

Biosensing Textiles for Medical Monitoring Applications

2010 Concertation and Consultation Workshop on Micro-Nano-Bio Convergence Systems (MNBS)

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February 15-16, 2010

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Outline

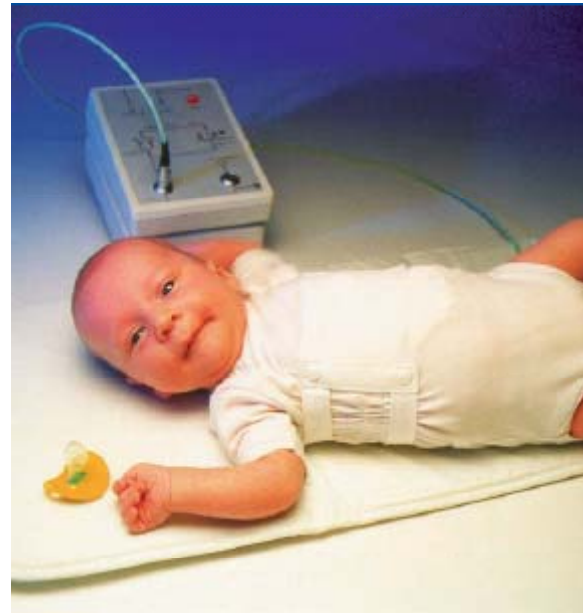
- Motivation of BIOTEX
- Consortium
- Common monitoring, biochemical monitoring and biosensing
- Project achievements and challenges
- Future steps and needed collaborations

Commercial products in sport

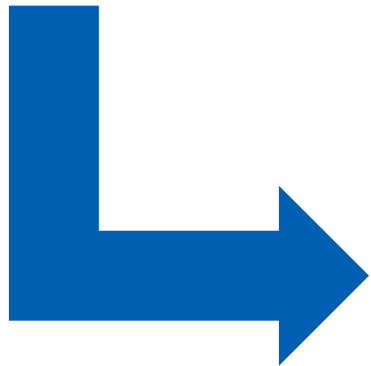


Sources: Adidas-Polar and Nike-Apple

Medical wearable systems



Sources: Vivometrics and Verhaert



Can it be extended by biochemical measurements in body fluids?

Selected sensors and targeted applications

| Sensing groups | Sensing methods | Sweat | Blood/plasma | Targeted Applications |
|-----------------|--|---|--|-----------------------------|
| Optical | Optical spectroscopy | | Non invasive O ₂ saturation | Sports |
| | Optical biosensors | | pH CRP | Wound |
| | Optical Colorimetry on sensitive layer | pH | | Sports |
| Electrical | Impedance | Conductivity | | Sports Diabetes Wound |
| | Impedance | Sweat Rate | | Sports Diabetes |
| Electrochemical | Electrochemical | Electrolytes Concentration Cl, Na, K | | Sports |

Source: BIOTEX

Achievements (1)

- Tested several sensing techniques in sweat, e.g. sports
 - Optical → sweat pH
 - Chemical → electrolytes concentration Na⁺, Cl⁻, K⁻
 - Electrical → sweat conductivity, sweat rate
- Development of biosensing techniques for wound healing
 - Optical biosensors → pH, CRP
- Developed a textile sweat pump
- Realized breadboards to perform tests on volunteers

Achievements (2)

- Proof of concept
 - Sensing of ultra-low concentrations with a wearable system
 - Collecting sweat
 - Calibration of the sensors
 - For the first time, perform continuous and real-time measurements in body fluids using a wearable system

Further challenges

- Sensor applicability for the selected applications
- Acceptance by the scientific and the medical communities
- Improve system to perform tests on more subjects
- Next step: perform pilot trials of the sensors

Future steps and needed collaborations



- Industry interested in commercial potential of BIOTEX results to support improvement and robustness of BIOTEX system and produce typ. 50-100 systems
- Clinics and physicians to supervise and perform pilot trials for 1-2 selected applications
 - Necessary approvals, from ethical, risk and safety point of views
- Scientific and medical communities to support novel way of monitoring for specific applications in combination with physiological monitoring
- Cluster collaboration to address these 3 aspects

Acknowledgments to BIOTEX consortium and European Commission



Thank you for your attention.

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