Merkel Cell Carcinomas in New Zealand: Virus or Ultraviolet?

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The NETwork! Project (New Zealand) began with creation of the NETwork! registry, which catalogues all Neuroendocrine tumour patients diagnosed between 1995-2012 in the Auckland region and 2008-2012 across New Zealand. With strong support from NET patient support group (Unicorn Foundation New Zealand), we have ethical approval to retrospectively access clinical formalin-fixed paraffin embedded (FFPE) tissue blocks belonging to patients in the NETwork! registry.

Merkel Cell Carcinoma (MCC) is a rare Neuroendocrine skin tumour originating from sensory cells in the skin. MCC behavior is more aggressive than Melanoma, with treatments in NZ often restricted to surgery or radiotherapy, although immunotherapy holds promise overseas. Histologically, MCCs have a distinct small cell architecture and diagnosis is confirmed by a panel of immunohistochemical markers including chromogranin A, synaptophysin and cytokeratin 20.

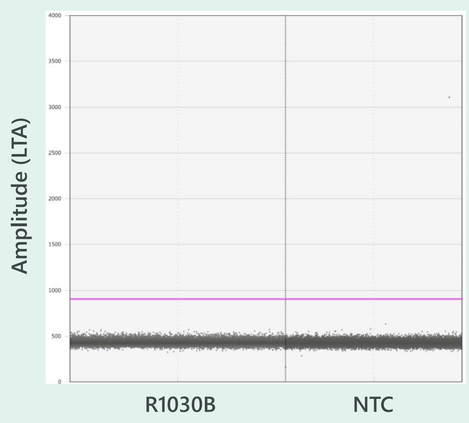
Virus or Ultraviolet? In 2008, a novel oncogenic polyomavirus (MCPyV) was identified in MCCs[1]. Studies from Europe and the USA confirmed MCPyV presence in ~80% of MCCs[2,3]. However, an Australian study found viral presence in just 24% (n=21)[4], suggesting an alternative mechanism; ultraviolet (UV) exposure was confirmed using mutational signature analysis[5]. Are these two separate diseases, requiring different clinical management strategies? Here, we present the first study in New Zealand to ask the question, Virus or UV?

Methods: 355 cases of MCC were identified from the NETwork! Registry. Archived FFPE tissue blocks were obtained from 103 patients, including skin primary plus matched nodal and distant metastases where possible. Regions of tumour and matched normal were macrodissected for nucleic acid extraction. Seventy-nine MCC patients have been screened for viral status using in-house droplet digital PCR (ddPCR) assays for the LTA gene and CM2B4 immunohistochemistry (IHC) assay.

MCC Viral Status in New Zealand

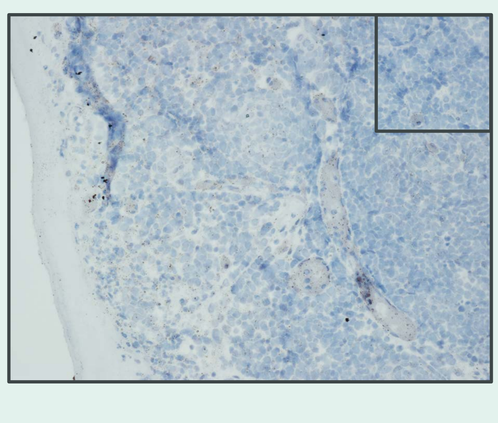
Virus Negative 76%

ddPCR



Clear absence and no expression of MCPyV LTA gene

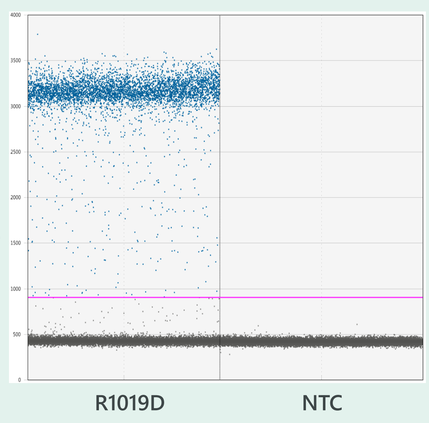
IHC



No production of MCPyV protein LTA seen by IHC

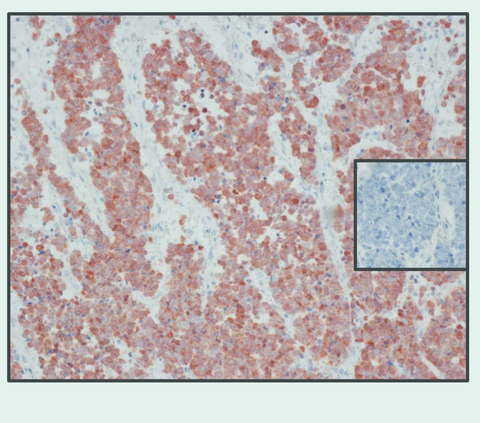
Virus Positive 24%

ddPCR



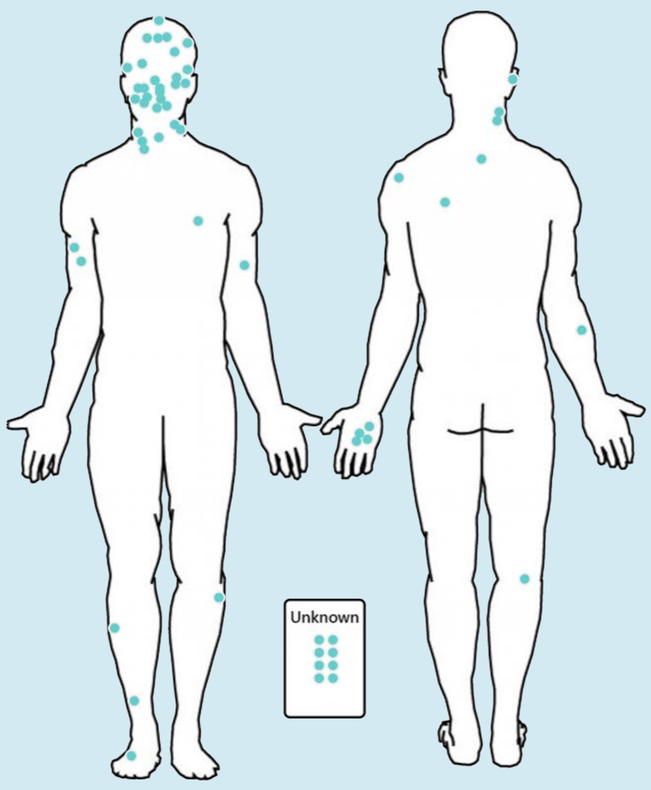
Clear presence and expression of MCPyV LTA gene

IHC

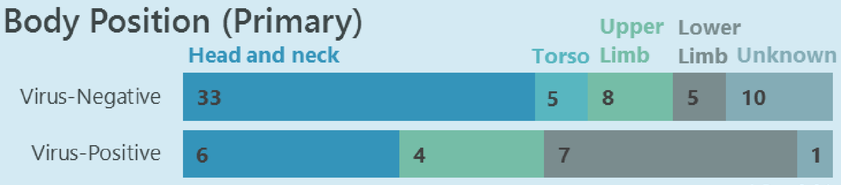


Clear production of MCPyV protein LTA seen by IHC

Virus Negative: Primary Tumour Site

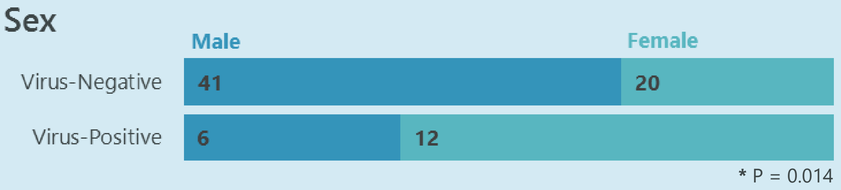


Body Position (Primary)



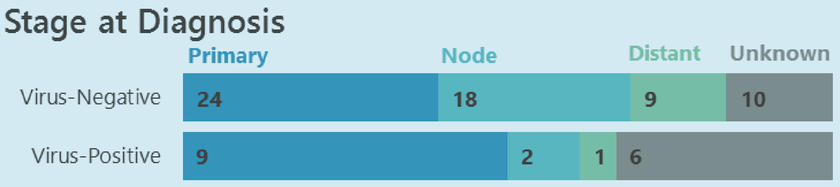
* P = 0.01

Sex



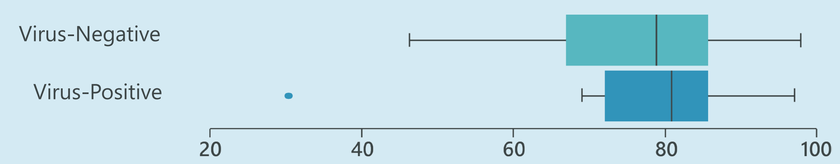
* P = 0.014

Stage at Diagnosis



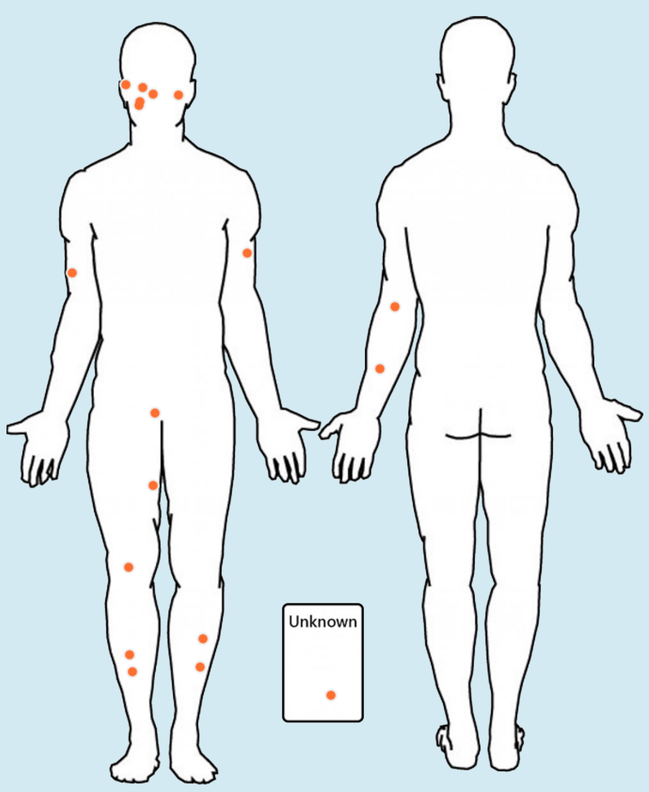
P = 0.16

Age at Diagnosis



P = 0.63

Virus Positive: Primary Tumour Site



Viral status was retained in subsequent lesions in the same patient

Conclusions and Future Work

- New Zealand MCCs are dominated by the non-viral form. As such, we question whether current guidelines for management and diagnosis that have originated in Europe and USA are valid for use in Australasia.
- Virus-positive tumours are more commonly found in females and located on the limbs, whereas virus-negative tumours are predominant in males and found on the head and neck.
- Viral status analysis is ongoing in an expanded cohort, with genomic analysis and further immunological assays to begin shortly.

1. Feng et al. (2008) PMID 18202256
2. Kassem et al. (2008) PMID 18593898
3. Becker et al. (2009) PMID 18633441
4. Garneski et al. (2009) PMID 18650846
5. Wong et al. (2015) PMID 26627015

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