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Tackling a 'ticking' time bomb

As Lyme disease hits the headlines amid controversy over its symptoms and resistance to treatment, the latest technology is helping researchers north of the border tackle the issue. But educating the public remains vital, says Ruaraidh MacNeil

A rise in the number of diagnosed cases of Lyme borreliosis, or Lyme Disease as it is known, now makes it one of the most common tick-borne diseases in the northern hemisphere.

Caused by a tick bite, Lyme Disease now affects around 65,000 people a year in Europe. The number of cases confirmed in England and Wales by Public Health England (PHE) grew from 268 in 2001 to 1,112 in 2013, although it estimates the true number of new cases to be closer to 3,000. Indeed, the former head of the National Lyme Disease Testing Service has suggested that each confirmed case should be multiplied by 10, which mean the number of cases a year is nearer the 11,000 mark.

As yet there are no official figures for the number of people diagnosed with Lyme Disease in Scotland. However, Dr Roger Evans, a clinical scientist with NHS Highland, believes the number of cases reported in Scotland has increased 10-fold in the past decade.

"Anecdotal evidence from GPs suggest an increase in numbers as diagnosis improves and awareness is raised among the public and primary care health workers. Climate and ecological conditions can also prolong the tick season with the potential for people to be bitten extending beyond the summer months well into October, November and December. Milder winters also mean more ticks are out, so this is another reason why the disease is becoming more prevalent as more people spend time outdoors during these months."

Collaborative campus

Dr Evans is part of a consortium, led by Scotland's Rural College (SRUC)'s Epidemiology Research Unit, which was awarded £250,000 by the European Space Agency's Advanced Research in Telecommunications Systems Integrated Applications Promotion programme.

The make-up of the consortium is a good example of the 'collaborative campus' model promoted by the Centre for Health Science associated with Inverness Campus …. A body that encourages business and academia to work together on a range of projects.

The consortium includes the National Lyme Borreliosis Testing Laboratory based at Inverness' Raigmore Hospital, NHS Highland Research and Development and Primary Care, the University of the Highlands and Islands' (UHI)'s Rural Health and Wellbeing department, Avia-GIS - a Belgian SME with a focus on agriculture and veterinary information and analysis - and Environmental Research Group Oxford which specialises in applied research for sustainable development and is working in consultation with the Scottish Government's Centre of Expertise in Animal Disease Outbreaks.

The LymeMAP system evolved under the project uses data from the testing laboratory, Earth Observation imagery, GPS satellites and end users, Spatial modelling techniques are then applied to produce maps of where the ticks are most prevalent. Users of the app are also able to upload locations of ticks and bites to the central database.

The two principal assets of LymeMAP are Earth Observation (EO) and Global Navigation Satellite Systems (GNSS). EO provides the data necessary to produce spatial distribution models of disease and vector risk, either from remotely-sensed imagery such as altitude or vegetation cover, or more distant derivatives such as land use, seasonality or bioclimatic indicators. The use of GNSS through mobile platforms and dedicated apps is essential to providing location-specific information on the risk of Lyme borreliosis and also to develop more accurate risk maps through the geo-located data submitted by users via the app.

Symptoms and diagnosis

Borrelia burgdorferi, the organism that causes Lyme disease, is carried by ticks that feed on the blood of mammals, including humans. It was