Committee on Mobile Health and Bioengineering in Laboratory Medicine (C-MHBLM/ IFCC-ETD)

Bernard GOUGET, Chair C-MHBLM

10th – 11th November 2018
Hotel Novotel Budapest City, Hungary

IFCC GENERAL CONFERENCE
BUDAPEST NOVEMBER 9-11, 2018

IFCC International Federation of Clinical Chemistry and Laboratory Medicine

Advancing excellence in laboratory medicine for better healthcare worldwide

Definition (C-MHBLM)

mHealth is a sub segment of eHealth

mHealth is the use of mobile and wireless devices to improve health outcomes, healthcare services and health research .

Lab medicine is seeing disruption with the introduction of artificial intelligence, machine learning, robotics, social networking platforms and wearable technology.

Definition (C-MHBLM)

- **Bioengineering** is a discipline that applies engineering principles of design and analysis to biological systems and biomedical technologies.

- **Examples include**: portable disease diagnostic devices, new medical imaging technology, advances in sensors, signal treatment, data analysis, robotics and intelligent control systems, nanoscale tools to study biological systems,….

NBIC: Nanotechnology, Biotechnology, Information Technology and Cognitive Science

- **Nanotechnologies** allow us to manipulate matter at a scale of a billionth of a meter, or even at the scale of the atoms
- **Biotechnology**, the B refers to a number of techniques which also includes genetics, and regenerative cell biology
- **IT the computing power** allows to multiply the efficiency of research > AI
- **C stands for cognitive science**

Integration of these 4 fields represents transhumanism's best hope for enhancing human capabilities and serving human needs

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Lab Medicine in the digital age

- The future of healthcare is **connected**, **patient centered**, **mobile** and **social.**
- Number of LM **tasks performed by trained professionals** will be replaced by technology.
- Rise in **patient engagement**
- **24/7 on line availability of health services** will strenghten **predictive medicine**.

Are we prepared for what lies ahead?

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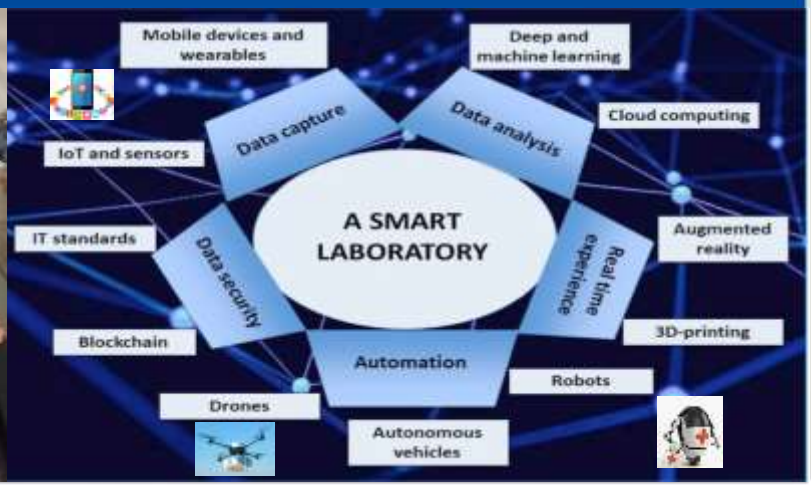
The SWITCH to SMART DIGITAL LAB *from Pr Damien Gruson*
(SMART: Speed Metrics Automation Remote Technologies)



mHealth: the promise of a quantum leap forward for Lab Medicine

- **The use of mobile and wireless technologies** has the potential to transform the face of lab medicine services across the globe.

- **Many factors are driving this evolution**:

Rapid advances in mobile technologies and applications, new opportunities for the integration of mobile health into existing eHealth services, and the continued growth in coverage of mobile cellular networks.

Smartphones are revolutionizing medicine

Smartphones are revolutionizing the diagnosis and treatment of illnesses, thanks to add-ons and apps that make their ubiquitous small screens into medical devices, researchers say. PHOTO: BLOOMBERG

Continuum of mHealth tools

- **Measurement**
  - Tracking- diet, exercise
  - Blood sugar, blood pressure
- **Diagnostic**
  - Portable imaging
  - Sensors
- **Treatment**
  - Chronic disease management
  - Remote clinical trials
- **Comprehensive**
  - Dissemination of health information
  - Disease surveillance
  - Prevention & Wellness interventions
  - Education & awareness
  - Helpline

Applications of mHealth

Klonoff, P., & Pratt, W. (2012). Healthcare in the pocket: Mapping the space of mobile-phone health interventions. Journal of Biomedical Informatics, 45(1), 184-198.

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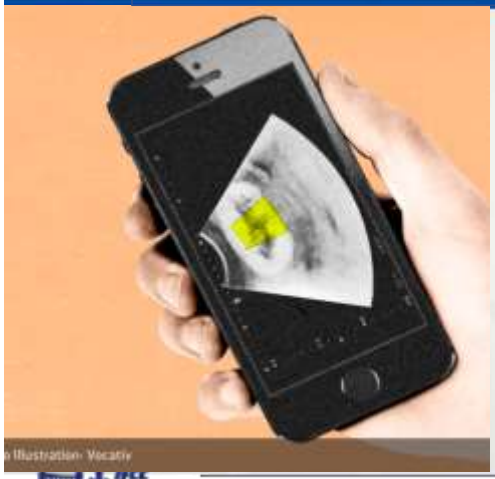
Doctor Uses His Phone To Diagnose Own Kidney Stone

Smartphone ultrasound technology could someday be the norm in medicine



- **Dr. Eric Topol, a cardiologist and advocate of mobile health technology**,

had an unexpected chance to demonstrate his ideas recently: he used his smartphone and a mobile ultrasound device to diagnose his own kidney stone at home.

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Oxygen Saturation

Oxygen saturation/pulse measured simultaneously with blood pressure, using an Masimo iSpO2 placed on the left ring finger

Glucose monitoring: still a timely topic

Minimal Invasive Glucose Monitoring

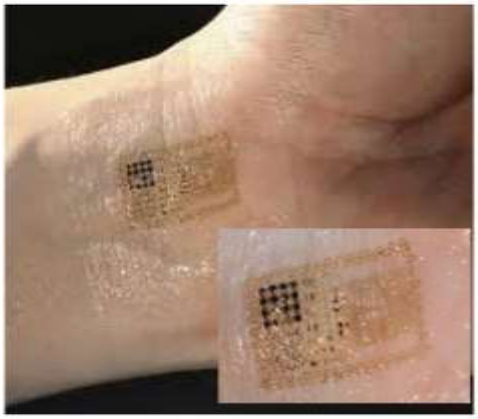
Subdermal Implant
- Measures glucose in skin fluids
- Sensor lifespan 72 hours

Source: Minimed Paradigm RTS, Medtronic Inc

Smart Contact Lens
- Sensors and microchip embedded in contact lens
- Measures glucose in tear fluid in the eye

Source: Google contact lens

A Lab-on-skin: Biosensors tattoos



Medical or non-medical devices can be applied to the skin permanently or non-permanently for measuring biological functions like heart-rate, temperature, etc.

From Steven R Steinhubl et al.

Sci trans Med 2015 Apr 15:7 (283)

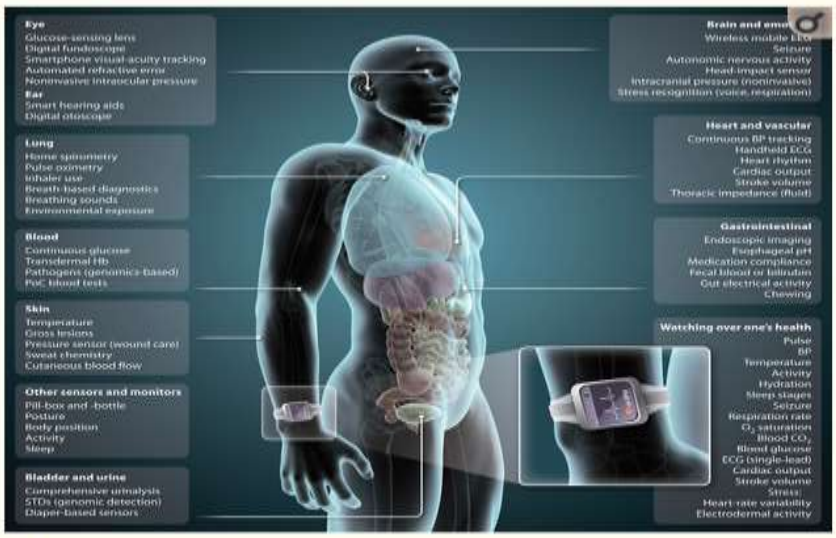


Fig. 1

Sensing a shift in health care. Shown are bodywide measurements by mHealth technologies that are available to health care providers and patients to aid in the tracking, diagnosis, or management of various physiological processes and disease conditions. **(Inset) Watching over one's health**. Multiple developers have reported that the listed physiological parameters are measurable with sensors in a wrist-worn device. BP, blood pressure; Hb, hemoglobin; STDs, sexually transmitted diseases.

The smart phone as a major disruptive element

- In the future, « the **health data will be continuously monitored and streamed** to personal data clouds **alerting the individual or health care professionals** at early signs of illnesses or pathological conditions **in real time,** opening the possibility to a **preventive medicine** prior to the onset of disease. »

From Pr M . Neumaier

C-MHBLM Mission statement

- **To map out** the challenges and opportunities facing LM and m-health in the networked age.

- **To explore** the role of social media in health care communication, the uses of wearable technologies, the potential of big data to reshape health behaviors, the ethics in m-health, and the impact on the doctor/patient/ specialist in LM relationships.

C-MHBLM Terms of reference

- 1**. To review the current concepts of m-Health** including broadband connectivity, software, digital networking, big data, mobile connectivity, smart infrastructure and even artificial intelligence to support the delivery of health and medical care for individuals and communities.
- 2. **To promote the potential of e-health and m-health in laboratory medicine to improve service delivery for patients** including more cost effective models of care, remote monitoring, improved access even over large distances and rapid data analyses and generation of knowledge.
- 3. **To establish collaborations and partnerships with the other organizations** concerned with e- Health /m-health and **clinical societies** and int. organizations/bodies and **industry.**
- 4. T**o promote an environment** where digitally enabled and integrated systems **help specialists in lab medicine** to deliver **patient-centered health experiences and quality health outcomes.**

C-MHBLM Membership 2018-2020

- **EDT-EC Liaison**: Prof Damien **Gruson** (BE)
- **Chair**: Dr Bernard **Gouget** (FR)
- **Full members:**
  - Dr James H **Nichols** (US)
  - Prof Kazuhiko **Kotani** (JP)
- **Corresponding members**:
  - Dr Anna **Fuezery** (CA); Dr Ramy Samir Helmy **Assaad** (EG)
- **Corporate representative**: Michael **Heydlauf,** Siemens (US)
- **Young Scientist** : Dr Zihni Onur **Uygun** (TR)

C-MHBLM Activities

CONGRESSES 2018:

- **15th Arab Conference of Clin Biology Conf. :** E-health tools for the medical lab for better outcomes, **April 18-21 2018 Ramallah (PA)**
- **1st Conf. on** :"Meeting the needs of Mediterranean countries" **Roma, July 2-4**
- **Calilab 2018 :** Risk Quality and management in m-Health, **Buenos Aires, October 24-27**
- **5th European Congress on eCardiology and eHealth:** Smartphone as a lab, **Moscov, October 29-30**

PUBLICATIONS:

- Laboratory medicine and mobile health technologies at crossroads: Perspectives for the management of chronic diseases. Gruson D[1,2], Ko G[3]. Crit Rev Clin Lab Sci. 2016 Oct;53(5):352-7
- New solutions for the sample transport and results delivery: a digital lab D.Gruson eJIFCC2018VolNo3pp210-214

C-MHBLM Activities

- **EDITORIALS/VIEWPOINTS**

- **Transforming Big Data into Knowledge**, EFLM newsletter n°1: 2017
- A **new Type of Convergence between Biology and Technologies**:**NBIC** IFCC news, May 17
- **Artificial Intelligence and Big Data**: the next Digital Disruption, IFCC news Feb-March 2018
- **Harnessing M-Health to improve Diabetes management**, IFCC news LMI April 2018
- **The next « Big Leap » Forward for lab Medicine: Artificial Intelligence**, IFCC news May 2018
- **The evolving Digital Era and Ethics,** IFCC news , October 2018

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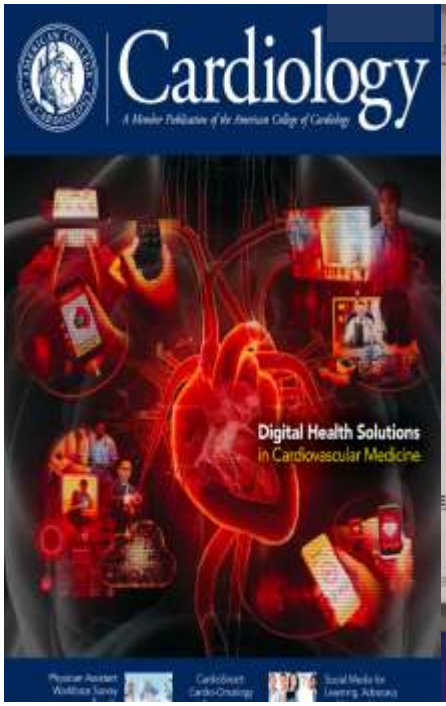
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THANK YOU !