Neoplasia and Cancer Pathogenesis

PTU-099 | **RADIATION-INDUCED GUT DAMAGE: IDENTIFYING 'AT RISK' PATIENTS WITH AN 'ELECTRONIC NOSE' (E-NOSE)**

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Introduction Almost all patients undergoing radical pelvic radiotherapy develop bowel symptoms during treatment and half go on to develop chronic bowel symptoms. Acute histological damage, due to the radiation, is at its worst at 2 weeks and then improves; subsequent chronic damage then is sustained over many years. We investigated if changes in gastrointestinal symptoms during radiotherapy correlated with alterations in colonic microbial balance, reflected by changes in the gases released when undigested fibre is fermented.

Two hypotheses were investigated in this pilot study: (1) Irradiation alter the microbial flora, reflected by changes in the fermentation profile. (2) An individual's susceptibility to damage may be recognised by their 'fermentation signature'.

Methods Two groups were selected from patients undergoing pelvic radiotherapy for malignancy: those 'hardly affected' and 'severely affected'. All completed a validated Inflammatory Bowel Disease Questionnaire Bowel subset score (IBDQ-B) which was recorded before irradiation and at 4 weeks. Scores : 10–70; 70='normal' (no symptoms). Faecal samples were collected at these times and immediately frozen at −20°C until analysis. Faecal samples were heated to 38 ± 0.1°C and the headspace (the air above the sample) analysed using a modified FOX 2000 series E-nose. This uses an array of 14 chemical sensors which are either broadly tuned to a chemical groups or to specific gases. Data analysis was by: (1) Principal Component Analysis (PCA): all data are analysed together without prior categorisation, and results displayed as clusters of individuals with shared features. (2) Linear Discriminant Analysis (LDA): samples are pre-categorised (clinical groups) and the system searches for additional features to enhance categorisation.

Results Mean IBDQ-B score (± SD).

All patients before radiotherapy had little or no symptoms but LDA showed 2 clusters with only slight overlap. One group developed severe symptoms, reflected by the fall in IBDQ-B scores. The corresponding PCA showed 2 distinct clusters

Table 1 PTU-099 Change in IBD-Q scores in those with minimal and severe toxicity

Time	Hardly affected; n=9	Severely affected; n=12
Week 0	67.7 (± 2.65)	69.0 (± 1.65)
Week 4	66.7 (± 3.04)	48.8 (± 7.09)
Mean change in score	−1.0 (± 1.18)	−20.3 (± 6.55)

without overlap. LDA: Almost all who became 'severely affected' arose from its corresponding baseline cluster.

Conclusion This pilot study supports our hypothesis: (1) The fermentation signature tracks changes induced by pelvic irradiation. (2) It suggests those 'at risk' of severe radiation-induced gut damage may be identifiable before treatment.

Competing interests None.

Keywords electronic nose, radiation, VOC.