Research explains how our body clock influences vaccine responses

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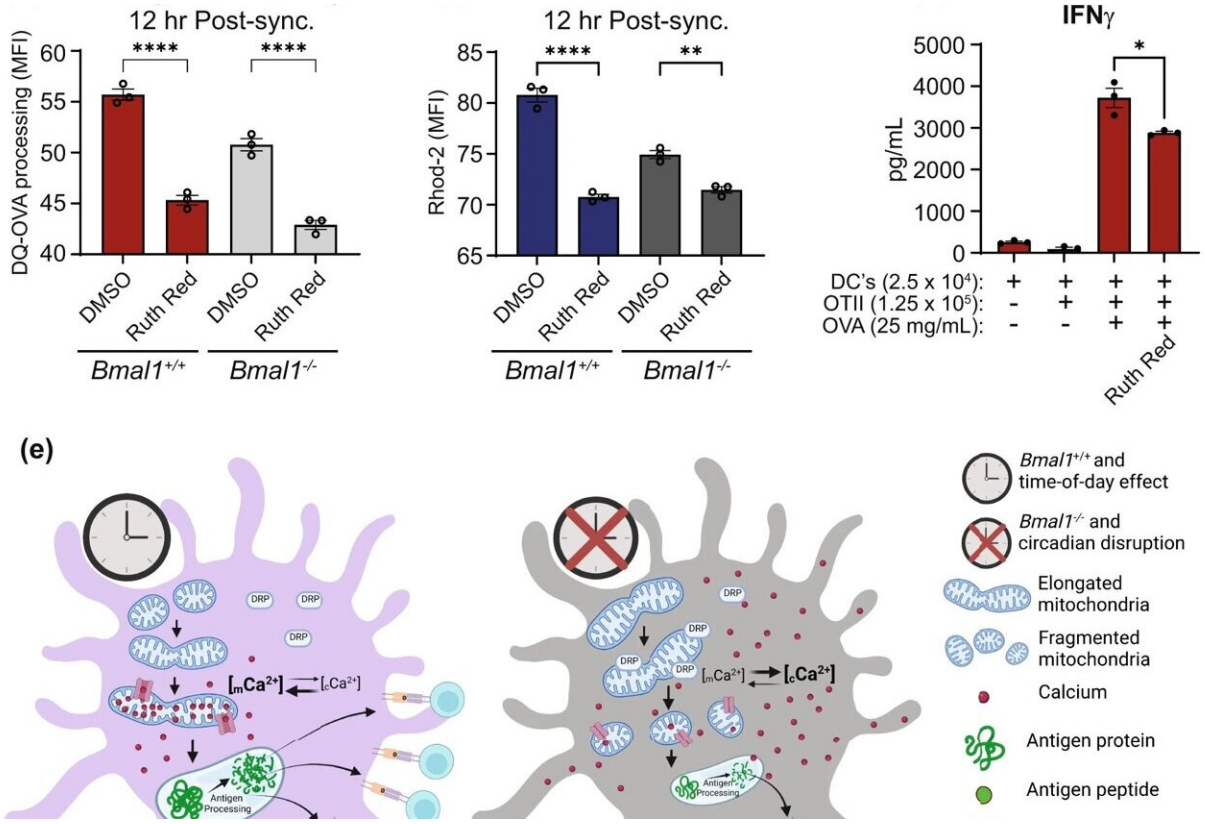

Circadian variation in mitochondrial calcium and antigen processing is directed via control of the mitochondrial calcium uniporter. **a** Spleens were isolated from WT mice at ZT 1, 7, 13 and 19. $CD11c^+$ cells were isolated and mRNA analyszd by qPCR. Circadian analysis was performed using Metacycle and cycMethod set to "JTK". *P* value for each gene is specified on the graph. ($n = 3$ mice) (**b, c**) *Bmal1*$^{+/+}$ and *Bmal1*$^{-/-}$ BMDCs were synchronized by serum shock. DQ-OVA and mitochondrial calcium uptake was quantified at 12 h post synchronization in the presence and absence of ruthenium red (5 μM) ($n = 3$ biologically

independent samples). **d** $CD11c^+$ cells were isolated from WT spleen at ZT4 and treated with ruthenium red (10 µM) for 3 h. OVA protein (25 µg/mL) was then added for 2 h. Supernatants were removed and indicated number of OTII $CD4^+$ T-cells were added to $CD11c^+$ cells. Cells were incubated for 3 days before IFNγ were analyzed by ELISA (n = 3 biologically independent samples) $p = 0.02$. **e** Schematic showing proposed mechanisms by which the circadian clock in DCs controls antigen processing as inferred from the present study. Data shown are means with error bars representing ± SEM. Data were analyzed by Ordinary one-way ANOVA with Tukey's post-hoc test for multiple comparisons (**b**, **c**) or by a two-tailed *t*-test (**d**). ***p*