

IM and Autism

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Research by scientists in Wales reported in *Molecular Psychiatry* (advance online issue 30th Jan 07) has identified that [Autistic Disorder](#) is associated with two genes involved in timing and biological clocks: *per1* and *npas2*. Cross species research shows that these two clock genes regulate timing mechanisms that control such things as sleep cycle, memory and communicative timing, a less familiar concept. The work, identifying a link between autism and these clock genes, was led by [Dr. Dawn Wimpory](#), Lecturer-Practitioner/Consultant Clinical Psychologist for Autism, practicing with the NWWales NHS Trust and Bangor University. She collaborated with Bangor University colleagues in both the School of Psychology and the North West Cancer Research Fund Institute (NWCRFI), together with Professor Michael J Owen's team from Cardiff University's Department of Psychological Medicine.

Dr. Wimpory's clinical work and observations of the lack of social/communicative timing in Autistic Disorder was complemented by colleague Brad Nicholas of The NWCRFI suggesting that clock genes may be involved. This idea waited many years to be tested but new information from the [human genome project](#), developments in the field of biological clocks and the construction of autism gene banks has recently allowed the experiment to be carried out.

Autistic Disorder is characterized by three areas of abnormality: impairment in communication (verbal and non-verbal) and reciprocal social interactions together with a markedly restricted repertoire of activities and interests, all in evidence before three years of age. (Autistic Spectrum Disorders or ASDs include milder and more varied related difficulties.) Dr. Wimpory works on the hypothesis that a deficiency in social timing contributes greatly to the difficulties faced by people with Autistic Disorder.

"Timing is quintessential to normal infant development. In Autistic Disorder, malfunction of adaptive timing may lead to a cascade of other developmental problems. In the first few months an unaffected infant can take part in social exchanges, sharing eye contact and babbling in what we'd recognize as 'natural' communication patterns. This facility for preverbal communication appears lacking or diminished in Autistic Disorder," explains Dr. Wimpory.

It is through such preverbal communication that an unaffected infant anticipates and predicts others' behavior, progressing to increasingly sophisticated social participation, for example, in teasing exchanges. Mutually enjoyable preverbal teasing games (e.g. 'peep-bo!') are timing-dependent. They appear as an early stage in the development of empathy and social pretence. Empathy and pretending are among the life-long difficulties for individuals with Autistic Disorder. These may be developmentally linked to early difficulties in synchronizing with the inbuilt rhythms of communication including eye-contact.

The study analyzed genetic markers in 11 clock related genes from 110 individuals with Autistic Disorder and each of their parents (avoiding the more varied ASD subjects and those with additional substantial learning/intellectual impairments often included in autism genetic studies). The results showed that markers in two of the genes, *npas2* and *per1*, had significant association with Autistic Disorder. These two genes had already been identified as regulating complex emotional memory, communicative timing and sleep patterns in the mouse and the fruit fly; organisms that are used by scientists to study the role of clock genes. Problems in sleep, memory and timing are all characteristic of Autistic Disorder; each may play an important role in its development.

"Autism is a disorder of complex inheritance where several interacting genes may be involved. This is the first autism study to identify interacting genes, it is also the first to identify genes that regulate behaviour recognized as affected in autism: timing and memory. It adds further evidence for the role of the biological clock in autism".

The research was funded by the Baily Thomas Charitable Fund with additional support from Autism Cymru; the researchers now intend to replicate their study with a larger sample.

Time Doc blogmaster comments: I pulled the following two mental timing publications from [Dr. Wimpory's web page](#):

- Nicholas B, Rudrasingham V, Nash, S., Kirov G, Owen MJ, Wimpory, D. (2007). Association of Per1 and Npas2 with Autistic Disorder: Support for the Clock Genes/Social Timing Hypothesis *Molecular Psychiatry*, 12,(6) 581-592 ([click here to view](#))
- Wimpory, D., Nicholas, B., Nash, S. (2002). Social Timing, Clock Genes and Autism: A New Hypothesis *Journal of Intellectual Disability Research*, 46,(4)352-358. ([click here to view](#); note that date is listed incorrectly as 2005 on Dr. Wimpory's web page)

UPDATE!

In response to [yesterday's post about the genetics-autism-brain clock link](#) I received an email from an OT that uses the [Interactive Metronome](#) treatment. She has reported case studies of IM benefits for a child with autism. You can check out her comments about the clinical effectiveness of the brain-clock based IM intervention (my description) at her blog: [OT, Self-Regulation and Autism](#). I'll be adding her blog to the IQ Brain Clock blogroll.