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Applications: Medicine (Plenary room | 14:00 – 16:00)

How many cues does it take to find every cancer?

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Understanding how observers interpret complex medical images and detect pathology is important as errors have serious health and economic implications. Visual search in this applied setting is typically compared between experts and novices to establish what processes experts optimise for high performance, e.g., more efficient eye movements (Donovan & Litchfield, 2013) or exploiting the first glimpse of the scene (Litchfield & Donovan 2016). Yet despite extensive training, experts still miss cancers (4-30%) and rarely achieve 100% cancer detection in experiments. Taking a novel experimental approach, novices were provided with increasing number of cues to establish what it would take to achieve 100% cancer detection. A key factor when finding 'lung nodules' in chest x-rays is that these targets have a variety of shapes and sizes, and their features can be mistaken for normal anatomy. Specifying the target-template so observers know what features precisely to find in images should increase performance, as should presenting this cue in the context of the image. Without cues novice accuracy is typically 50% whereas experts achieve 80%-90% (Donovan & Litchfield, 2013). Presenting 30 novices the precise visual depiction of cancer on 36 images (using a 1-pixel cropped border of the target) yielded 65% accuracy (1 novice achieved 100%). A separate group of 30 novices shown the target cue with a 100-pixel border (including surrounding spatial information), yielded 86% accuracy (and 4 achieved 100%). We discuss how observers make use of these cues and why cancer is still hard to find even when shown onscreen.