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Biomonitoring and predictive modelling of genomic instability in childhood obesity

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Epidemiological evidence indicates obesity in childhood and adolescence to be an independent risk factor for cancer and premature mortality in adulthood. Pathological implications from excess adiposity may begin early in life. Obesity in childhood and adolescence is concurrent with a state of chronic, low-grade inflammation, a well-known aetiological factor for DNA damage. In addition, obesity in childhood and adolescence has been associated with micro-nutritional deficiencies. Vitamin D has attracted attention for its anti-inflammatory properties and role in genomic integrity and stability.

We have conducted research aimed at devising a novel approach for predicting genomic instability in childhood obesity via the combined, non-invasive assessment of adiposity, DNA damage, systemic inflammation, and vitamin D status. We carried out a cross-sectional study with participants, aged 10–18, recruited from schools and paediatric obesity clinics in London. Our results support the hypothesis that childhood obesity is associated with increased genomic instability. Importantly, we have found that obesity, vitamin D and oxidative DNA damage can together predict genomic instability.

Non-invasive biomonitoring and predictive modelling of genomic instability in young patients with obesity may contribute to the prioritisation and severity of clinical intervention measures.

Keywords:
Childhood obesity; genomic instability; Vitamin D; DNA damage; inflammation.