



Ronald M. Evans

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“Our lab studies how control of chronic inflammation can be used to devise new cures to battle obesity, diabetes, heart disease and cancer.”

Our body’s activity levels fall and rise to the beat of our internal drums—the 24-hour cycles that govern fundamental physiological functions, from sleeping and feeding patterns to the energy available to our cells. The clocks themselves keep time through the rhythmic waxing and waning of circadian gene expression on a roughly 24-hour schedule that anticipates environmental changes and adapts many of the body’s physiological functions to the appropriate time of day. Since the body’s circadian rhythm and its metabolism are closely intertwined, the risk for metabolic disease shoots up, when they are out of sync. Shift workers, for example, face a 100 percent increase in the risk for obesity and its consequences, such as high blood pressure, insulin resistance, and an increased risk of heart attacks.

Whereas the master clock in the brain is set by light, the pacemakers in peripheral organs are set by food availability, but the underlying molecular mechanism was still unclear. In

probing the relationship between metabolism and circadian cycles, Evans’s team discovered that a metabolic master switch, when thrown, allows nutrients to directly control peripheral clocks. The switch, an enzyme known as AMPK, acts like a gas gauge by sensing how much energy a cell has. If a cell runs on empty, AMPK is turned on to activate the clock and reset rhythm. Evans has been able to show that the exercise drug AICAR (known as exercise in a pill) also works on the clock AMPK switch, providing a close link between circadian rhythm and exercise.

In addition to helping to reset the circadian clock, this work provides a better understanding of how nutrition acts on genes, helping to create new ways to treat obesity, diabetes, and cancer by controlling DNA.

For more information, please visit salk.edu/faculty/evans.html



Left to right:

First row: Liming Pei, Henry Juguilon, Henriette Uhlentaut, Mingxiao He, Li-Jung Tai, Corinne Ocampo, Ester Banayo, Katja Lamia, Ronald Evans, Ruth Yu, Estelita Ong, Samantha Kaufman, Ann Atkins, Sally Ganley, Vihang Narkar, Erin Dunn

Second row: Jamie Whyte, Angkang Li, Xuan Zhao, Jaem Yung Suh, Michael Downes, Shigeki Sugii, Ning Ding, Han Cho, Sungsoon Fang, Tao Li, Elliot Williams, Malith Karunasiri, Yunqiang Yin

Third row: Grant Barish, Russell Nofsinger, Ling- Wa Chong, Johan Jonker, Suk-Hyun Hong, Yasuyuki Kida