TROY TECHNICAL

BIOSENSORS

WEEKLY REPORT

October 31 - November 6, 2026 | Issue 2026-W44

Analytical validity, clinical utility, workflow fit and reimbursement

11	10
ANALYZED ARTICLES	PRIORITY THEMES

Issued 2026-11-06 | English edition | fixed approved cover artwork



Biosensors: the boundary moved from isolated claims to qualification evidence

11 English articles were reviewed independently from the Japanese edition. Ten themes are retained for management decisions.

SIGNAL 01 | BIORECOGNITION

Wearable pMUT Array: Low-Voltage Cardiovascular Imaging Specs

Researchers have developed a wearable piezoelectric micromachined ultrasonic transducer (pMUT) array that achieves 81.7% broadband performance while operating at a low voltage of 5 Vp.

SIGNAL 02 | TRANSDUCTION

Hanji-Based Theranostic Patch: Sweat Sensing and Drug Delivery

Researchers at Jeonbuk National University developed a breathable, paper-based patch using traditional Korean mulberry paper (hanji) that integrates wireless uric acid sensing and drug-delivery microneedles.

SIGNAL 03 | DEVICE

Mycoplasma Biosensor: Electrochemical Detection of MHO in T Cells

Researchers have developed an electrochemical aptamer biosensor for the direct detection of Mycoplasma hyorhinis (MHO) by targeting the p37 high-affinity transport protein.

SIGNAL 04 | CLINICAL WORKFLOW

Wireless Magnetic Implant System: Neuromuscular Sensing Specs

Researchers have developed a skin-mounted magnetometer array that wirelessly tracks 3-mm-diameter magnetic beads implanted in human muscle tissue.

DECISION

Focus this week's management attention on analytical validity, clinical utility, workflow fit and reimbursement. Move only when the linked evidence can be reproduced under your own operating conditions.

THREE MANAGEMENT MOVES

1. Buyers: define intended use, comparator, false-result cost and action triggered by each measurement.
2. Suppliers: link sensing materials and devices to calibration, stability, manufacturability and data integrity.
3. Executives: track sample variability, specificity, drift, clinical endpoints, regulation and payment.

EVIDENCE DISCIPLINE

FACT states what the collected English source reports. BUSINESS READ and ACTION are editorial interpretations. UNKNOWN lists information that the source file does not establish. A linked article is not treated as independent confirmation of every claim.

Five numbers or evidence anchors that require conditions

81.7%
A05

SOURCE-BOUND CONDITION
Researchers have developed a wearable piezoelectric micromachined ultrasonic transducer (pMUT) array that achieves 81.7% broadband performance while operating at a low voltage of 5 Vp.

25.36%
A10

SOURCE-BOUND CONDITION
The platform achieves a detection limit of 9.3 nanomolar for uric acid and a drug-loading capacity of 25.36%, offering a potential alternative to repeated blood draws for monitoring gout and hyperuricemia.

2 cells
A08

SOURCE-BOUND CONDITION
The sensor achieves a detection limit of ~2 cells/mL in human T-cell co-culture medium, offering a non-invasive monitoring tool for high-value cell therapy manufacturing.

6 cm
A09

SOURCE-BOUND CONDITION
The system achieves sub-millimetre resolution at depths up to 6 cm, providing a high-fidelity control signal for neuroprosthetic movement.

4.65%
A11

SOURCE-BOUND CONDITION
Apollon secured first place in both analysis and clinical accuracy categories at the Glucose Prediction Challenge 2026, achieving a MARD of 4.65%.

HOW TO USE THESE NUMBERS
Each value is shown with the condition stated in the collected English article. Do not compare values across different test methods, device sizes, operating temperatures or commercial stages without normalizing those conditions.

Where the value chain moved

Each stage combines one leading theme and one supporting theme. The report treats handoffs as evidence transfers, not decorative arrows.

1

Biorecognition

P01/P06

Researchers have developed a wearable piezoelectric micromachined ultrasonic transducer (pMUT) array that achieves 81.7%.

2

Transduction

P02/P07

Researchers at Jeonbuk National University developed a breathable, paper-based patch using traditional Korean mulberry paper.

3

Device

P03/P08

Researchers have developed an electrochemical aptamer biosensor for the direct detection of Mycoplasma hyorhinis (MHO) by.

4

Clinical workflow

P04/P09

Researchers have developed a skin-mounted magnetometer array that wirelessly tracks 3-mm-diameter magnetic beads implanted in.

5

Data & reimbursement

P05/P10

Hybrid paper-plastic fluidic diode modules enable unidirectional, sequential reagent delivery in lateral flow assays (LFAs).

EVIDENCE REQUIRED AT EACH HANDOFF

Biorecognition to Transduction	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck sample variability, specificity, drift, clinical endpoints, regulation and payment.
Transduction to Device	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck sample variability, specificity, drift, clinical endpoints, regulation and payment.
Device to Clinical workflow	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck sample variability, specificity, drift, clinical endpoints, regulation and payment.
Clinical workflow to Data & reimbursement	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck sample variability, specificity, drift, clinical endpoints, regulation and payment.

COMMON CONTROL POINT

No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented sample variability, specificity, drift, clinical endpoints, regulation and payment.

Priority map: maturity and next decision locus



P01	Wearable pMUT Array: Low-Voltage Cardiovascular Imaging Specs System / adoption | cue: clinical
P02	Hanji-Based Theranostic Patch: Sweat Sensing and Drug Delivery Business / rules | cue: capacity
P03	Mycoplasma Biosensor: Electrochemical Detection of MHO in T Cells Tech / process | cue: no system/business cue
P04	Wireless Magnetic Implant System: Neuromuscular Sensing Specs System / adoption | cue: System
P05	Fluidic Diode Modules: Multi-step Reagent Delivery for LFAs System / adoption | cue: Integration
P06	Apollon: AI Glucose Prediction Accuracy and Moglu CGM Roadmap System / adoption | cue: clinical
P07	Consumer CGM: Metabolic risk and insulin resistance in 62,122 adults System / adoption | cue: platform
P08	Short-Lived Hyperglycaemia: Impact on CGM Metrics in T1D (2026) Tech / process | cue: no system/business cue
P09	Centrifugal Microfluidics: Automated POC Molecular Diagnostics Specs Business / rules | cue: acquisition
P10	Wearable Cortisol Sensors: Differential OECTs Reduce Drift Tech / process | cue: no system/business cue

REPRODUCIBLE POSITIONING RULE

Horizontal position uses five discrete stages: Research, Prototype, Joint evaluation, Product adoption and Scale. The vertical bands classify the next decision locus: Tech / process, System / adoption, or Business / rules (including supply systems). Article-title cues take precedence; the overview is used only when the title is silent. These are categories, not impact ranks. Bubble diameter reflects the editorial score.

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P01 Wearable pMUT Array: Low-Voltage Cardiovascular Imaging Specs

A05 | Biorecognition | Pilot

2026-11-02

FACT

Researchers have developed a wearable piezoelectric micromachined ultrasonic transducer (pMUT) array that achieves 81.7% broadband performance while operating at a low voltage of 5 Vp. The device enables continuous in vivo cardiovascular monitoring with blood pressure measurements deviating by only 2.2 mmHg from clinical monitors. This framework bridges the gap between low-voltage CMOS logic and high-performance ultrasound transduction for mass-producible systems-on-chip.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P01.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 21/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P02 Hanji-Based Theranostic Patch: Sweat Sensing and Drug Delivery

A10 | Transduction | Product adoption

2026-11-06

FACT

Researchers at Jeonbuk National University developed a breathable, paper-based patch using traditional Korean mulberry paper (hanji) that integrates wireless uric acid sensing and drug-delivery microneedles. The platform achieves a detection limit of 9.3 nanomolar for uric acid and a drug-loading capacity of 25.36%, offering a potential alternative to repeated blood draws for monitoring gout and hyperuricemia.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P02.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 20/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P03 Mycoplasma Biosensor: Electrochemical Detection of MHO in T Cells

A08 | Device | Pilot

2026-10-30

FACT

Researchers have developed an electrochemical aptamer biosensor for the direct detection of Mycoplasma hyorhinis (MHO) by targeting the p37 high-affinity transport protein. The sensor achieves a detection limit of ~2 cells/mL in human T-cell co-culture medium, offering a non-invasive monitoring tool for high-value cell therapy manufacturing.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 20/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

P04 Wireless Magnetic Implant System: Neuromuscular Sensing Specs

A09 | Clinical workflow | Pilot

2026-10-29

FACT

Researchers have developed a skin-mounted magnetometer array that wirelessly tracks 3-mm-diameter magnetic beads implanted in human muscle tissue. The system achieves sub-millimetre resolution at depths up to 6 cm, providing a high-fidelity control signal for neuroprosthetic movement.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 20/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P05 Fluidic Diode Modules: Multi-step Reagent Delivery for LFAs

A06 | Data & reimbursement | Research

2026-11-04

FACT

Hybrid paper-plastic fluidic diode modules enable unidirectional, sequential reagent delivery in lateral flow assays (LFAs), overcoming the limitations of single-flow architectures. Integration into a SARS-CoV-2 assay resulted in a 2.5-fold enhancement in test line signal intensity compared to conventional single-flow LFAs.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

P06 Apollon: AI Glucose Prediction Accuracy and Moglu CGM Roadmap

A11 | Biorecognition | Research

2026-11-02

FACT

Apollon secured first place in both analysis and clinical accuracy categories at the Glucose Prediction Challenge 2026, achieving a MARD of 4.65%. The company plans to integrate this AI prediction technology into "Moglu," a non-invasive continuous glucose monitor (CGM) utilizing Raman spectroscopy.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P07 Consumer CGM: Metabolic risk and insulin resistance in 62,122 adults

A03 | Transduction | Research

2026-11-04

FACT

Analysis of 62,122 adults on the Levels platform indicates that average glucose is a more reliable indicator of metabolic risk than HbA1c in non-diabetics. Specifically, average glucose ≥110 mg/dL was associated with a doubling of occult hyperinsulinemia prevalence compared to lower levels.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P07.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

P08 Short-Lived Hyperglycaemia: Impact on CGM Metrics in T1D (2026)

A04 | Device | Research

2026-10-30

FACT

Short-lived hyperglycaemia (SLH) accounts for 18.5% of hyperglycaemic episodes in paediatric type 1 diabetes patients and can inflate CGM metrics. Removing these brief episodes increases daytime time in range (TIR) by 1.74 percentage points, suggesting that aggregate metrics may lead to unnecessary insulin intensification.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P08.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P09 Centrifugal Microfluidics: Automated POC Molecular Diagnostics Specs

A02 | Clinical workflow | Product adoption

2026-11-02

FACT

A sample-to-answer automated centrifugal microfluidic system has been developed for point-of-care molecular diagnostics using computer-vision readout. The system integrates a three-layer PMMA disc, a custom PCB heating module, and a Raspberry Pi 4-based signal acquisition unit to automate detection.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

P10 Wearable Cortisol Sensors: Differential OECTs Reduce Drift

A01 | Data & reimbursement | Research

2026-11-03

FACT

A differential organic electrochemical transistor (OECT) design reduces calibration drift in wearable sweat cortisol sensors by pairing a molecularly imprinted polymer (MIP) with a non-imprinted polymer (NIP). Testing over 14 days showed that differential output shifted by only 1% to 10%, compared to 15% to 22% for the MIP alone. This approach improves the long-term stability of cortisol monitoring in wearable formats.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: TECH / PROCESS

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW | 0-30 DAYS	NEXT | 1-12 MONTHS	LATER | 1-5 YEARS
Operating companies	define intended use, comparator, false-result cost and action triggered by each measurement	Run production-like qualification with explicit acceptance and stop criteria.	Build a portfolio and architecture that can absorb technology and supplier changes.
Materials, equipment and technology suppliers	link sensing materials and devices to calibration, stability, manufacturability and data integrity	Create shared reliability, process-window and failure-analysis data with customers.	Standardize interfaces, traceability, lifecycle support and recovery services.
Trading, investment and legal teams	Map sample variability, specificity, drift, clinical endpoints, regulation and payment.	Contract for capacity, quality, change notice, liability, alternatives and exit.	Diversify regional, technical and customer concentration risk.

ROADMAP

NOW | 0-30 DAYS
Evidence ledger
Owner: Strategy + quality
Deliverable: claim, source, condition, owner

NOW | 0-30 DAYS
Risk screen
Owner: Procurement + legal
Deliverable: unknowns, alternatives, stop

NEXT | 1-12 MONTHS
Joint qualification
Owner: R&D + supplier
Deliverable: process window and failure data

NEXT | 1-12 MONTHS
Commercial gate
Owner: Business + finance
Deliverable: unit economics and capacity

LATER | 1-5 YEARS
Platform strategy
Owner: Executive team
Deliverable: portfolio and interface roadmap

LATER | 1-5 YEARS
Service layer
Owner: Operations + channel
Deliverable: monitoring, maintenance and recovery

GO / NO-GO GATES

GATE	OWNER	REQUIRED EVIDENCE	NO-GO CONDITION
G1 Evidence	**Quality**	Source, test conditions and reproducibility	No traceable evidence
G2 Integration	**R&D**	Interface, process window and failure analysis	Cannot meet system conditions
G3 Commercial	**Business**	Capacity, total cost, contract and alternatives	Economics or supply cannot be supported
G4 Lifecycle	**Operations**	Monitoring, maintenance, change notice and exit	No accountable operating plan

ANALYZED ARTICLES | ITEMS 01-11

Every title and URL is displayed in full. URLs wrap without shortening and remain clickable. A verified-reference label means the translated HTML did not retain its original source URL.

ID	FULL ARTICLE TITLE	FULL SOURCE / VERIFIED REFERENCE URL - CLICKABLE
A01	Wearable Cortisol Sensors: Differential OECTs Reduce Drift	https://doi.org/10.64898/2026.10.31.763347
A02	Centrifugal Microfluidics: Automated POC Molecular Diagnostics Specs	https://doi.org/10.21203/rs.3.rs-11174292/v1
A03	Consumer CGM: Metabolic risk and insulin resistance in 62,122 adults	https://doi.org/10.64898/2026.11.03.26367126
A04	Short-Lived Hyperglycaemia: Impact on CGM Metrics in T1D (2026)	https://doi.org/10.64898/2026.10.28.26365991
A05	Wearable pMUT Array: Low-Voltage Cardiovascular Imaging Specs	https://doi.org/10.1038/s41378-026-01451-6
A06	Fluidic Diode Modules: Multi-step Reagent Delivery for LFAs	https://doi.org/10.21203/rs.3.rs-11067801/v1
A07	Standalone Wearable Glucose Inference: Edge Computing vs BLE	https://doi.org/10.21203/rs.3.rs-11184870/v1
A08	Mycoplasma Biosensor: Electrochemical Detection of MHO in T Cells	https://www.nature.com/articles/s44328-026-00118-6
A09	Wireless Magnetic Implant System: Neuromuscular Sensing Specs	https://www.nature.com/articles/s44460-026-00157-6
A10	Hanji-Based Theranostic Patch: Sweat Sensing and Drug Delivery	https://www.hospimedica.com/critical-care/articles/294814478/paper-based-patch-integrates-sweat-sensors-and-drug-delivery-microneedles.html
A11	Apollon: AI Glucose Prediction Accuracy and Moglu CGM Roadmap	https://www.biotimes.co.kr/news/articleView.html?idxno=35792

Biosensors — Selected Articles

Date: 2026-11-08

Articles: 11

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#05 Wearable pMUT Array: Low-Voltage Cardiovascular Imaging Specs

#06 Fluidic Diode Modules: Multi-step Reagent Delivery for LFAs

#07 Standalone Wearable Glucose Inference: Edge Computing vs BLE

#08 Mycoplasma Biosensor: Electrochemical Detection of MHO in T Cells

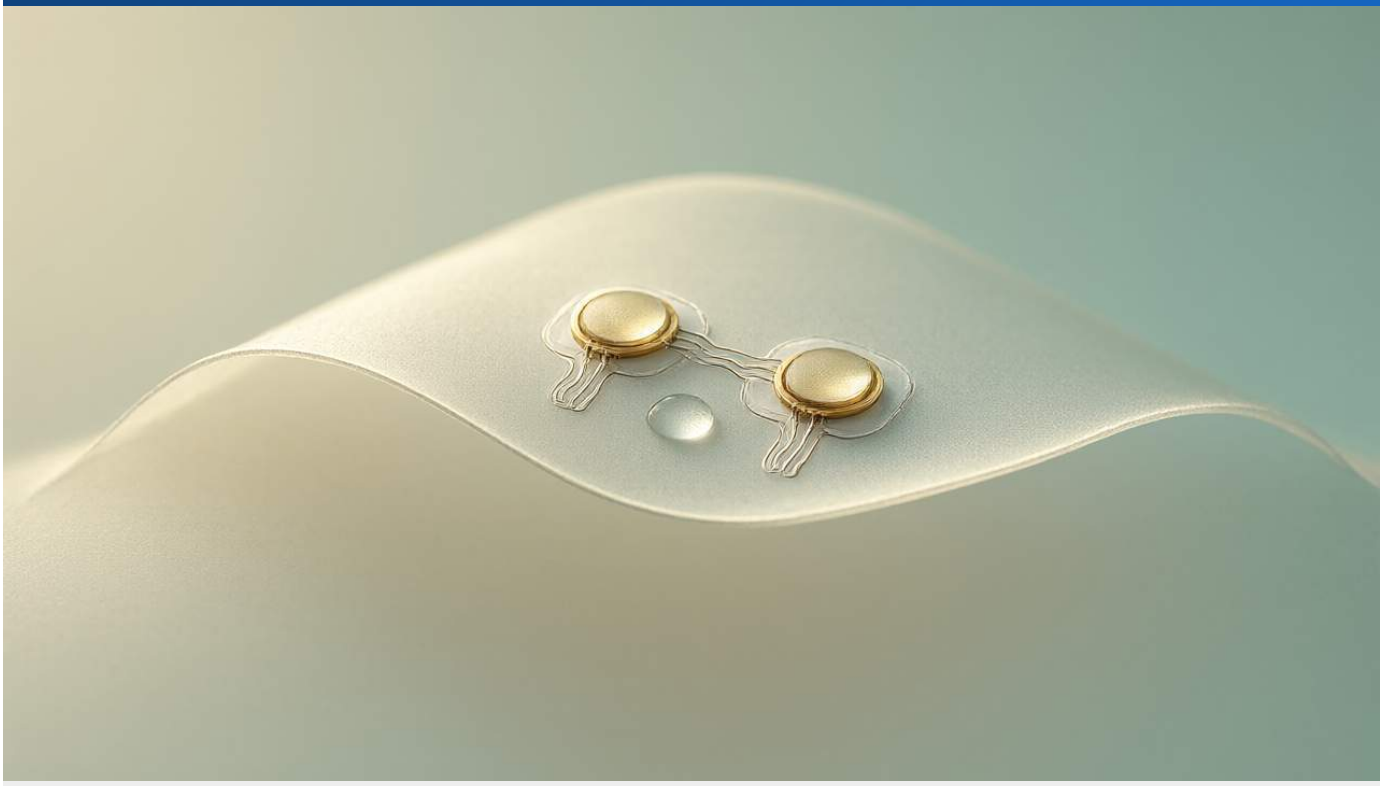
#09 Wireless Magnetic Implant System: Neuromuscular Sensing Specs

#10 Hanji-Based Theranostic Patch: Sweat Sensing and Drug Delivery

#11 Apollon: AI Glucose Prediction Accuracy and Moglu CGM Roadmap

#01 Wearable Cortisol Sensors: Differential OECTs Reduce Drift

Published November 03, 2026 bioRxiv USA



OVERVIEW

A differential organic electrochemical transistor (OECT) design reduces calibration drift in wearable sweat cortisol sensors by pairing a molecularly imprinted polymer (MIP) with a non-imprinted polymer (NIP). Testing over 14 days showed that differential output shifted by only 1% to 10%, compared to 15% to 22% for the MIP alone. This approach improves the long-term stability of cortisol monitoring in wearable formats.

IN DEPTH

Key Findings

The implementation of differential sensing in organic electrochemical transistors significantly mitigates calibration drift in wearable cortisol sensors. In tests using artificial sweat over 14 days, the differential output shifted by 1% to 10% of its range, whereas the response of the MIP-coated transistor alone shifted by 15% to 22% on day 1. Furthermore, for individual pairs at concentrations of 1 to 10nM, the variation between days decreased by an average of 65% to 70%.

Technical Details

The sensor architecture utilizes PEDOT:PSS transistors. The system employs a differential pair consisting of:

- A transistor coated with a molecularly imprinted polymer (MIP) specifically for cortisol.
- A transistor coated with a non-imprinted polymer (NIP) of the same composition.

To obtain the final reading, the NIP response is subtracted from the MIP response. This configuration allows the system to cancel out signals unrelated to cortisol that typically cause output drift over several days.

Background & Context

Wearable cortisol sensors often suffer from output drift due to factors unrelated to the target analyte. This instability means that a calibration performed on the first day of use quickly becomes invalid, hindering the reliability of long-term monitoring. To validate the differential approach, the researchers tested the sensors with sweat from one participant. When measured against the day 1 calibration, both the MIP and differential outputs tracked the direction of changes in salivary cortisol; however, the MIP-only output diverged from the differential output, mirroring the drift observed in laboratory settings.

Significance & Outlook

By reducing the impact of non-specific drift, this differential OECT design enhances the accuracy of wearable cortisol sensing over extended periods. The reduction in daily variation at 1 to 10nM suggests a more robust calibration profile, potentially reducing the frequency of recalibration required for wearable health monitors.

Source: https://doi.org/10.64898/2026.10.31.763347

Collected: November 07, 2026 | Automated Research System (AI)

#02 Centrifugal Microfluidics: Automated POC Molecular Diagnostics Specs

Published November 02, 2026 Research Square



OVERVIEW

A sample-to-answer automated centrifugal microfluidic system has been developed for point-of-care molecular diagnostics using computer-vision readout. The system integrates a three-layer PMMA disc, a custom PCB heating module, and a Raspberry Pi 4-based signal acquisition unit to automate detection.

IN DEPTH

Key Findings

The developed system enables automated molecular diagnostics by combining centrifugal microfluidic discs with a computer-vision-based detection module. The system utilizes AruCo markers as references to identify detection chambers and measure RGB values to determine whether a sample is positive or negative based on defined thresholds.

Technical Details

The centrifugal disc consists of three layers: a 2 mm thick clear PMMA top disc, a 50 µm thick double-sided pressure sensitive adhesive (PSA) middle layer, and a 0.5 mm thick clear PMMA bottom disc. The top layer includes a round loading chamber, a venting channel, and a bead loading column. The middle layer contains the fluid flow channel connecting the loading and detection chambers. These components are fabricated using a Roland Modela MDX-40A CNC milling machine and a Graphtec CE6000-40 cutter plotter.

For sample processing, NBNM agarose beads (Capto Adhere, Cytiva) are packed into the discs. The process involves diluting the bead resin stock in DI-water at 20% (v/v), adding 20 µL to the bead chamber, and dehydrating the beads in a vacuum chamber (15 Pa, 10 min) using a Femto Science CUTE.

The heating module is a custom ring-shaped aluminum PCB (outer diameter 120 mm, inner diameter 75 mm) that employs joule heating. It features a conductor 4288 mm long and 1 mm wide with a resistance of 3.2 Ω and a cross section of 0.03 mm². At a supply voltage of 12V, it has a power dissipation of 43W. Temperature is managed via a MOSFET and a PID control algorithm.

Signal Acquisition and Readout

The readout system employs a Raspberry Pi 4 and a Raspberry Pi Camera Module 2 with an 8-megapixel sensor. A Kapton (polyimide) film is applied to the sensor to serve as an emission filter for fluorescence imaging. The computer vision algorithm identifies the detection chamber via AruCo markers to perform the final RGB value measurement.

Source: https://doi.org/10.21203/rs.3.rs-11174292/v1

Collected: November 07, 2026 | Automated Research System (AI)

#03 Consumer CGM: Metabolic risk and insulin resistance in 62,122 adults

Published November 04, 2026 medRxiv USA



OVERVIEW

Analysis of 62,122 adults on the Levels platform indicates that average glucose is a more reliable indicator of metabolic risk than HbA1c in non-diabetics. Specifically, average glucose ≥110 mg/dL was associated with a doubling of occult hyperinsulinemia prevalence compared to lower levels.

IN DEPTH

Key Findings

Average glucose serves as a more precise marker for metabolic health in adults without diabetes than HbA1c. In a study of 7,930 participants with laboratory data, average glucose tracked insulin resistance, triglycerides, HDL cholesterol, uric acid, and C-reactive protein more closely than HbA1c. Notably, average glucose explained nearly three times more variance in fasting insulin (R^2 0.131 vs 0.048).

Technical Details

The study utilized data from 62,122 free-living adults on the Levels digital-health platform, finding that average glucose was the most reliable measure across weeks with an intraclass correlation of 0.747. The researchers identified a significant link between average glucose levels and occult hyperinsulinemia (defined as fasting insulin ≥10 μIU/mL) in individuals with normal HbA1c: the prevalence was 27.5% for those with average glucose ≥110 mg/dL, compared to 12.6% for those below that threshold.

Analysis of glucose spikes revealed that spike width—rather than spike height or frequency—tracked insulin resistance, triglycerides, and C-reactive protein. While carbohydrate sensitivity was found to be reliable, it did not track insulin resistance.

Background & Context

The utility of continuous glucose monitoring (CGM) for non-diabetic adults has been contested because CGM metrics were originally designed for diabetes management, and standard screening typically relies on HbA1c. This cross-sectional study sought to determine if CGM provides actionable metabolic information for the general population.

Significance & Outlook

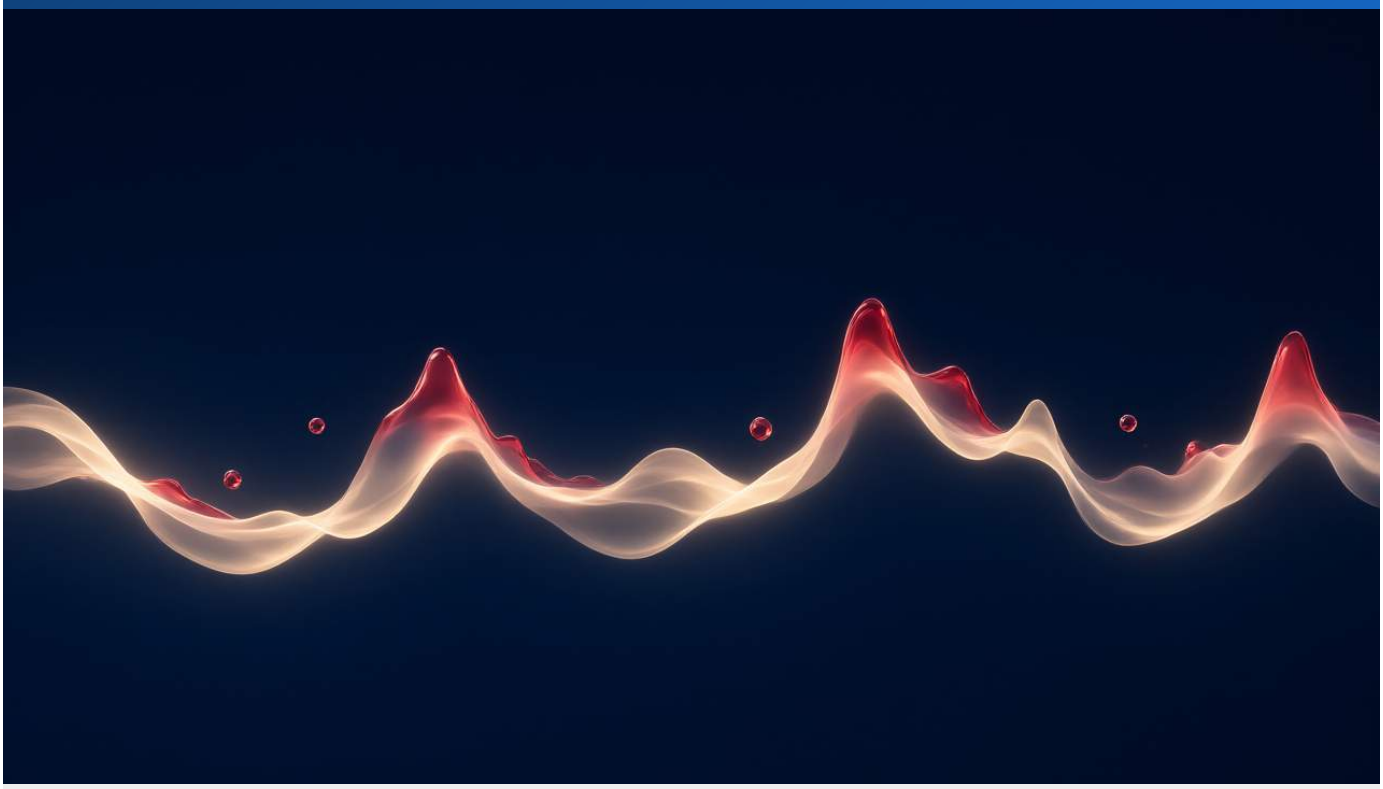
These results suggest a new framework for interpreting CGM data in adults without diabetes, highlighting that traditional markers like HbA1c may miss hidden metabolic risks. The study provides a basis for using average glucose and spike width to identify occult hyperinsulinemia and other metabolic dysfunctions in free-living populations.

Source: https://doi.org/10.64898/2026.11.03.26367126

Collected: November 07, 2026 | Automated Research System (AI)

#04 Short-Lived Hyperglycaemia: Impact on CGM Metrics in T1D (2026)

Published October 30, 2026 medRxiv



OVERVIEW

Short-lived hyperglycaemia (SLH) accounts for 18.5% of hyperglycaemic episodes in paediatric type 1 diabetes patients and can inflate CGM metrics. Removing these brief episodes increases daytime time in range (TIR) by 1.74 percentage points, suggesting that aggregate metrics may lead to unnecessary insulin intensification.

IN DEPTH

Key Findings

Short-lived hyperglycaemia (SLH)—defined as isolated hyperglycaemic episodes lasting 10–60 minutes—significantly impacts continuous glucose monitoring (CGM) metrics in children and adolescents with type 1 diabetes (T1D). In a cohort of 135 participants, 2,874 out of 15,556 hyperglycaemic episodes (18.5%) were classified as daytime SLH, with a median of 19.0 episodes per participant. The removal of SLH from data increased daytime TIR by 1.74 percentage points (95% CI 1.59–1.89) and reduced daytime median glucose by 0.18 mmol/L (95% CI 0.17–0.20).

Technical Details

The retrospective cohort study included patients aged 6 months–20 years with 5-minute CGM data, ≥70% coverage, and median glucose between 6.1–9.4 mmol/L over a 45-day window. Researchers estimated the contribution of SLH by replacing these episodes with plausible trajectories. While whole-day effects were modest, the local impact was more pronounced; at maximal divergence, glucose profiles differed by 1.30 mmol/L (95% CI 1.21–1.38), specifically around meals. The study found that SLH frequency was higher in younger children, those with shorter diabetes duration, and those with better overall glycaemic control (lower GTAA1c).

Background & Context

Current CGM metrics, such as median glucose and TIR, guide therapeutic decisions but fail to distinguish between sustained and transient hyperglycaemia. This lack of distinction means that patients with nearly identical conventional metrics can exhibit markedly different SLH frequencies, a temporal pattern that remains invisible when using summary metrics alone.

Significance & Outlook

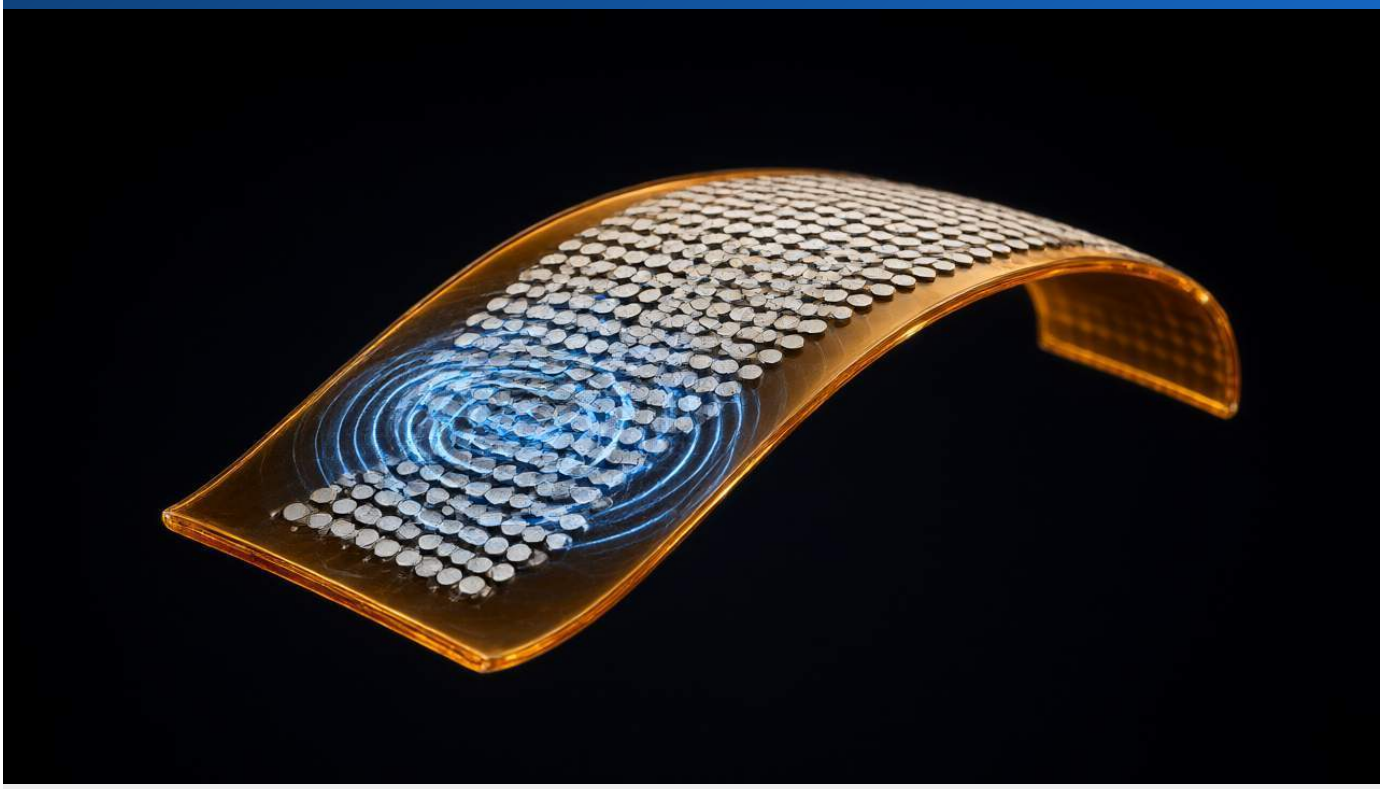
The prevalence of SLH suggests that recurrent brief episodes can inflate the metrics used for insulin titration. The authors conclude that clinicians should verify if hyperglycaemia is brief and isolated before intensifying insulin, as behavioural or educational interventions may be more appropriate. Future directions include integrating automated SLH detection into CGM reports and conducting prospective tests to determine if targeting SLH reduces overtreatment.

Source: https://doi.org/10.64898/2026.10.28.26365991

Collected: November 07, 2026 | Automated Research System (AI)

#05 Wearable pMUT Array: Low-Voltage Cardiovascular Imaging Specs

Published November 02, 2026 Microsystems & Nanoengineering



OVERVIEW

Researchers have developed a wearable piezoelectric micromachined ultrasonic transducer (pMUT) array that achieves 81.7% broadband performance while operating at a low voltage of 5 Vp. The device enables continuous in vivo cardiovascular monitoring with blood pressure measurements deviating by only 2.2 mmHg from clinical monitors. This framework bridges the gap between low-voltage CMOS logic and high-performance ultrasound transduction for mass-producible systems-on-chip.

IN DEPTH

Key Findings

The developed wearable pMUT array operates at a low driving voltage of 5 Vp while maintaining an 81.7% broadband response. In vitro testing using wire phantoms demonstrated a penetration depth of up to 9 cm, with axial and lateral resolutions of 0.64 mm and 1.27 mm, respectively. In vivo applications showed high-fidelity B-mode and M-mode imaging of the radial, brachial, and carotid arteries within a 4 cm depth, performing comparably to commercial rigid probes.

Technical Details

To overcome the physical trade-off between driving voltage and acoustic bandwidth, the study implemented two primary innovations:

- **Frequency-Merging Design:** A novel design, quantified via an equivalent circuit model, was used to decouple the voltage-bandwidth trade-off.
- **Wafer-Scale Fabrication:** A scalable silicon-on-insulator (SOI) wafer-level fabrication process was utilized to enable semiconductor batch manufacturing.

The device supports continuous hemodynamic monitoring for up to 9 hours during daily postural activities. Inter-subject validation confirmed precise blood pressure measurements, showing deviations of 2.2 mmHg compared to FDA-approved clinical monitors.

Background & Context

Continuous non-invasive monitoring of central hemodynamics is critical for cardiovascular care. Previous wearable ultrasound devices typically relied on bulk piezoelectric ceramics (PZT) or 1–3 composites. While these materials offer high penetration and fidelity, they require high excitation voltages—generally ranging from 10 V to over 90 V—to overcome human tissue attenuation. Such high voltages increase system complexity, expand the hardware footprint, and increase battery consumption due to the need for specialized ASICs or charge pumps.

Significance & Outlook

By operating within the standard low-voltage logic levels of complementary metal-oxide-semiconductor (CMOS) technologies (typically below 5 V), this pMUT framework removes the need for high-voltage components. This alignment with standard semiconductor manufacturing provides a feasible path toward highly integrated, mass-producible cardiovascular ultrasound systems-on-chip (SoC).

Source: https://doi.org/10.1038/s41378-026-01451-6

Collected: November 07, 2026 | Automated Research System (AI)

#06 Fluidic Diode Modules: Multi-step Reagent Delivery for LFAs

Published November 04, 2026 Research Square



OVERVIEW

Hybrid paper-plastic fluidic diode modules enable unidirectional, sequential reagent delivery in lateral flow assays (LFAs), overcoming the limitations of single-flow architectures. Integration into a SARS-CoV-2 assay resulted in a 2.5-fold enhancement in test line signal intensity compared to conventional single-flow LFAs.

IN DEPTH

Key Findings

The integration of a two-stage cascaded diode assembly into a SARS-CoV-2 lateral flow assay achieved a 2.5-fold increase in test line signal intensity relative to a conventional single-flow LFA using the same assay chemistries. These hybrid paper-plastic fluidic diode modules allow for controlled, unidirectional, multi-step reagent delivery within a single device.

Technical Details

The fluidic diode modules are designed to facilitate forward flow initiation while providing robust prevention of reverse flow. Characterization across various buffer compositions showed results that align with theoretical predictions. To enable complex sequencing, the diodes can be arranged in cascaded assemblies, which demonstrated well-defined sequential reagent delivery with minimal mixing between zones.

From a manufacturing perspective, the components feature a simple geometry that allows them to be assembled as a planar laminated stack. This design ensures they can be integrated with other LFA components and singulated into individual test strips using the same cutting operations employed in standard LFA manufacturing.

Background & Context

Lateral flow assays are widely used point-of-care diagnostic platforms. However, their traditional single-flow architecture limits them to single-step binding assays. This inherent design precludes the sequential delivery of multiple reagents, which is often necessary for more complex diagnostic procedures.

Significance & Outlook

The fluidic diode provides a scalable and manufacturable solution for introducing multi-step reagent sequencing into diagnostics. Because the system does not require specialized equipment or precision microfabrication, it can be seamlessly integrated into existing LFA architectures, potentially transforming simple assays into more sophisticated multistep diagnostic devices.

Source: https://doi.org/10.21203/rs.3.rs-11067801/v1

Collected: November 07, 2026 | Automated Research System (AI)

#07 Standalone Wearable Glucose Inference: Edge Computing vs BLE

Published October 30, 2026 Research Square



OVERVIEW

Deploying a neurometabolic glucose inference model onto a standalone STM32 microcontroller reduces end-to-end latency from 109.6 ms to 37.8 ms compared to smartphone-dependent architectures. This edge-computing approach optimizes battery life by replacing continuous BLE transmission of high-frequency raw data with local processing and OLED dark-mode interfaces.

IN DEPTH

Key Findings

The transition from smartphone-dependent architectures to a standalone edge-computing paradigm significantly improves processing efficiency for non-invasive blood glucose inference. By executing data filtering, feature extraction, and metabolic state inference locally on an embedded STM32 microcontroller, the system achieves an average end-to-end latency of 37.8 ms, compared to 109.6 ms in cloud- or smartphone-dependent pipelines.

Technical Details

The system addresses the computational demands of monitoring dynamic physiological parameters, such as autonomic nervous system activity and hypoxic stress (indicated by SpO_2 desaturation). Traditional architectures streaming raw PPG waveform data at sampling rates up to 100 Hz via BLE saturate wireless bandwidth and accelerate battery depletion. The standalone architecture mitigates this by:

- **Local Processing:** Performing all inference and anomaly detection at the device node, removing the need for continuous BLE transmission.
- **Data Compression:** Converting millions of high-frequency raw pulse data points into low-frequency summary variables, such as minute-level glucose estimates.
- **Display Optimization:** Utilizing OLED technology and customized dark-mode interfaces. Because OLED pixels can be completely deactivated for "true black," power consumption is reduced compared to LCDs, which require a constant backlight.

Background & Context

Real-time inference is critical for capturing rapid cardiovascular responses to acute stress, such as catecholamine surges driving hepatic glycogenolysis. Local edge computation ensures that model correction terms, including autonomic response coefficients and hypoxic stress modifiers, are evaluated continuously without requiring cellular or Wi-Fi connectivity.

Significance & Outlook

The trade-off between integrated display power and wireless transmission suggests that standalone devices can be more energy-efficient than tethered systems. By combining event-driven OLED activation (such as wrist-raise detection) with the disabling of the BLE module for most operational time, the architecture reduces the overall energy footprint and extends battery longevity in continuous monitoring scenarios.

Source: https://doi.org/10.21203/rs.3.rs-11184870/v1

Collected: November 07, 2026 | Automated Research System (AI)

#08 Mycoplasma Biosensor: Electrochemical Detection of MHO in T Cells

Published October 30, 2026 npj Biosensing Australia



OVERVIEW

Researchers have developed an electrochemical aptamer biosensor for the direct detection of Mycoplasma hyorhinis (MHO) by targeting the p37 high-affinity transport protein. The sensor achieves a detection limit of ~2 cells/mL in human T-cell co-culture medium, offering a non-invasive monitoring tool for high-value cell therapy manufacturing.

IN DEPTH

Key Findings

The developed electrochemical aptamer biosensor enables the label-free detection of Mycoplasma hyorhinis (MHO) and its secreted p37 protein with minimal sample processing. In tests using buffer and human T-cell co-culture medium, the biosensor demonstrated a detection limit of ~2 cells/mL and a quantification limit of ~7 cells/mL. The recorded sensitivity is 16.9 ± 0.7%Δ R ct /cells/mL.

Technical Details

The biosensor operates through the specific recognition of the p37 high-affinity transport protein, a lipoprotein associated with MHO. Unlike traditional DNA-based electrochemical strategies, this aptamer-based approach does not require cell lysis or DNA extraction. Investigation into MHO sample supernatants confirmed that the sensor responds to p37 proteins released into the extracellular medium during growth and lysis, even in the absence of whole MHO cells, although the response is consistently lower than in samples containing intact cells.

Background & Context

Mycoplasma contamination is a primary cause of insidious cell culture failure because these organisms lack a cell wall, allowing them to evade standard antibiotic treatments and alter cellular physiology. Current detection methods typically rely on DNA-based assays, which increase assay complexity and time due to the necessary steps of cell lysis and DNA extraction.

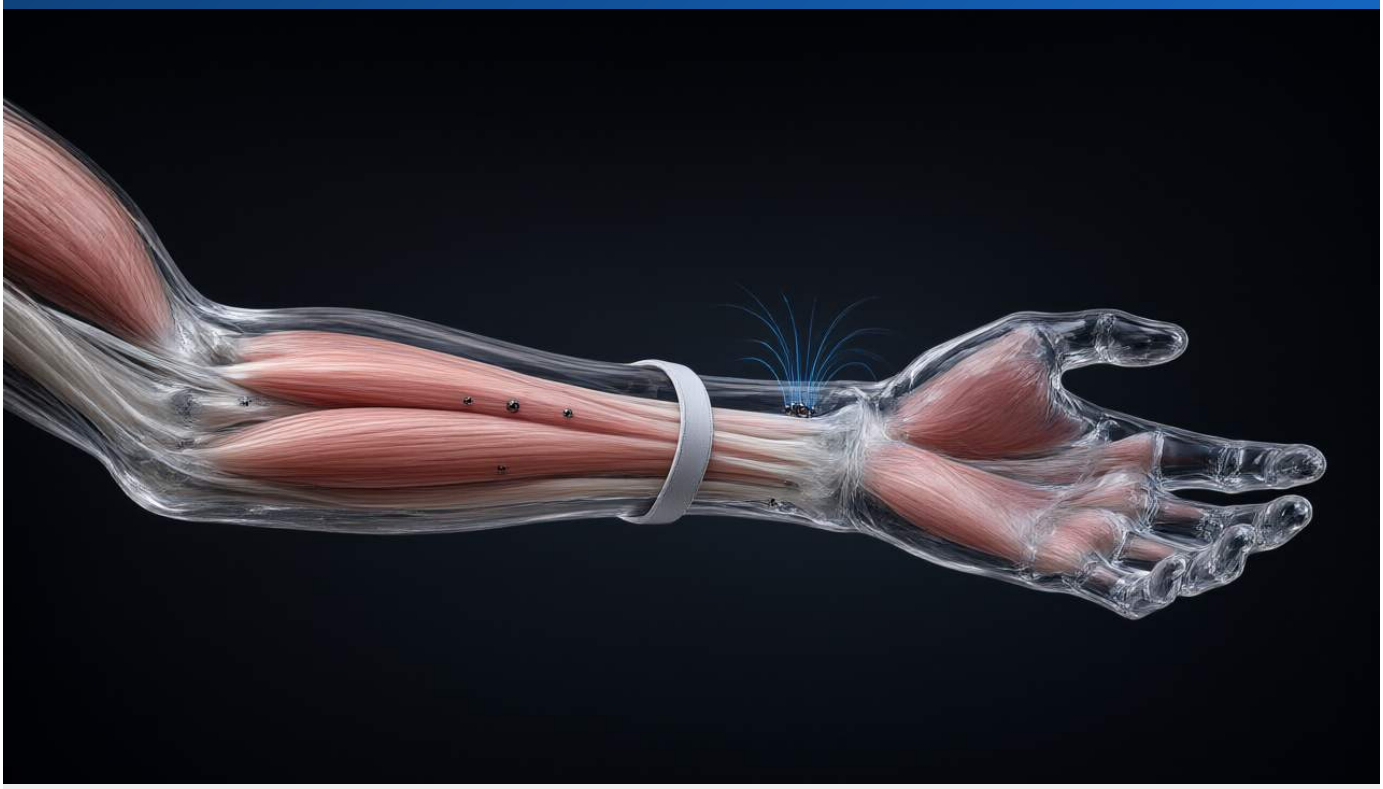
Significance & Outlook

This technology provides a foundation for a non-invasive electrochemical monitoring tool to track contamination in human T-cell cultures. By reducing the need for complex sample preparation, the biosensor supports enhanced quality control within high-value cell therapy manufacturing workflows.

Source: https://www.nature.com/articles/s44328-026-00118-6

#09 Wireless Magnetic Implant System: Neuromuscular Sensing Specs

Published October 29, 2026 Nature Sensors



OVERVIEW

Researchers have developed a skin-mounted magnetometer array that wirelessly tracks 3-mm-diameter magnetic beads implanted in human muscle tissue. The system achieves sub-millimetre resolution at depths up to 6 cm, providing a high-fidelity control signal for neuroprosthetic movement.

IN DEPTH

Key Findings

The wireless magnetic implant system enables continuous neuromuscular sensing by tracking permanently implanted magnets to support neuroprosthetic control with multiple degrees of freedom. In tests with three participants with transtibial amputation, muscle-state estimation using this platform matched or outperformed standard surface and implanted electromyography (EMG) across most evaluated outcomes. Additionally, the researchers demonstrated that muscle activation can be detected through magnetic induction alone, presenting a potential alternative to traditional EMG.

Technical Details

The platform consists of a skin-mounted magnetometer array integrated with customized high-density sensing electronics and an information-theoretic architecture. The system tracks passive magnetic beads with a diameter of 3 mm implanted within human muscle tissue. Key technical specifications include:

- **Resolution:** Sub-millimetre resolution of real-time muscle dynamics.
- **Sensing Depth:** Capability to track implants at depths of up to 6 cm.
- **Implementation:** Deployment of a constellation of magnets to facilitate complex prosthetic control.

The simulation framework for evaluating tracking algorithms and the information filter algorithm are implemented in Python.

Background & Context

Precise measurement of neuromuscular mechanics is essential for synchronizing movement with wearable robotics. However, existing muscle-sensing technologies typically require significant trade-offs between system complexity, invasiveness, and signal fidelity. This magnetic tracking approach seeks to overcome these limitations by providing a wireless method for continuous sensing.

Significance & Outlook

By achieving accurate and responsive neuroprosthetic movement in participants with transtibial amputation, this system demonstrates a viable path toward higher-performance bionic limbs. The ability to detect muscle activation via magnetic induction suggests a shift away from electrical sensing, potentially reducing the complexity and invasiveness associated with current EMG-based interfaces for human-machine integration.

Source: https://www.nature.com/articles/s44460-026-00157-6

Collected: November 07, 2026 | Automated Research System (AI)

#10 Hanji-Based Theranostic Patch: Sweat Sensing and Drug Delivery

Published November 06, 2026 HospiMedica South Korea



OVERVIEW

Researchers at Jeonbuk National University developed a breathable, paper-based patch using traditional Korean mulberry paper (hanji) that integrates wireless uric acid sensing and drug-delivery microneedles. The platform achieves a detection limit of 9.3 nanomolar for uric acid and a drug-loading capacity of 25.36%, offering a potential alternative to repeated blood draws for monitoring gout and hyperuricemia.

IN DEPTH

Key Findings

The developed theranostic patch combines wireless electrochemical sensing with 3D-printed microneedles on a breathable mulberry paper substrate. The sensor successfully detected uric acid concentrations from 0.01 to 8 micromolar with a detection limit of 9.3 nanomolar. In tests using buffer and sweat, the sensor showed recoveries between 98.1% and 101.3%, results that were consistent with liquid chromatography–mass spectrometry analysis.

Technical Details

The use of porous plant-fiber mulberry paper facilitates moisture transport, with the water contact angle decreasing from 72.19° to 7.96° within six seconds. This breathability reduces moisture accumulation under the patch and directs sweat toward the sensing electrodes. The sensor dried within 13 seconds after use and maintained consistent readings over three consecutive uses, utilizing a wireless board with a peak power draw of approximately 15 mW.

The drug-delivery component consists of light-based 3D-printed microneedles fabricated directly onto the paper without an adhesive layer. Optimized microneedles achieved a drug-loading capacity of 25.36%, an increase from 12.6% for unmodified versions. These needles penetrated approximately 954 micrometers into excised rat skin without structural deformation and released 56.41% of a loaded model dye over 80 hours.

Background and Context

Conventional wearable health-monitoring patches often suffer from poor breathability, which can trap sweat, cause skin discomfort, and reduce the reliability of biochemical monitoring. By utilizing hanji, the researchers aimed to balance skin comfort with efficient sweat collection for personalized care.

Significance and Outlook

Because uric acid serves as a marker for hyperuricemia and gout, this breathable platform could enable at-home monitoring without the need for frequent blood draws. Future research will focus on testing clinically relevant uric acid-lowering drugs, performing skin-safety studies, and evaluating the platform for real-time on-body monitoring.

Source: https://www.hospimedica.com/critical-care/articles/294814478/paper-based-patch-integrates-sweat-sensors-and-drug-delivery-microneedles.html

Collected: November 07, 2026 | Automated Research System (AI)

#11 Apollon: AI Glucose Prediction Accuracy and Moglu CGM Roadmap

Published November 02, 2026 바이오타임즈 (BioTimes） South Korea



OVERVIEW

Apollon secured first place in both analysis and clinical accuracy categories at the Glucose Prediction Challenge 2026, achieving a MARD of 4.65%. The company plans to integrate this AI prediction technology into "Moglu," a non-invasive continuous glucose monitor (CGM) utilizing Raman spectroscopy.

IN DEPTH

Key Findings

Apollon won two categories at the Glucose Prediction Challenge 2026, held during the Diabetes Technology Meeting (DTM 2026) in Washington, D.C., from October 27 to 29. Competing against 31 teams, Apollon's AI model recorded a Mean Absolute Relative Difference (MARD) of 4.65% and a 97.0% proportion in Zone A of the DTS error grid for clinical accuracy. The competition was supported by the Helmsley Charitable Trust.

Technical Details

The challenge evaluated the ability to predict glucose changes from 30 minutes to 2 hours in the future based on historical glucose records and insulin administration data. Apollon developed an Attention-based AI model that analyzes up to 16 days of continuous glucose monitoring (CGM) and insulin data to predict changes at 5-minute intervals for the subsequent 2 hours. The model assigns higher weights to longer prediction intervals and incorporates data from users of the same type of insulin pump to refine accuracy.

Background and Context

Apollon is developing "Moglu," a non-invasive CGM that uses Raman spectroscopy to eliminate the need for needles or consumables. The company presented a prototype measuring 80mm x 90mm x 30mm at the DTM startup showcase. Additionally, Apollon shared joint research with the MIT Laser Bioengineering Center on non-invasive glucose and ketone measurement using bandpass Raman spectroscopy, with results published in the Journal of Diabetes Science and Technology.

Significance and Outlook

The company intends to apply its award-winning AI prediction technology to Moglu to provide proactive alerts for hypoglycemia and hyperglycemia. Apollon has filed 54 patents (21 registered) primarily in the U.S. and received a CES 2025 Innovation Award. Having secured a first round of Series A investment led by SBI Investment, the company is pursuing follow-on investment from U.S. investors and preparing clinical feasibility studies for diabetes patients at the Joslin Diabetes Center affiliated with Harvard Medical School.

Source: https://www.biotimes.co.kr/news/articleView.html?idxno=35792

Collected: November 07, 2026 | Automated Research System (AI)