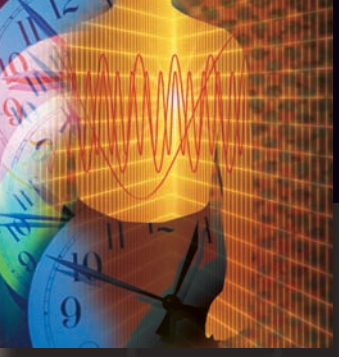
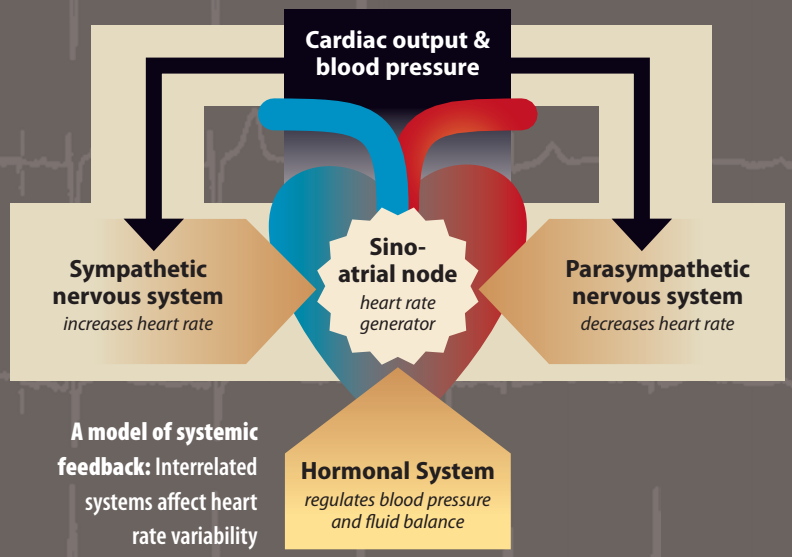
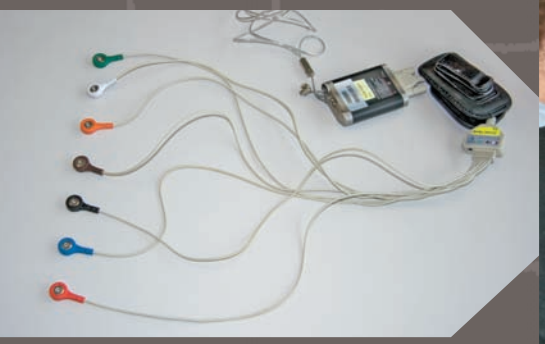


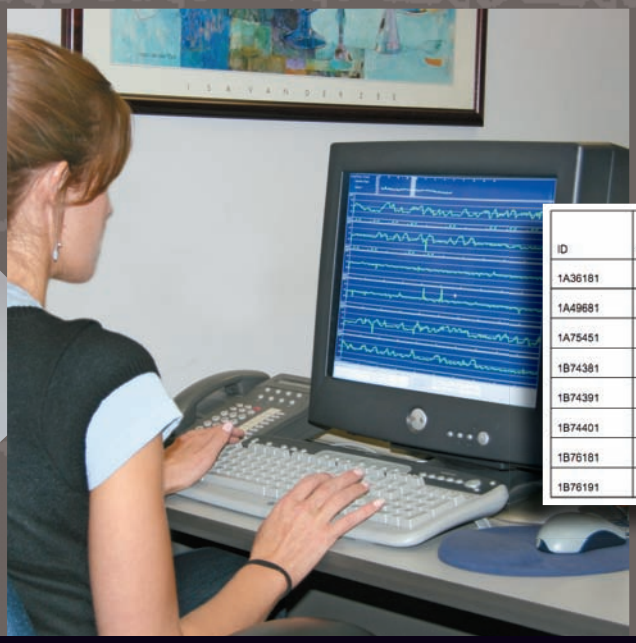
Heart Rate VARIABILITY

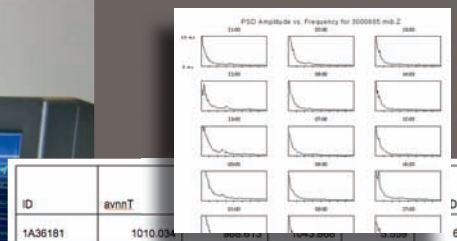
The heart must respond to the body's needs. So its rate varies from moment to moment, relative to respiration, physical activity, the sleep cycle, and other factors. Determining the organ's ongoing functional variability — a key indicator of health — requires long-term measurements, computer-driven calculations and detection of subtle cyclical patterns. Such exacting, complex work yields links to disease, and within the data lie indications of a person's risk for sudden death. This data collection, analysis and correlation with various disease risks is the work of the Heart Rate Variability Lab.



A model of systemic feedback: Interrelated systems affect heart rate variability





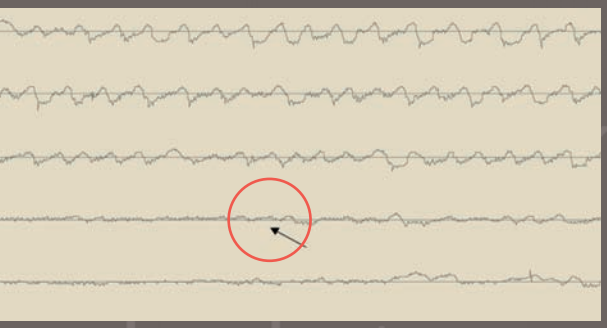


ID	avnnT				D	pnn50N
1A36181	1010.034				6.188	4.36
1A49681	999.295	988.617	1016.784	1.295	2.018	0.586
1A75451	846.611	849.501	836.082	0.482	0.4	0.572
1B74381	810.154	813.078	780.171	9.725	10.264	4.494
1B74391	725.69	710.065	777.362	6.451	5.553	12.008
1B74401	866.626	821.987	930.132	15.402	8.237	35.138
1B76181	674.383	703.628	646.714	0.933	1.38	0.398
1B76191	817.108	826.079	789.545	2.274	3.173	1.034

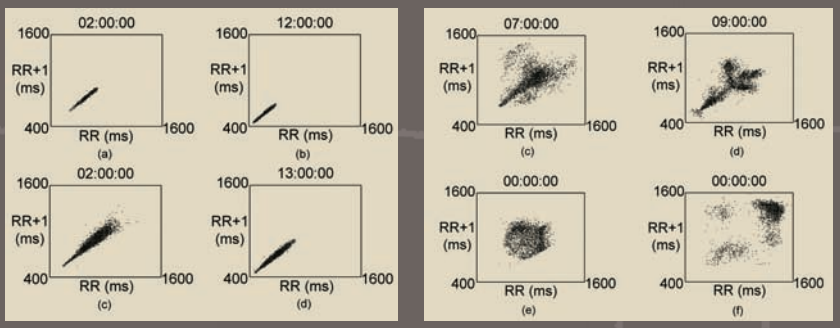
A patient wears a portable heart monitor (above) for up to 24 hours. The device records data that is later downloaded to a computer for detailed analysis (right).

24 hours = 100,000+ heartbeats!

The computer decodes seas of data that must then be painstakingly analyzed. This number crunching reveals telltale patterns of heart rate variability.



This variation indicates the onset of sleep apnea. Someday, overnight heart monitoring could routinely be used to identify those who need treatment for sleep apnea.



Patterns of normal heart rate variability (left) and abnormal variability (right). The hearts on the right are not responding appropriately. Like an orchestra missing the maestro's cues, these hearts are out of sync with the rest of the body — although here the results could be deadly.