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M.G. Galli\*  
A. Bianchi  
A. Raimondi  
M. Tesaro  
M. Consonni

Department of Public Health, Microbiology and Virology, Università degli Studi di Milano, Italy  
E-mail address: maria.galli@unimi.it

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\* Corresponding author. Address: Department of Public Health, Microbiology and Virology, Università degli Studi di Milano, via Pascal 36, 20133 Milano, Italy. Tel.: +039 02 50315111; fax: +039 02 50315100.

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### Luminol-based forensic detection of latent blood; an approach to rapid wide-area screening combined with Glo-Germ™ oil simulant studies

Madam,

Bergervoet *et al.* describe the use of luminol-based kits for the forensic detection of latent blood

residues.<sup>1</sup> Used to monitor cleaning and disinfection procedures in clinical areas, and as a training aid to raise the awareness of healthcare workers to the possibility of contamination with blood, luminol-based products show considerable promise as an infection control training and evaluation tool. However, the technique may be cumbersome in use since it requires low-light or near-blackout conditions for effective visualisation, particularly if photography is contemplated, and necessitates spraying of surfaces with an aqueous solution that may be inappropriate for use on electrical and electronic devices.

In-situ detection of latent blood residues is widely used by forensic science services. Luminol-based products permit rapid visualisation of blood residues with high sensitivity and specificity, and the opportunity for subsequent DNA fingerprinting of recovered blood residues. Since it is unlikely that this degree of sophistication would be required in hygiene and infection control studies, a much simplified approach may be appropriate. We are presently using a commercial luminol-based product to evaluate the risk of contamination with blood splashes during handling of clinical waste containers.<sup>2</sup> In circumstances where low-light conditions for in-situ visualisation of chemiluminescence cannot be achieved, or would be intrusive or inconvenient, we have devised a modification of the standard forensic approach described by Bergervoet *et al.* For this, we used 100 cm<sup>2</sup> plain cotton dressing pads lightly moistened with sterile water. Using a gloved hand, these swabs are rubbed vigorously over areas to be tested and then examined in a convenient darkroom using the luminol reagent. All materials were first tested for cross-reactivity, with uniformly negative results. Areas in excess of 2 m<sup>2</sup> can be sampled quickly and economically using a single swab. This approach allows screening of large areas with minimal disruption, without the need for blackout, and with no risk from wetting of electrical or electronic equipment with the luminol reagent spray. Overall, our findings compare favourably with in-situ examination, with only the smallest and lightest of trace blood residues not detected by this indirect approach to testing. Heavy soiling of the sample swabs does not interfere with the test reaction, or diminish the intensity of chemiluminescence. To maximise the use of the luminol reagents that have a 12-h shelf life once activated, we have additionally compared the chemiluminescence of fresh moistened swabs examined immediately after sample collection with duplicate swabs stored at room temperature for up to three days with no apparent variation in sensitivity.

We are additionally using absorbent cotton or paper 'targets' fixed to the front of uniforms and

other workwear. Disposable paper or fabric gowns or disposable plastic aprons also prove convenient for testing and offer a larger sample area. Target pieces have also been fixed on temporary supports positioned around or taped to high-risk equipment items, or mounted close to and within the likely fallout zone of procedures likely to generate and release droplets. For more extensive environmental sampling and dispersal studies, A4 paper sheets have been suspended vertically or laid on horizontal surfaces as required. These are retrieved for later forensic testing and have been particularly successful in identifying sources of environmental contamination and personal exposure. This approach avoids extensive spraying of the work environment, the need for low-light conditions, and the inconvenience of spraying of clothing or skin surfaces. To obtain additional information regarding the potential for splash contamination, we have evaluated also the dual use of the luminol-based product with Glo-Germ™ oil as a simulant. Visible chemiluminescence from the luminol reaction does not interfere with the distinct blue fluorescence of the Glo-Germ product under ultraviolet illumination and the two products can be used simultaneously to provide further information about both actual and potential hazards of splash contamination. In low-light conditions, photographic recording is possible using a film speed of ISO 400 with an exposure time of up to 30 s at *f*/2.8, which is suitable also for the recording of the fluorescent Glo-Germ image after introduction of black-light illumination. Used together, these products represent complementary tools for the investigation of splash contamination as well as the efficacy of environmental and other cleaning regimens.

#### Conflict of interest statement

None declared.

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J.I. Blenkharn\*  
Blenkharn Environmental,  
London, UK

E-mail address: [blenkharn@ianblenkharn.com](mailto:blenkharn@ianblenkharn.com)

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\* Address: Blenkharn Environmental, 18 South Road, London W5 4RY, UK. Tel.: +44 20 8569 8316; fax: +44 20 8847 5994.

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#### Stability of human metapneumovirus and human coronavirus NL63 on medical instruments and in the patient environment

Madam,

Since their discovery in 2001 and 2004, respectively, the human metapneumovirus (HMPV; a paramyxovirus) and the human coronavirus (HCoV)-NL63 have been found to be important respiratory pathogens.<sup>1,2</sup> Both viruses are responsible for respiratory infections in children and adults and their clinical spectrum ranges from mild to life-threatening clinical syndromes.<sup>3</sup> Both viruses have been involved in nosocomial outbreaks, for example in a long-term care facility for elderly institutionalised persons.<sup>4–7</sup> To our knowledge, no investigations on the survival of HMPV and HCoV-NL63 have been published. Rabenau *et al.* have already demonstrated that the long-described virus HCoV-229E is significantly less stable than severe acute respiratory syndrome (SARS) virus, although both viruses belong to the family of coronaviruses and share many biochemical and structural characteristics.<sup>8</sup> Consequently, we examined the stability of HMPV and HCoV-NL63, suspended in a medium or dried on surfaces derived from the inanimate hospital environment.

Viruses were grown under standard conditions essentially as previously described.<sup>1,2</sup> Supernatants were collected and viral RNA was extracted using the QIAamp MinElute Virus Spin Kit or RNeasy Protect Mini Kit (Qiagen, Hilden, Germany) according to the manufacturer's protocol. For real-time reverse transcriptase–polymerase chain reaction (RT–PCR) detection and quantification of HMPV, the primers sv581s (NL-N-forward) 5'-CATATAAG CATGCTATATTTAAAAGAGTCTC-3' and sv582as (NL-N-reverse) 5'-CCTATTTCTGCAGCATATTTGTAATCA G-3' were used. For detection and quantification of HCoV-NL63 the primers repSZ-RT (as) 5'-CCACTATAAC-3', repSZ-1 s 5'-GTGATGCATATGCTA