**The impact of early nutrition on cognitive functioning in mature adults born preterm**

Prematurity is a major cause of morbidity and a large burden on health care and special education resources (around £3 bn/ year in the UK). The most important adverse long-term outcomes of prematurity relate to the brain. Those born preterm have lower cognitive performance, on average a 12-point reduction in IQ, with deficits in specific cognitive functions such as arithmetic, nonverbal executive functions and behavioural difficulties.

Nutrition is viewed as the single environmental variable with the widest range of possible effects on brain development. Our own studies and those of others show that, in humans, the developing brain is particularly vulnerable to nutritional insults prior to full term.

The first randomised trials were conducted at ICH over 30 years ago with follow-up studies into adolescence showing major long term effects of preterm nutritional interventions on cognition, behaviour, educational performance and the incidence of neurodevelopmental impairment. Follow-up studies have been confined to infancy, childhood and occasionally adolescence. Our own research indicates that those born preterm have significant and unexpected decline in cognitive function tracked so far from childhood into adolescence, making further follow-up important to define the ultimate long-term outcome effects which are currently unknown. This project therefore proposes to examine the consequences of early nutrition in preterms on cognitive functioning and cerebral structure measured using a cognitive battery and MRI in mature adults in their early 30s when the brain is at its most developmentally stable.

The cognitive assessment:

· Behavioural outcomes – Achenbach system of Empirically Based Assessment and a life satisfaction questionnaire.

· Overall cognitive level – the Wechsler Abbreviated Scale of Intelligence – II (WASI-II)

· Attainments - We will use the Numerical Operations and Maths Reasoning sub-tests from the Wechsler Individual Achievement Test –II (WIAT-II) to assess numerical ability and the Adult Reading Test (ART)35 to measure reading accuracy and comprehension.

· Memory - We will use the Verbal Paired Associates (Immediate, Delayed and Recognition scores) sub-test from the Wechsler Memory Scale – IV to assess relational learning and the Rivermead Behavioural Memory Test – 3 to obtain measures of impairment in certain aspects of everyday memory.

· Executive Functions - We plan to use selected stand-alone subtests from the Delis-Kaplan Executive Function System (D-KEFS) to assess various aspects of frontal-lobe based tasks such as problem solving, concept formation and flexibility of thinking.

· Visuo-spatial – We plan to use subtests that assess visual-spatial perception from the Visual Object and Space Perception Battery.

· Speed We will measure speed of processing at two different levels. Simple and complex reaction time tasks will be administered via computer and be recorded in milliseconds.

A Quick Test of Cognitive Speed will measure processing speed at a more cognitive level.

Measures of height, weight and head circumference will be obtained, as well as information regarding educational achievements, socio-economic status (allowing determination of social mobility) and record of employment.