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Molecular epidemiology of locally acquired Hansen's disease in Central Florida

To the Editor: From 2010 to 2017, 90 cases of Hansen's disease (HD) were reported in Florida, with some cases believed to have been acquired locally from 9-banded armadillos (*Dasypus novemcinctus*), which are the only known zoonotic reservoir of *Mycobacterium leprae* in North America.[1,2] However, their role in transmitting HD in Central Florida has been questioned owing to a lack of definitive evidence.[3] Previous literature classified global strains of *M leprae* by using single-nucleotide polymorphism (SNP) types and variable number of tandem repeats (VNTR), resulting in the identification of 2 strains of *M. leprae* able to infect humans (zoonotic strains).[4]

Our study protocol was approved by the University of Central Florida institutional review board and involved interviews and genotyping of *M. leprae* isolates from patients with newly diagnosed HD to assess for risk factors and potential exposures. All patients with biopsy-proven HD in a Central Florida dermatology clinic were approached regarding the study, and 5 out of 5 subjects were recruited. The subjects were interviewed using a list of questions regarding their history of exposure to potential risk factors. The HD-causing bacteria in the diagnostic skin biopsy specimens were genotyped by the National Hansen's Disease Program to assess whether the identified strains were zoonotic. The molecular genotyping data were then compared against the reported history of disease exposure to examine for correlation.

All 5 subjects reported no known contact with infected humans and minimal exposure to international travelers (Table I). They routinely participated in outdoor activities and observed armadillos on a regular basis, but only subject 1 recalled direct physical contact.

Of the 5 subjects, 4 were infected with *M leprae* SNP 3I-2, which is a known zoonotic SNP type. Additionally, the strain isolated from subject 4 matched both the SNP and VNTR found in armadillos. Subject 1 was infected with SNP 3K, which is a strain not found in previously tested armadillos.[5]

Through a combination of interview and molecular genotyping, our findings provided preliminary evidence that at least 4 of the 5 subjects had acquired HD from armadillos. SNP3I-2 has been identified in all sampled armadillos with HD and in up to 70% of human cases from the southern United States.[2,4] Because of the rarity of HD, it can be concluded that patients infected with the same *M. leprae* SNP type found in local armadillos likely acquired HD through animal exposure. Although subject 5 reported travel to areas with endemic HD, her *M. leprae* strain is found primarily in North America, suggesting that she likely acquired HD locally.

Table I. Phone interview results denoting history of potential exposure to *M leprae* at least 20 years before diagnosis

Subject	*M leprae* SNP type	How long lived in Central Florida	History of any foreign travel	Contact with infected person	Observed armadillos in daily life	Had physical contact with armadillo	Had contact with armadillo droppings or body fluids	Does outdoor activities	Occupation
1	3K	Entire life	Barbados, Bahamas cruise	Denies	Yes	Yes, multiple instances	Yes	Gardening, dirt biking, hiking, fishing	Delivery driver
2	3I	Since 1980	Western Europe, Bahamas, Northern Europe/ Estonia	Denies	Yes	Denies	Likely, regularly handles caged armadillos because of occupation	Hiking in woods, gardening	Wildlife manager, indoor desk job
3	3I	28 y	Never	Denies	Yes	Denies	No known contact, but possible because of gardening hobby	Outdoor gardening	Desk jobs with minimal contact with people outside office
4	3I	Entire life	Never	Denies	Yes	Denies	No known contact, but possible because of yard work and gardening	Hunting, gardening/ yard work without gloves	Purchasing agent with no tourist interaction
5	3I	33 y	Brazil, Western Europe, South Africa/Botswana/ Zimbabwe, Iceland, China	Denies	Yes	Denies	No known contact, but possible because of outdoor hobbies	Gardens regularly, outdoor swimming, local camping	Clinical social worker

M leprae, Mycobacterium leprae.

Limitations of the study were its small sample size and incomplete VNTR analysis in 4 subjects, which could have provided stronger evidence of zoonotic transmission. Future studies will aim to expand the sample size by collaborating with the National Hansen's Disease Program and additional regional dermatology practices.

Determining the mode of transmission of HD is important for preventing future infection and also to dispel the notion that HD is strictly a disease of migrants and foreign travelers. How our subjects who did not recall any direct contact with armadillos contracted HD is unclear. Further investigation of HD transmission is warranted.

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The acceleration of melanoma in situ: A population-based study of melanoma incidence trends from Victoria, Australia, 1985-2015

To the Editor: When considering melanoma burden, national health bodies generally focus on invasive melanoma, giving comparatively little attention to melanoma in situ (MIS). However, because MIS incidence is not publicly reported, the true burden of melanoma in a community may be underrecognized. Public health goals to slow or plateau the incidence of invasive melanoma could be achieved even with rates of the underlying disease still increasing. A number of studies have found that the incidence of MIS has been increasing at a faster rate than invasive melanoma in several countries, demonstrating the importance of considering MIS.[1-3]

This population-based study investigates trends in the incidences of MIS and invasive melanoma from the state of Victoria, Australia. Both invasive melanoma and MIS are mandatorily reported in Victoria, and all melanoma records held by the Victorian Cancer Registry from 1985 to 2015 were examined. Cancer Council Victoria approved the data release, and ethics committee approval was obtained (HREC ref: LNR/17/HAWKE/206). Age-standardized incidences were calculated in the standard manner and trends were examined by joinpoint analysis. Joinpoint models were constrained to have a minimum of 4 data points between joinpoints, with additional joinpoints considered sequentially.

A total of 100,848 records from 87,004 individuals were considered. After adjustment for multiple primary tumors following standard convention, the final sample consisted of 53,982 invasive melanomas and 33,022 in MIS tumors.

Table I presents the 2015 incidences and estimated trends from the fitted joinpoint models of the age-standardized incidences. In 2015, Victoria recorded more melanoma tumors than in any year prior. A total of 5967 initial primary tumors were diagnosed in 2015; of these tumors, 3235 (54%) were MIS tumors and 2732 (46%) were invasive melanoma. For males, this equates to 2015 incidences of 59.0 per 100,000 for MIS and 52.9 for invasive melanoma. The 2015 incidences for females were 50.0 per 100,000 for MIS and 39.2 for invasive melanoma. This is the second consecutive year in which there have been more cases of MIS than invasive melanoma tumors.

The invasive melanoma incidence trend models exhibit a deceleration in late 1990s, whereas the trend models for MIS incidences show a flattening in 1990 and a steep acceleration in 2012 (Fig 1). This