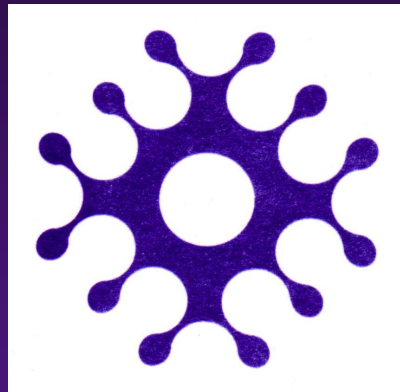


Rapid testing and automation in clinical microbiology: where are we today ?



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Two testing places – evolving concept

point-of-care testing

simple but reliable tests for critical questions and for
immediate decisions

+

clinical microbiology laboratories

complex testing
confirmatory testing
automated and multiplex technology
consultation

Didier Raoult.

In vitro diagnostics in clinical microbiology: status quo and the future.
18th ECCMID, Barcelona, 2008.

Two testing places – evolving concept

point-of-care testing

simple but reliable tests for critical questions and for immediate decisions

miniaturisation

+

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automation

replacement of technicians with machines



- random access
- highly standardised
- reliable
- quick

Molecular methods

Commercially interesting microorganisms

VS.

Commercially noninteresting microorganisms

Commercially noninteresting microorganisms?

automated isolation of DNA or RNA

+

real-time PCR

GeneXpert Enterovirus Assay: One-Year Experience in a Routine Laboratory Setting and Evaluation on Three Proficiency Panels[∇]

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Received 25 August 2007/Returned for modification 25 October 2007/Accepted 25 January 2008

A prospective unblinded comparative evaluation of three assays for the detection of enteroviral RNA performed on 83 positive and 79 negative cerebrospinal fluid samples showed initial and resolved sensitivities of 90.4% and 98.8%, respectively, for the Cepheid GeneXpert enterovirus assay; 94.0% and 97.6%, respectively, for the Argene enterovirus consensus kit; and 100% and 100%, respectively, for an in-house real-time PCR. The initial and resolved specificities were 100% for all three assays.

Lab-on-a-Chip

microfluidic device that has closed channels, wells, pumps, "virtual" or micromechanical valves and other structures in which the sample is manipulated

chemical reactions at a scale that is 100 to 10,000-fold smaller than traditional assays

Pal R, Yang M, Lin R, et al.

An integrated microfluidic device for influenza and other genetic analyses.

Lab Chip 2005; 5: 1024–1032.

6-minute micro real-time PCR

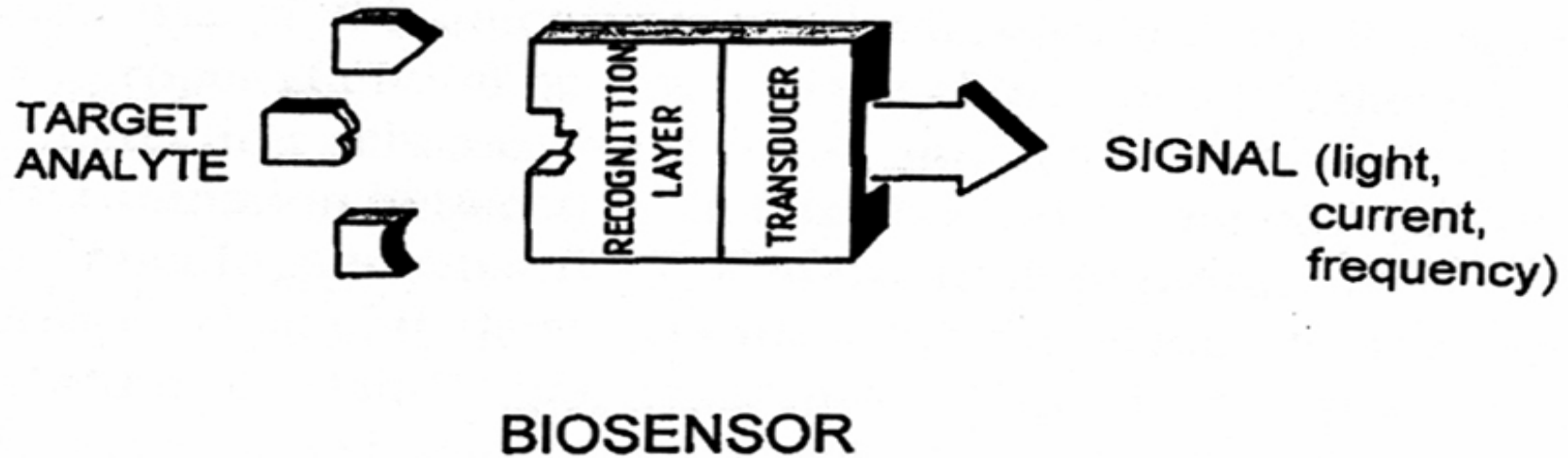
Neuzil P, Zhang C, Pipper J, Oh S, Zhuo L.

Ultra fast miniaturized real-time PCR: 40 cycles in less than six minutes.

Nucleic Acids Res 2006; 34: e77.

Biosensors

small devices which utilize biological reactions
for detecting target analytes



Patolsky F, Zheng G, Hayden O, Lakadamyali M, Zhuang X, Lieber CM.
Electrical detection of single viruses.

Proc Natl Acad Sci USA 2004; 101:14017-22.

Syndromic approach microarrays/biosensors

- CNS infection array/biosensor
- fever in immunosuppressed transplant recipients array/biosensor
- genitourinary tract infections array/biosensor
- lower respiratory tract infections array/biosensor
- blood-borne pathogens screening array/biosensor

JOURNAL OF CLINICAL MICROBIOLOGY, Feb. 2006, p. 561–570
0095-1137/06/\$08.00+0 doi:10.1128/JCM.44.2.561–570.2006
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Use of Electrochemical DNA Biosensors for Rapid Molecular Identification of Uropathogens in Clinical Urine Specimens

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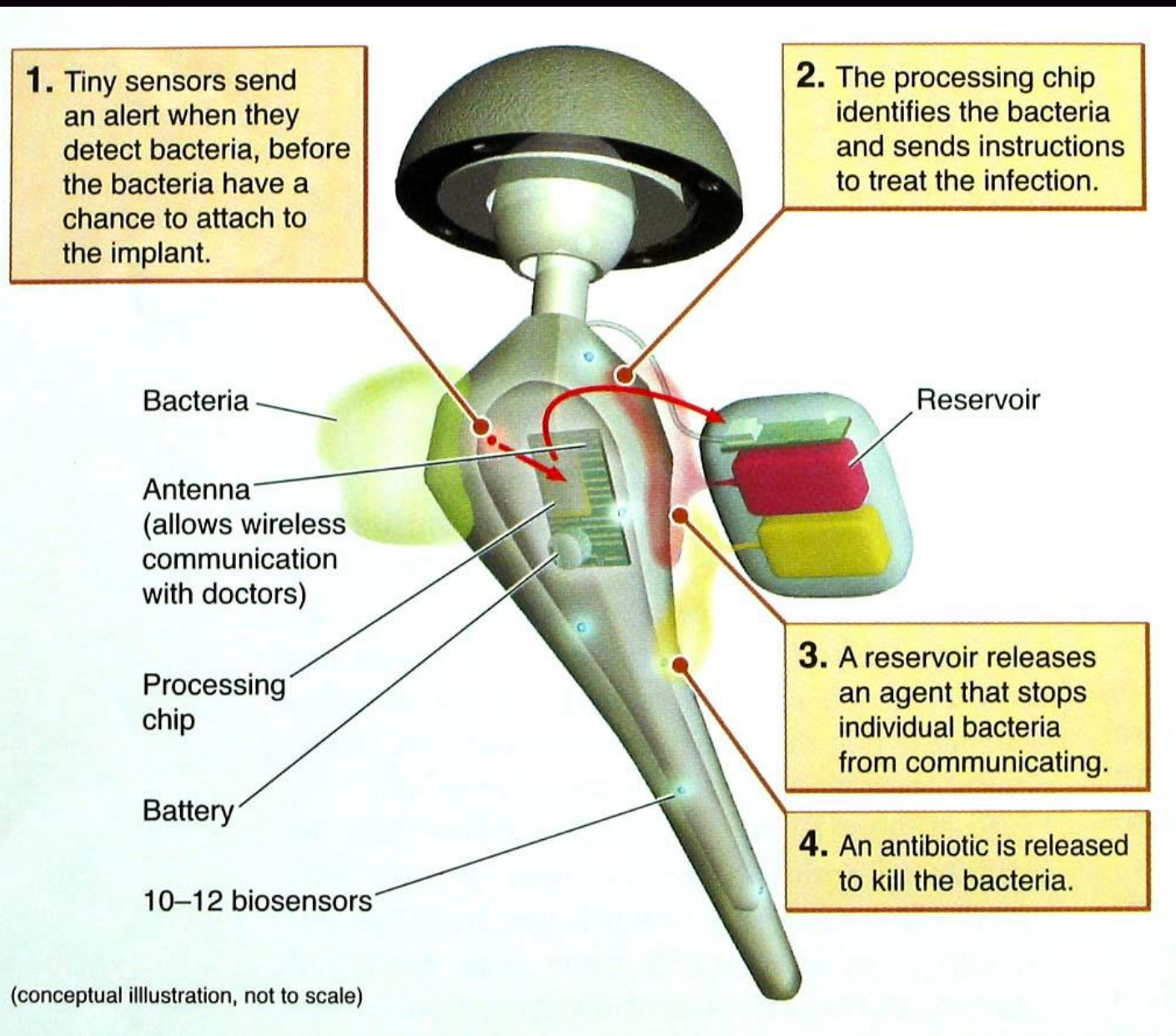
INNOVATION

Ibis T5000: a universal biosensor approach for microbiology

David J. Ecker, Rangarajan Sampath, Christian Massire, Lawrence B. Blyn, Thomas A. Hall, Mark W. Eshoo and Steven A. Hofstadler

Abstract | We describe a new technology, the Ibis T5000, for the identification of pathogens in clinical and environmental samples. The Ibis T5000 couples nucleic acid amplification to high-performance electrospray ionization mass spectrometry and base-composition analysis. The system enables the identification and quantification of a broad set of pathogens, including all known bacteria, all major groups of pathogenic fungi and the major families of viruses that cause disease in humans and animals, along with the detection of virulence factors and antibiotic resistance markers.

Intelligent chips ?



Ehrlich GD et al.
Intelligent implants to battle biofilms.
ASM News 2004; 70: 127-133.