Genetic link between body clocks and blood pressure

August 31 2007

A region of DNA involved in the body's inbuilt 24 hour cycle (the circadian rhythm) is also involved in controlling blood pressure, report scientists from the Wellcome Trust Centre for Human Genetics (WTCHG) at the University of Oxford.

The results indicate that altered circadian regulation of biological functions increases the risk of cardiovascular disease and diabetes.

The research, funded mainly by the Wellcome Trust, used genetic studies in rat models and humans to demonstrate a link between changes in a gene involved with the body's 'clock' and risk of developing cardiovascular disease. The results of the study are published online this week by the journal *Proceedings of the National Academy of Sciences*.

Previous research from other institutions into the epidemiology of cardiovascular disease and diabetes had already shown they are somehow linked, but this is the first genetic evidence.

It is known that key biological functions, such as body temperature, sleep-wake rhythms, feeding, blood pressure, blood glucose, and numerous neural and hormonal signals, show a 24-hour pattern. The same is true of some diseases, including heart attacks and stroke (which are more frequent in the early hours of the morning) and some features of psychiatric disorders.

The gene BMAL1 has been shown to be a key component of the body's

molecular clock. If BMAL1 is inactivated, the body clock stops working and blood pressure, blood glucose levels, and body weight and metabolism are altered.

This study provides direct evidence that a genetic change in BMAL1 is linked to high blood pressure. This is the first evidence in humans for a direct causal link between changes in the body clock and increased risk of type 2 diabetes and high blood pressure.

The research also highlights the importance of cross species studies to test new hypotheses. Study leader Professor Dominique Gauguier said:'The regulation of circadian rhythm is central to a wide range of biological processes and this type of genetic study should be extended to other disease areas.'

The results of the study may lead to changes in how the diseases involved are managed, as the body's response to drugs used for treatment could also be linked to the body's internal clock.

Source: University of Oxford