Wearable Derived Physiological Signals Differentiate Inflammation From Remission After Biologic Initiation in Inflammatory Bowel Disease

DDW2026 Digestive Disease Week®
MAY 2–5, 2026 | CHICAGO, IL
EXHIBIT DATES: MAY 3–5, 2026

R. Hirten[1], P. Seidman[1], A. Delgado[1], M. Suarez-Farinaas[1], M. Danieletto[1], T. Hewitt[1], D. Schorr[1], D. Helmus[1] R. Z. U. Rehman[2], E. H. Nirjhar[3], M. Chatterjee[3], N. V. Manyakov[4], Y. Huo[3], M. S. Jain[3], T. Lontoc[3], K. Wilby[3], B. E. Sands[1], M. Morris[3]

1. Icahn School of Medicine at Mount Sinai, New York, NY, United States; 2. Johnson & Johnson, High Wycombe, United Kingdom; 3. Johnson & Johnson, Raritan, NJ, United States; 4. Johnson & Johnson, Beerse, Belgium.

INTRODUCTION

- Biologic therapies are central to the management of inflammatory bowel disease (IBD), yet only -40% of patients respond after initiation.[1]
- Current methods to monitor post-initiation response rely on symptoms and infrequent, burdensome assessments of blood, stool, imaging, or endoscopy.
- Wearable devices can continuously capture physiologic parameters such as heart rate (HR) and heart rate variability (HRV), which reflect autonomic nervous system activity.

AIM

- To determine whether wearable-derived physiologic metrics can distinguish periods of active inflammation from remission following biologic initiation.

METHOD

- Adults (≥18 years) with IBD initiating a biologic, with objectively confirmed active inflammation, were enrolled and asked to continuously use a wearable device (Corsano CardioWatch) for 14 weeks.
- Inflammation was assessed using C-reactive protein (CRP) at baseline (drug initiation) and weeks 2, 6, and 14.
- Active inflammation was defined as a CRP >5 mg/L. Remission was defined as CRP ≤5 mg/L.
- CRP values were imputed ±3 days around each laboratory measurement.
- HRV was quantified using the Root Mean Square of Successive Differences (RMSSD) and the Standard Deviation of Normal-to-Normal intervals (SDNN).
- Changes in daily circadian HRV patterns were assessed using mixed-effect cosinor models.
- Heart rate (HR) and minimum HR were evaluated using mixed-effect linear models.
- All models adjusted for age, sex, body mass index, and steroid use, with participant as a random effect.

RESULTS

- Sixty-five participants (37 Crohn's disease, 28 ulcerative colitis) were followed for 14 weeks after biologic initiation (**Table 1**).
- Mean HR (69.68±1.22 bpm vs 67.15±1.19 bpm, p<0.001) and minimum daily HR (56.50±0.94 bpm vs 54.14±0.92 bpm, p<0.001) were higher during periods of persistent inflammation compared with remission, respectively (**Figure 1 and 2**).
- Circadian HRV features differed significantly by inflammatory status.
- The MESOR or midline of the circadian pattern of the RMSSD was lower during ongoing inflammatory activity (45.68 ms, 95% CI 42.80-48.18 ms) compared with remission (49.41 ms, 95% CI 46.78-51.90 ms, p<0.001) (**Figure 3**).
- Similarly, the MESOR of the SDNN was lower during ongoing inflammatory activity (54.14 ms, 95% CI 50.58-57.75 ms) compared with remission (58.29 ms, 95% CI 55.07-61.77 ms, p<0.001), indicating altered autonomic activity during persistently active disease (**Figure 4**).

Table 1. Demographic information for study participants

Demographics	UC (n=28) (Mean ± SD)	CD (n=37) (Mean ± SD)	Combined (n=65) (Mean ± SD)
Female Sex, (%)	17 (60.7)	15 (40.5)	32 (49.2)
Age (years)	34.3 ± 11.0	35.2 ± 10.6	34.8 ± 10.7
Time in Study (days)	114 ± 11.2	117 ± 13.1	116 ± 12.4

CONCLUSIONS

- Continuous HR and HRV signals from a wearable device distinguished inflammatory from non-inflammatory states following biologic initiation.
- These findings support the use of wearable-derived physiological biomarkers for real-time detection of disease activity after treatment initiation and support proactive, remote monitoring in IBD.

Mean Daily Heart Rate Based on Inflammatory Status

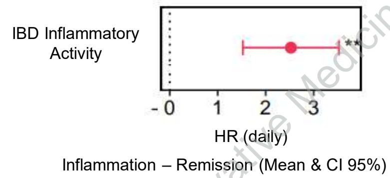

Figure 1. The relationship between physiological metrics collected from wearable devices with inflammation and remission after biologic initiation. The average daily HR was significantly elevated during periods of persistent inflammatory activity compared with periods of remission. *p < 0.05; **p < 0.01

Minimum Daily Heart Rate Based on Inflammatory Status

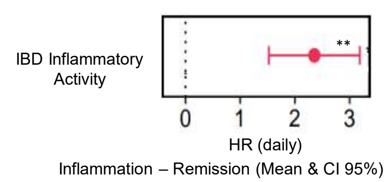

Figure 2. The minimum daily HR was significantly elevated during periods of persistent inflammatory activity compared with periods of remission. *p < 0.05; **p < 0.01

REFERENCES

1. Peyrin-Biroulet L, et al. Review article: remission rates achievable by current therapies for inflammatory bowel disease. Aliment Pharmacol Ther. 2011 Apr;33(8):870-9.

Scan the QR code
The QR code is intended to provide scientific information for individual reference, and the information should not be altered or reproduced in any way.

Circadian Features of RMSSD Stratified by Inflammatory Status

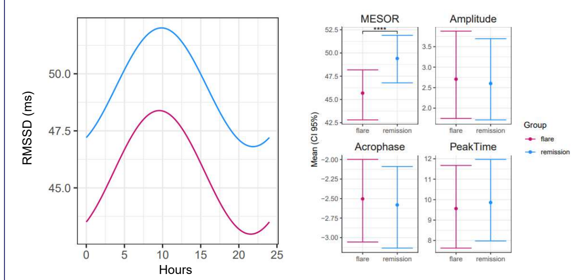

Figure 3. Estimated daily RMSSD circadian patterns differed significantly between periods of ongoing inflammation compared to periods of remission, with means and 95% CI for HRV measures. *p < 0.05; **p < 0.01; ***p < 0.001

Circadian Features of SDNN Stratified by Inflammatory Status

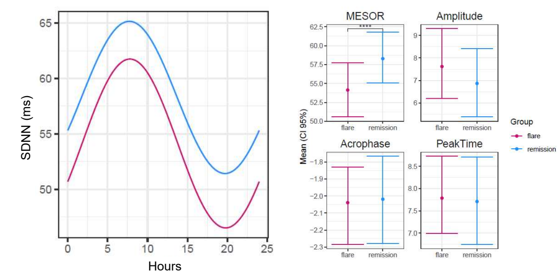

Figure 4. Estimated daily SDNN circadian patterns differed significantly between periods of ongoing inflammation compared to periods of remission, with means and 95% CI for HRV measures. *p < 0.05; **p < 0.01; ***p < 0.001

CONTACT INFORMATION

Robert Hirten MD, Icahn School of Medicine at Mount Sinai.
robert.hirten@mountsinai.org