# 24-hour human adrenal steroid rhythms by ULTRADIAN automated interstitial microdialysis

## Comparison with plasma

**Thomas Upton**[1,2], Paal Methlie[3], Georgina Russell[1], Nina Henne[3], Stelios Tsagarakis[4], Olle Kämpe[5], Stafford Lightman[1], Eystein Husebye[3].

[1]University of Bristol, Bristol, United Kingdom. [2]University of Otago, Dunedin, New Zealand. [3]University of Bergen, Bergen, Norway. [4]Evangelismos Athens General Hospital , Athens, Greece. [5]Karolinska Institute, Stockholm, Sweden.

Hormones are rhythmic making single time point measurements difficult to interpret

U-RHYTHM ambulatory microdialysis allows high-frequency measurement of free hormone rhythms in subcutaneous interstitial fluid

Here we compare U-RHYTHM automated tissue microdialysis with blood plasma measurements in order to validate the technique

## Design

**Healthy volunteers**

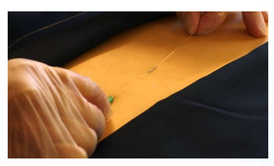
**20 minute sampling for 24 hours**

**Standardised routine**

**Standard meal type and timing**

**ULTRADIAN multiplex hormone analysis by LC-MS**

### U-RHYTHM microdialysis

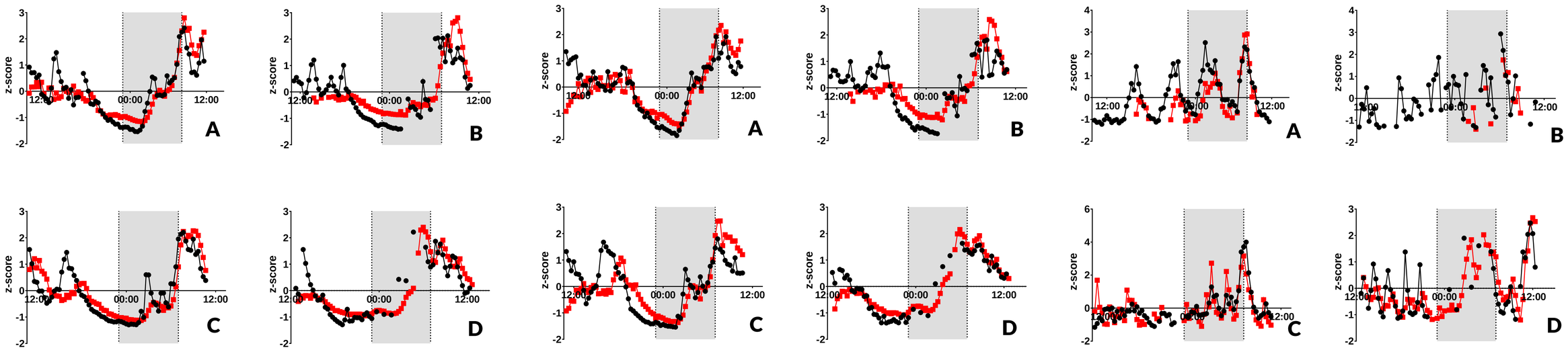
Perfuse 1.0 µL/min → 20kDa linear catheter → U-RHYTHM collector → See the device in action

### Automated blood sampling

Venous plasma every 20 minutes → Automated collection avoids disturbing participant → Read the published method

## Results

Hormones measured in both plasma and microdialysate include cortisol, THF, aTHF, cortisone, corticosterone, DHEAS and aldosterone. Selected illustrative profile data from 4 participants (A-D, females=1, mean age 27.5y) is shown with plasma in **black** and microdialysis in **red**. Shaded areas indicate darkness (<10 lux).




24-hour cortisol profiles

24-hour cortisone profiles

24-hour aldosterone profiles

## Conclusion

U-RHYTHM free hormones strongly correlate with total concentrations in plasma. U-RHYTHM promises to be a powerful clinical tool for diagnosis and monitoring of adrenal disorders.

## What happens now?

Additional participants will be recruited. Data will be used to compute statistics including formal tissue-plasma correlation analyses and interactions between all measured hormones.

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@ultradian2020

thomas.upton@bristol.ac.uk

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## Gather data

- Continuous glucose monitoring
- Tissue free cortisol and melatonin
- Bright light exposure
- Actigraphy
- Sleep duration and quality
- Heart rate and variability

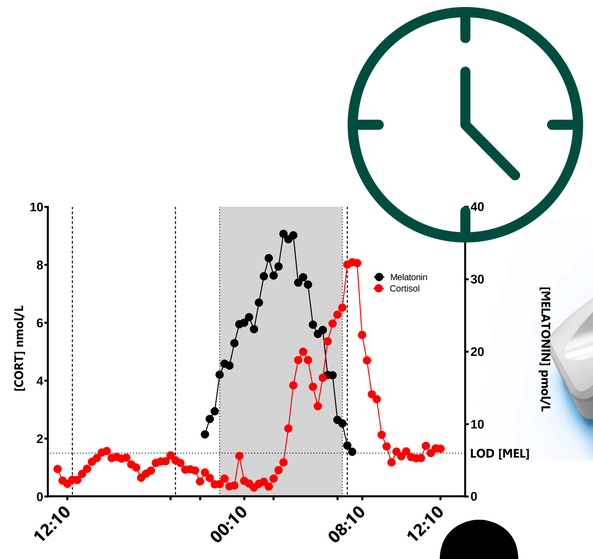
## Explore relationships

- Tissue hormone measurement
- Dynamic sensor data

## Build models

- Interactions between oscillators
- Can one output predict another?

**bioRHYTHM**





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Monday, Apr 15, 2019
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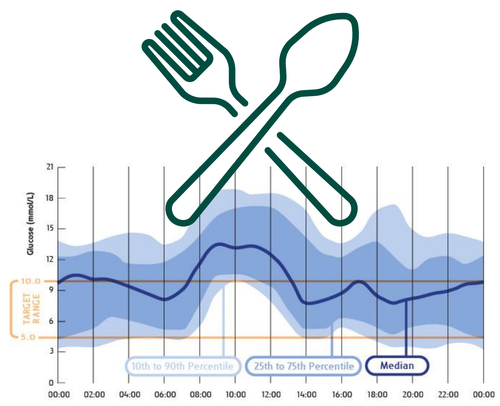



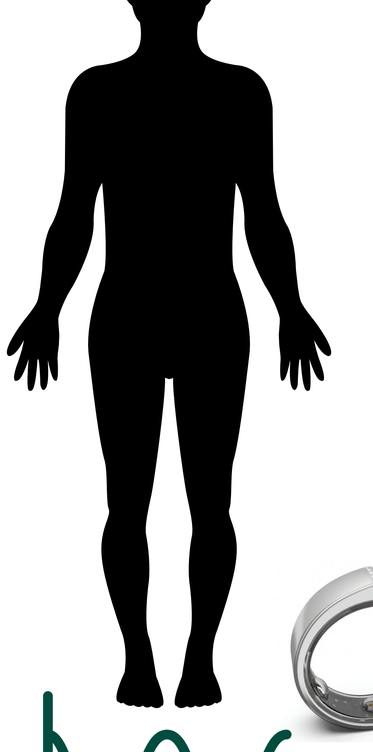

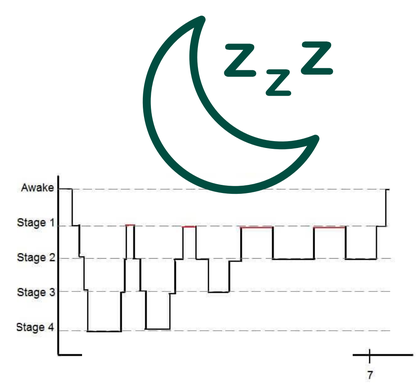



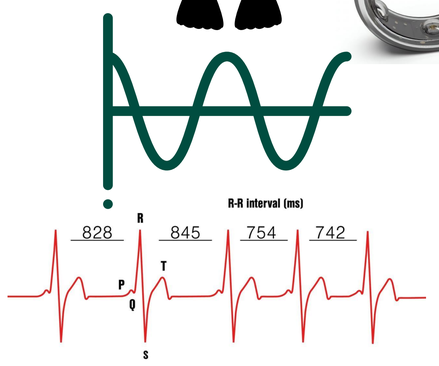


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