

EDITORIAL

Creature comforts — living with mites and moulds

We inescapably share our homes with numerous microscopic life forms. These organisms — arthropods, fungi, bacteria, etc. — share many of our needs and preferences and consume what we provide, either in the form of our own shed skin scales and other biological excreta, or rich organic materials (preferably damp) in the fabric and furnishings of the buildings we inhabit. Increasingly we keep our 'gardens-homes' warm and moist all year round; it keeps us comfortable and our commensals thriving. Indeed, our homes are generally so comfortable that we are content to spend a very large proportion of our time there; for some people this can be 90% or more. Of course, sometimes the home construction is faulty or resources are limited so that the home is not just moist, from condensation for example, but becomes structurally damp. This can result in the marked and noticeable proliferation of particular organisms.

The presence of our various cohabitants has come to be associated with a variety of detrimental impacts on health and well-being. We now know that house dust mites, which love to share our beds, pillows, chairs and carpets, produce a potent allergen, Der p 1. Exposure to this leads to sensitization and can exacerbate or possibly cause one of the principal diseases of current public health concern — asthma [1]. The full significance of Der p 1 and the exposure-response relation with asthma symptoms remain rather ill-defined [2], but efforts to evaluate the impact of reducing humidity on house dust mite numbers (or allergen production) and asthma symptoms or prevalence continue. Clearly then, our relations with these acarids are important: moulds form another very significant group of damp home-loving organisms that have been associated with human ill-health.

Increased occurrence or severity of respiratory symptoms, especially self-reported symptoms in children, have for many years been associated with damp and mouldy homes [3]. The presumption has been that it is the mould rather than dampness *per se* that is important, but this assumption is now being challenged [4] and specifically tested, for example in the current programme of research into indoor air quality, cofunded by the UK Health and Environment Departments. Certainly it is not inconceivable that particular hygrothermic conditions could be directly detrimental to health. Furthermore, it is clearly important to take into account socioeconomic factors; damp housing conditions are likely to be associated with generally poorer standards of living. Nevertheless, the primary thesis has been that fungi — their hyphae, spores and volatile metabolites — can be inhaled and, through various

possible toxicological and biological mechanisms, have adverse impacts on respiratory health, manifested by non-specific symptoms such as cough, wheeze and rhinitis. Unfortunately, perhaps because of methodological problems and difficulties in establishing the most relevant exposure metric to use, it has always proved difficult to equate particular measurements (e.g. spore counts) for particular species with specific or general respiratory health symptoms [2]. This may be, of course, because no such simple specific link exists. For example, identified relations between mould and ill-health (if not actually due to 'dampness') could be due to *combined* effects of exposure to liberated spores, cellular components (including mycotoxins), cell metabolites, etc. To further complicate the picture, it is now established that the potency of inhaled allergens can be enhanced by concomitant exposure to nitrogen dioxide [5] and perhaps other common, gaseous, indoor pollutants with irritant properties, including tobacco smoke. It is known from laboratory studies that histamine release can be potentiated by both Gram-positive and Gram-negative bacterial cell walls and by spores of nonallergenic moulds [6], and it has been recently postulated that domestic fungal contamination leads to chronic stimulation of lymphocytes in children [7].

In this edition of *Clinical & Experimental Allergy*, Yitzhak Katz and colleagues report a survey of moulds and mould atopy in Israel [8]. Testing whether or not an individual is sensitized to a particular mould certainly indicates whether exposure has taken place, but correlating this with health effects remains problematic. In this study, Katz and his colleagues set out to determine the significance and contribution of moulds to allergic disease, namely allergic rhinitis and asthma, in a rural community. The results are a useful addition to the still rather sparse database on mould prevalence in homes in different parts of the world. Unsurprisingly the authors conclude that viable moulds (as collected on agar plates) are common in houses in a temperate climate. However, using positive skin prick tests (SPT) to determine mould 'allergy', they found no significant correlation between positive SPT, mould abundance and symptomatology. This, and other studies like it (for example the recently reported extensive UK survey [2,9]), continue to add information but, as yet, little further understanding about the link between mouldy homes and respiratory ill health. Until and unless mechanisms of action, measurement methodologies, exposure assessments and outcome measures are better developed, we are likely to stay in the dark with respect to the harm

our common fungal cohabitants may, or may not, be causing us.

Thus, the consistent association between damp and mouldy housing and reports of respiratory symptoms cannot at present be attributed to specific fungi in the air, although there is some very recent evidence that sensitization to *Alternaria* allergens may be a significant independent risk factor for asthma in children [10]. Whilst indicative of a relationship, the few epidemiological studies relating adequate measurements of indoor airborne fungi to respiratory disease have generally not shown convincing associations. Mould and dampness are often associated with poor ventilation, which tends to increase exposure to both microbiological contaminants and other indoor pollutants with potential impacts on health and well-being [11]. Also, it must be recognized that house dust mites, damp and mould are all closely interlinked and that it is rare to be mould sensitive (IgE) in the absence of house dust mite sensitivity. Furthermore, the importance of parental smoking as a confounding factor when assessing symptoms in children is well recognized [12]. To progress understanding in this field it is important to use and encourage the further development of valid measures of exposure to fungal biomass, to improve methods for species identification and the characterization of microbiological (metabolic) products, and to conduct in-depth toxicological studies on fungi and their products.

References

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