

Monoclonal antibodies for 1-Hydroxypyrene Glucuronide (1-OHPyrG), Lateral Flow (LF) tests and the development of on-site Polycyclic Aromatic Hydrocarbon (PAH) biomonitoring

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15 Monoclonal antibodies for 1-Hydroxypyrene Glucuronide (1-OHPyrG), Lateral Flow (LF) tests and the development of on-site Polycyclic Aromatic Hydrocarbon (PAH) biomonitoring

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abstract

Objective

Anti 1-OHPyrG sheep Mabs have been raised, characterised and employed in a sensitive and specific ELISA. The development of a LF test will enable the manufacture of a simple, rapid and cost-effective point of use test. On-site screening will allow employers to immediately confirm safe working practice and significantly increase the efficacy of biomonitoring.

Methods

A quantitative LF test has been developed which employs an anti-1-OHPyrG sMab to capture the PAH metabolite. The captured metabolite is visualised through a second Mab raised against the sMab-1-OHPyrG immune complex. This sandwich assay provides a positive correlation between the assay signal and biomarker concentration. The LF test can determine biomarker concentrations in non-occupationally exposed individuals and performance has been determined in a comparative study.

Results

A specific LF immunoassay, with a measuring range of 20-500pg/ml of 1-OHPyrG, can detect increasing levels of PAH metabolite in urine due to lifestyle factors (e.g. smoking and consumption of chargrilled food) in samples from non-occupationally exposed individuals. The LF determined concentrations compared well to literature values. Urines determined by LF and ELISA were in excellent agreement ($R^2=97$, $N=8$).

Conclusions

Antibodies enable the development of quantitative LF tests, providing "real-time" analysis to occupational health professionals. On-site testing allows the immediate confirmation of safe working practice and provides immediate reassurance to those involved in potentially hazardous activities. An 'app' to support LF testing is now under development and a survey of potential industry end-users has highlighted the desired features.