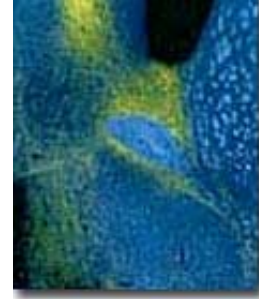




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Research Interests

The pineal gland is a neuroendocrine organ of the brain that synthesizes and releases melatonin, a nocturnal hormone important in seasonal reproduction, sleep, and pacemaker modulation. Melatonin production is controlled centrally by a biological clock in the suprachiasmatic nucleus (SCN) in the form of nightly norepinephrine release, and is the most reliable marker of the central pacemaker. Locally within the pineal gland, melatonin production is dictated by the combined action of cAMP signaling and pineal specific transcriptional activities.

The first focus of my lab is to investigate the properties of the central pacemaker by studying the melatonin output, the hands of the circadian clock, under normal and perturbed conditions. To facilitate analysis of the central pacemaker, we have recently developed a long-term automated pineal microdialysis technique, which allows us to follow melatonin secretion from individual animals for long time with precision and high temporal resolution. Using this new approach, we have found novel features of the central pacemaker that have not been appreciated. We plan to investigate in detail the properties of entrainment and reentrainment of the circadian clock following light stimulation of various kinds.

The second focus of my lab is to study how circadian rhythms of melatonin production are regulated within the pineal gland. Our studies have demonstrated that melatonin production in rat pineal is determined by transcriptional activation of serotonin N-acetyltransferase (NAT) and that the rate of nocturnal melatonin production is limited by hydroxyindole-O-methyltransferase (HIOMT). Our plan is to study the temporal and spatial regulation of circadian melatonin production with an emphasis on identification of the key *in vivo* factors in regulating melatonin formation.



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