1038-92-57 **Michael Rempe** (mrempe@mbi.osu.edu), Mathematical Biosciences Institute, Jennings Hall 3rd Floor, 1735 Neil Ave., Columbus, OH 43210, **Janet Best** (jbest@math.ohio-state.edu), 231 W. 18th Avenue, Department of Mathematics, Ohio State University, Columbus, OH 43210, and **David Terman*** (terman.1@osu.edu), 231 W. 18th Ave., Department of Mathematics, Ohio State University, Columbus, OH 43210. *A neurobiological model of the human sleep/wake cycle.*

We present a biologically based mathematical model that accounts for several features of the human sleep/wake cycle. These features include the timing of sleep and wakefulness under normal, sleep deprived and nap conditions, ultradian rhythms, and rapid switching between sleep and wakefulness due to the loss of orexin. The model demonstrates how these features depend on interactions between a circadian pacemaker and a sleep homeostat and provides a biological basis for the two-process model for sleep regulation. The model is based on Saper's two flip-flop models for sleep/wake and REM/NREM and we explore whether the neuronal components in Saper's flip-flop models, with the addition of a sleep-homeostatic process, are sufficient to account for the features of the sleep/wake cycle listed above. Dynamical systems methods are used to better understand mechanisms underlying the sleep/wake cycle. (Received January 23, 2008)