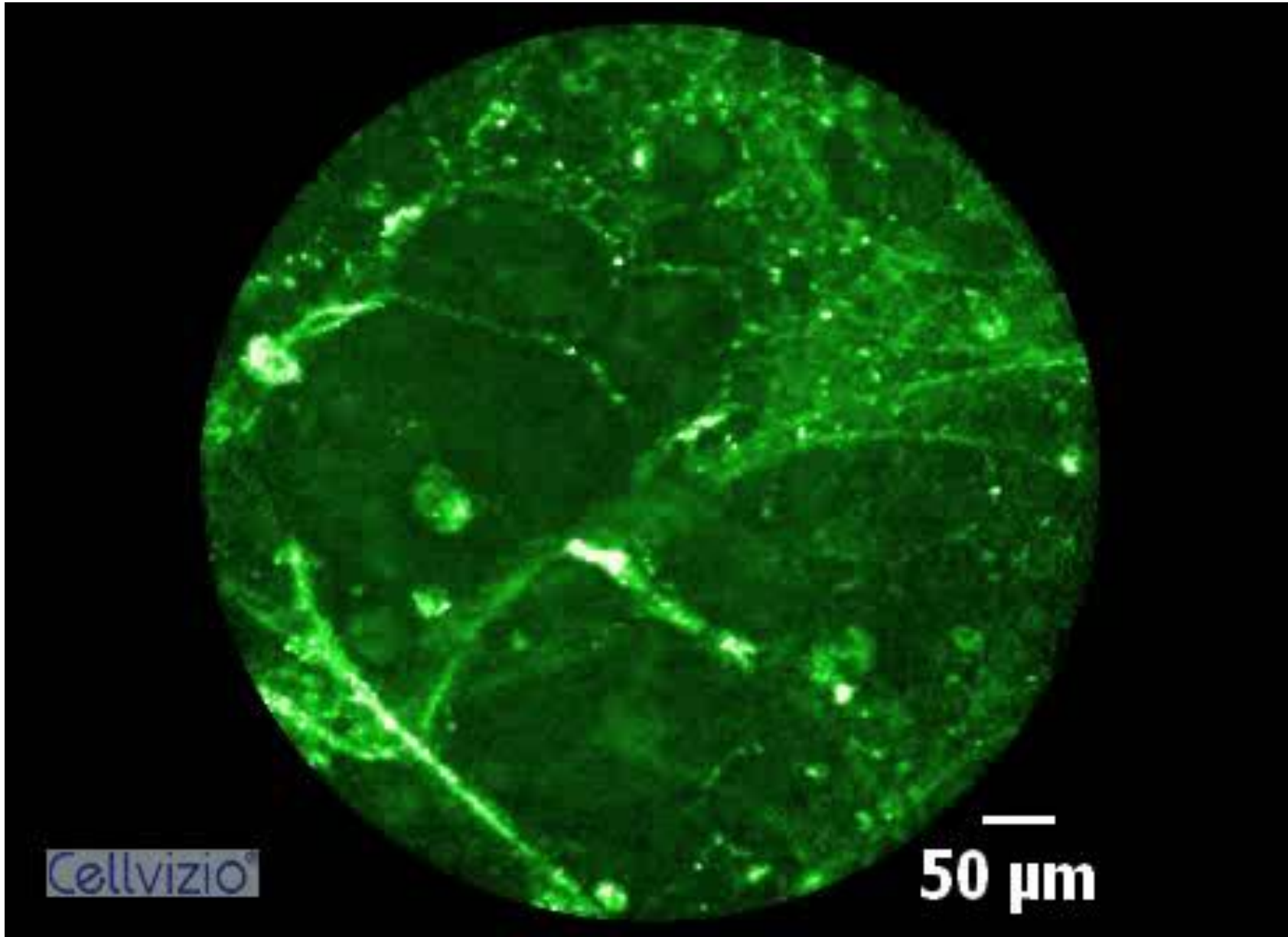
# Optical endomicroscopy



fiberoptic confocal



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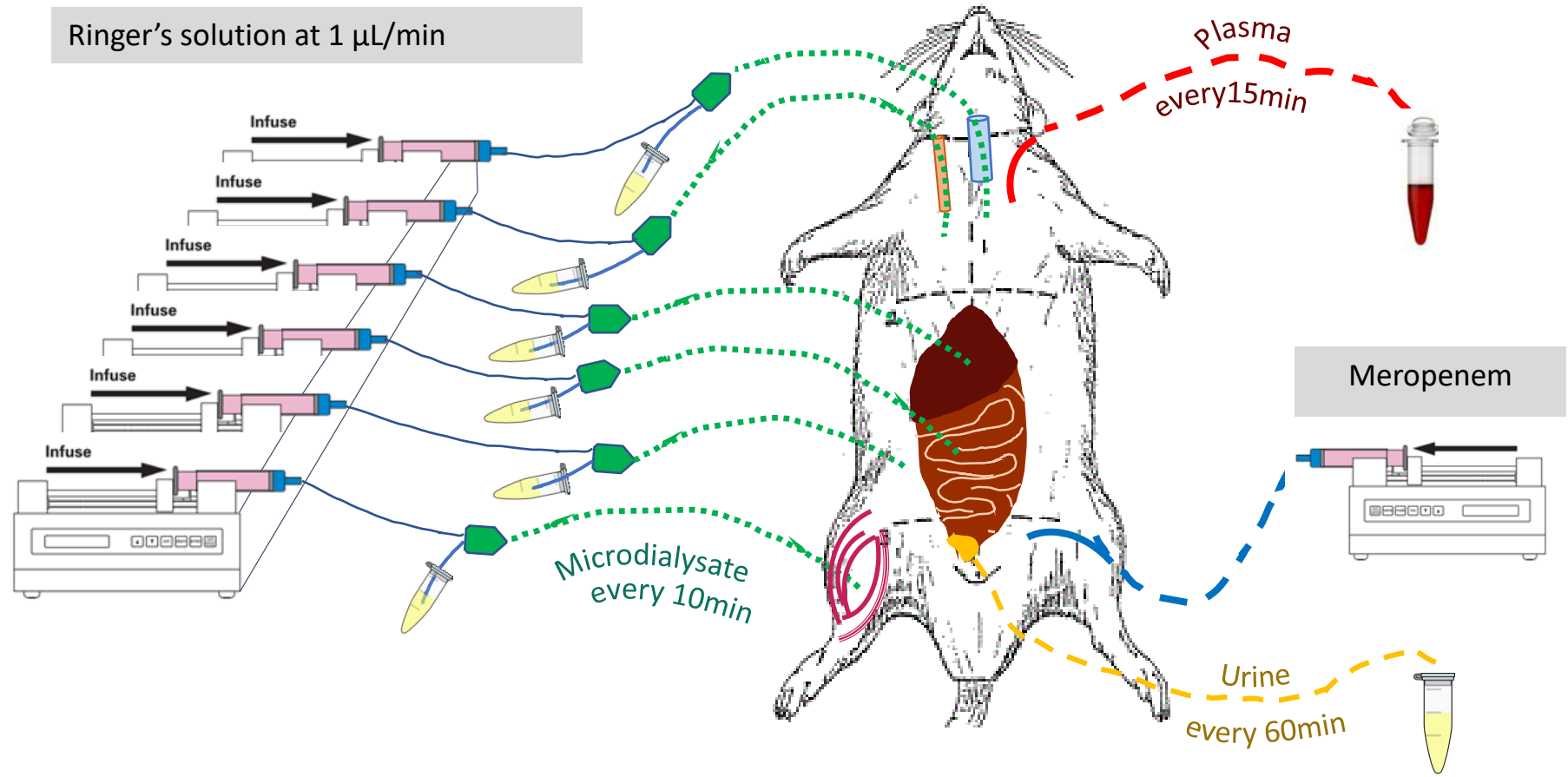








# Pre-clinical/translational projects

- sophisticated short- and long-term animal models of sepsis e.g. faecal peritonitis, pneumonia
- instrumented, heavily monitored, fluid-resuscitated
- in vitro models
- various projects related to new antimicrobials, diagnostics, sepsis biomarkers and pathophysiology, monitoring, and novel therapies (e.g antibiotics delivered via liposomes or nanoparticles)



# Microdialysis monitoring of tissue antibiotic concentrations



-  Respiratory Tract
-  Intravascular
-  Liver
-  Intra-peritoneal
-  Subcutaneous
-  Intra-muscular



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**Thank you for listening!**

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