Genomic instability linked to cancer is more likely in children and adolescents with obesity, study finds

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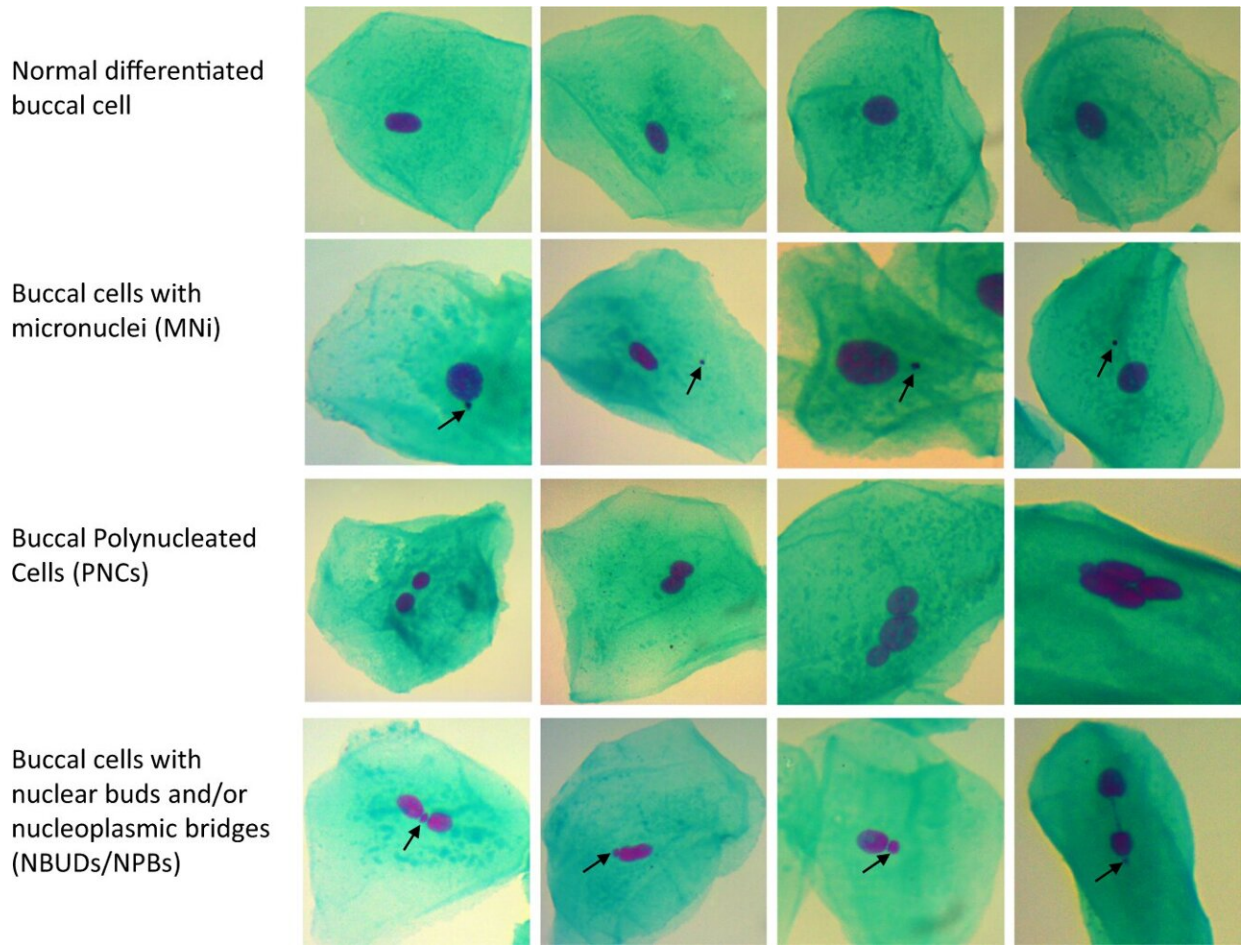

Fig. 1: Nuclear anomalies in buccal cells from participants. Photomicrographs of exfoliated buccal mucosa cells stained with Feulgen and Light Green and viewed at 1000× magnification under transmitted light. The figure shows examples of normal differentiated cells (top row) compared to cells presenting different types

of nuclear abnormalities (rows below) (buccal MNi = cells with micronuclei; PNCs = cells showing poly-nucleation or multiple nuclei; NBUDs/NPBs = cells with nuclear buds and/or nucleoplasmic bridges). Cells were scored and nuclear abnormalities classified according to the criteria defined in the 'buccal micronucleus cytome assay' [45]. From: Obesity, oxidative DNA damage and vitamin D as predictors of genomic instability in children and adolescents

A new study led by the University of Westminster has found greater evidence of genomic instability, a well-recognized enabler of cancer, in children and adolescents with obesity than those with a normal range body mass index (BMI).

By utilizing a non-invasive approach to sample collection and through statistical modeling, the researchers have found that levels of genomic instability can be predicted by combining BMI status, vitamin D levels in saliva and measurements of DNA damage in urine. The study is the first of its kind to make a combined, non-invasive assessment of genomic instability, vitamin D deficiency and inflammation in relation to multiple indicators of body fat in children and adolescents.

In addition, they identified that high levels of body fat markers were associated with high levels of inflammation and DNA damage, and with low levels of Vitamin D. Their findings substantiate claims that childhood obesity is associated with genomic instability and presents causative implications for increased risk of cancer in adulthood.

As a result, the researchers highlighted the need for accelerated action towards the development of effective weight loss interventions in this age group.

The research was a collaborative effort between academics at the

University of Westminster and Clinicians based at King's College Hospital and St George's Hospital. First Name Author Dr. Moonisah Usman explains: "The study involved 132 children and adolescents aged 10^{-18} and used quantitative measurements of the body composition of participants including BMI Z-score, waist and hip circumference, and body fat percentage. Inflammation and vitamin D levels in saliva and DNA damage through urine and cheek swab samples were also assessed to score for genomic instability."

Published in the *International Journal of Obesity*, the study draws on previous studies which have demonstrated that excess fat can result in higher levels of inflammation and nutritional deficiencies, leading to a harmful environment for DNA integrity and stability. Genome health is known to be essential for correct cellular functioning, and is directly related to human health as a whole. For instance, accumulation of DNA damage and genomic instability are well recognized enablers of cancer.

Talking about the study, Dr. Emanuela Volpi, Reader in the School of Life Sciences and Lead Author, said: "Predictive modeling based on these findings could assist clinicians in interpreting the significance of weight loss interventions in children and adolescents, and support them with prioritizing the provision of further clinical measures to help reduce the risk of cancer later in life."

More information: Moonisah Usman et al, Obesity, oxidative DNA damage and vitamin D as predictors of genomic instability in children and adolescents, *International Journal of Obesity* (2021). DOI: 10.1038/s41366-021-00879-2

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