



## **Proceedings of the Scientific Meeting of the Christchurch Medical Research Society, Friday 30 July 2003**

### **Determination of house dust mite numbers and allergen levels in floor coverings: Some practical considerations. C Shorter, SM Causer, KJ Botica; Canesis Networks Ltd, Lincoln, North Canterbury.**

In assessing house dust mite numbers and allergen levels (Der p I) on existing carpets in six Christchurch homes, a 'mobility' test, which relied on capturing mites on an adhesive film as a result of natural movement, resulted in low mite recoveries (mean 6.6 mites/141 x 141 mm). These were not correlated with those obtained with a 'heat escape' method (mean 104 mites/141 x 141 mm) ( $r^2 = 0.11$ ), which uses heat application to increase recovery rates. Because mobility testing is affected by external factors, such as room temperature, it perhaps should be considered more as an indicator of mite activity than total numbers.

Allergen levels measured in core samples were not correlated with mite numbers determined using the heat escape method ( $r^2 = 0.044$ ). No correlation was found between allergen levels in carpet cores (mean 2342.7  $\mu\text{g}/\text{m}^2$  Der p I) and vacuum samples (mean 576.6  $\mu\text{g}/\text{g}$  Der p I) ( $r^2 = 0.002$ ), suggesting that vacuum sampling does not reflect the total amount of allergen contained in the carpet, rather that in the dust fraction able to be dislodged by vacuuming, which is likely influenced by airflow rate, agitation and carpet structure.

Carpet structure also needs to be considered when using the heat escape technique. In a laboratory trial, mite recoveries from loop-pile carpets were significantly lower than those from cut-pile carpets ( $p > 0.05$ ), while recoveries on short-pile carpet (6.5 mm) were also significantly higher than those on long-pile carpets (9 mm) ( $p > 0.05$ ).

We conclude that, where possible, heat escape testing should be used in preference to mobility testing, as it provides a more accurate measure of mite numbers. Likewise, core sampling provides a better measure of total allergen content than vacuum sampling, but ideally, both should be performed.

### **A novel biomaterial for direct cell and protein patterning: potential applications in tendon and ligament repair. MA Ali<sup>1,2</sup>, W He<sup>2</sup>, D Greenberg<sup>2</sup>, KE Gonsalves<sup>2</sup>; <sup>1</sup>Biopolymer Research Group, Canesis Networks Ltd, Lincoln, North Canterbury; <sup>2</sup>Polymer & Nanotechnology Research Laboratory, C. C. Cameron Applied Research Center, University of North Carolina, USA.**

A novel biocompatible biomaterial was developed for applications in microlithography. Microlithography is the process of micro- or nano-scale patterning on a surface such as glass, plastic or semiconductor wafer. Microlithography processes are commonly used for the fabrication of micro-/nano devices and chips for electronic applications. In these studies, we used our newly developed biomaterials for the fabrication of micro-/nano- patterned materials and design of bioscaffold biodevices for medical applications such as cartilage and ligament repair.

This novel biomaterial and its bioscaffolds were prepared through copolymerization and/or photopolymerization by incorporating novel initiators and co-diluents. The biomaterials were characterized by NMR, IR and elemental analysis. Micro- to nano-patterning and micro-/nano-biodevice fabrications were performed with this novel biomaterial using photolithographic techniques. After photolithography the newly developed biomaterials have distinct hydrophobic and hydrophilic micro-patterned regions. Using rat fibroblast cell lines, we observed that cell adhesion, proliferation and differentiation were significantly enhanced along the hydrophilic pattern regions.

Thus the biomaterial is a promising candidate for the formation of extra cellular matrix (ECM) in tissue engineering, particularly for tendon and ligament repair. This biocompatible biomaterial can also improve conventional lithography, including applications for micro-stamping techniques commonly use for the fabrication of biosensors, bio-immuno-sensors and biochips. In addition this novel biomaterial potentially has applications in tissue engineering by direct cell and protein patterning because novel functionalities can be introduced through the copolymerization and photopolymerization processes.

**Lapses of consciousness during a continuous tracking task. MTR. Peiris<sup>1,2,3</sup>, RD Jones<sup>1,2,3</sup>, GJ Carroll<sup>3,4</sup>, PJ Bones<sup>1,3</sup>; <sup>1</sup>Department of Electrical and Computer Engineering, University of Canterbury, Christchurch; <sup>2</sup>Department of Medical Physics and Bioengineering, Christchurch Hospital, Christchurch; <sup>3</sup>Van der Veer Institute for Parkinson's and Brain Research, Christchurch; <sup>4</sup>Department of Neurology, Christchurch Hospital, Christchurch.**

Lapses of consciousness ('microsleeps') and falling asleep are considered major causes of serious accidents in the transport sector. Hence, it would be of considerable value if a person could be monitored and any lapses of consciousness (LoCs) detected automatically so that preventative or remedial action can be undertaken to maintain safety. The primary aim of this study was to capture and investigate LoCs.

Fifteen normal non-sleep-deprived male subjects (18–36 years) were observed on two afternoons (7–50 days apart) while performing a continuous tracking task for 1 hour. EEG, eye movements, tracking performance, and video were recorded. Subjects were required to refrain from taking any stimulants/depressants during the 4 hours prior to the sessions. A LoC was defined as a temporary (> 1.0 s) complete loss of responsiveness, indicated by a lapse in tracking performance concurrent with an apparent loss of consciousness as determined independently by video observation.

Eleven of the 15 subjects had a LoC at some stage. Four subjects averaged over 50 LoC/h. The mean rate of lapsing over all subjects was 29.1 LoC/h. The mean duration of a LoC was 4.0 s. Lapses in performance were caused by both LoCs (30.1%) and lapses of attention (69.9%). There was no correlation between age of subject and number of LoCs.

This study indicates that LoCs can occur in young healthy adults to a much greater extent than previously recognized. This has major implications for occupations that require sustained alertness over long periods of time.