

## Gluten-free, casein-free diet in autism spectrum disorders

### What is the issue?

Complementary and alternative medicines and treatments (CAMS) are widely used by families of children with autism and restricted and elimination diets are the most frequently reported (Hanson et al, 2007; Wong & Smith, 2006). Of these, the elimination of gluten and casein (known as 'gluten-free, casein-free' or 'GFCF') has received the most attention.

### What is the hypothesis?

Gluten is the protein found in cereals including wheat, rye, oats and barley while casein is the protein found in milk and other mammalian dairy products. The theories behind the use of GFCF diets vary (Christison & Ivany, 2006). The most prominent include 'opioid excess', reduced peptidase activity, immune dysfunction and gastrointestinal abnormalities.

The central hypothesis is that in people with autism, gluten and casein are inadequately metabolised into peptides with 'opiate agonist' properties (Christison & Ivany, 2006). It is theorised that people with autism may also have a 'leaky gut' which allows larger than usual molecules (such as the peptides) to cross into the blood stream (Autism Research Unit, N.D.) retrieved November 2008). The theory is that some of these molecules then cross into the brain, and have an opioid type effect on normal activity.

### What does the research say?

There is inconsistent evidence regarding the theories behind the GFCF diet, such as gut permeability and the role of urinary peptides. Recent research, for example, found no evidence of opioid peptides in the urine of children with autism (Cass et al, 2008). While there have been a number of studies of various types of diets for people with autism, several of which have reported positive outcomes, there has been limited high quality research into the effect of dietary changes on the behavioural markers of autism spectrum disorders. A review by Christison & Ivany (2006) examined seven studies, all of which reported some benefit, however all had significant methodological flaws. The majority of the studies had small sample sizes, most did not independently verify the children's diagnosis and/or used heterogenous groups (e.g. groups consisted of children with wide age ranges and a mixture of diagnoses including autistic disorder, Asperger syndrome and semantic pragmatic disorder) and several used no standardised assessments to examine the children's behaviours and skills so that behaviour before and after treatment could not be meaningfully compared. In addition, several studies included subjects on different diets (e.g. gluten-free, casein reduced; casein-free, gluten reduced; gluten- and casein-free; specific allergen elimination diets; elimination diets with supplements) but did not examine or report on these groups separately.

To date, there have been two studies of dietary intervention in ASDs with stronger methodological designs; Knivsberg et al, (2002) (cited in Christison & Ivany, 2006) and Elder et al, (2006). Both studies had random assignment of participants into treatment groups, non-treatment control groups, standardised assessments allowing reliable before and after comparisons and designs that allowed assessors (Knivsberg et al, 2002) and assessors and parents (Elder et al, 2006) to be blind to whether the children were in the treatment or control group to minimise bias. Knivsberg et al, (2002) found some significant effects for children on the GFCF diet, including in the areas of attention, communication and nonverbal cognition, though small sample size and the single blind design mean that results still need to be interpreted with caution. Elder et al, (2006) found no significant difference between the two groups, though small sample size and short treatment periods (6 weeks on the GFCF diet in a cross over design) may have contributed to this finding.

### In summary

At this stage, the lack of high quality studies in this area means that there is no clear evidence for the use of the GFCF diet as a standard treatment for autism (Millard et al, 2008). Christison & Ivany (2006) suggest that the research is inadequate to either clearly support or clearly refute the use of GFCF diets in ASDs. There remains a need for well designed studies with adequate sample size to provide more evidence for or against the efficacy of gluten-free, casein-free diet in autism spectrum disorders.

### References

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