WILD BOARS AND STAPHYLOCOCCUS AUREUS - A SENTINEL SYSTEM TO ASSESS HUMAN IMPACT ON ECOSYSTEM HEALTH.

Main author: Ágnes Csivincsik (Hungarian University of Agricultural and Life Science -MATE)

Co-authors: Eszter Nagy, Tibor Halász, Tamás Tari, Brigitta Bóta, Rebeka Nagy, Ildikó Benedek, Gábor Nagy, Melinda Kovács

INTRODUCTION

Within temperate zone forests, wild boars are a common part of the ecosystem. They have a large and dense population. The feeding ecology of wild boars can be characterised by omnivorous food choices with rare scavenging activity. These mammals gain most of their diet components by rooting, whereby they are in contact with soil and all the contaminants that accumulate in it. Our hypothesis was that wild boars can harbourbacteria originating from environment in the submandibular lymph node, which is an entrance gate of the body.

Staphylococci are ubiquitous bacteria, which can even be found in healthy humans and animals, and in the environment. The selective culture of these bacteria is simple, and there are reliable molecular methods for identifying the species and detecting the mecA gene of methicillin resistance.

Our aim was to demonstrate that the Staphylococcus aureus subpopulation, which infects wild boars, can be a good sentinel to assess the impact of human activity on the natural ecosystem.

METHODOLOGY

Our study was conducted in the southwestern part of Hungary, in a nature conservation area where hunting is permitted. The area is associated with the county seat city, Kaposvár. Large-scale animal farms are not characteristic of this area. Within the study site, there are some popular tourist attractions (Zselic Starry Sky Park and a forest hotel).

The sampled carcasses were harvested as part of the routine hunting regime and not for scientific purposes. During hunting events, we collected submandibular lymph node specimens, which we submitted to the laboratory without delay. In the laboratory, we decontaminated the specimens by sinking them into boiling water five times for three seconds. We removed connective tissue using sterile equipment and repeated the decontamination process. The decontaminated specimens were grounded in a mortar using sterilised sand. We submerged the decontaminated specimens in buffered peptone water, mixed it well, and poured the suspension into a culture tube. After 30 minutes of incubation at 37°C, we inoculated mannitol salt agar with 100 µL of vortexed specimen suspension. All

Gram positive cocci went through a molecular identification process using specific primers for the detection of S. aureus and the mecA gene.

RESULTS

We collected submandibular lymph node specimens from 28 wild boar carcasses, of which eight were confirmed to be infected with Staphylococcus aureus. Two of the isolated Staphylococcus aureus strains carried the mecA gene. Meanwhile, four specimens contained other Staphylococcus spp. with the mecA gene.

DISCUSSION

As a result of our study, we established that S. aureus can be detected in wild boars' submandibular lymph nodes at a relatively high prevalence. Based on this finding, we can conclude that a surveillance system, which is based on the laboratory processing of wild boars' submandibular lymph nodes, is suitable to detect S. aureus in a natural ecosystem.

The occurrence rate of the mecA gene in the wild boars' carcasses reached 15 % in our study, which seems to be high, considering that the study site is a natural habitat. This study did not analyse the source of resistant gene contamination. While animal husbandry is not extensive in the area, we deem that the nearby city or the local tourist activity could emit antimicrobial resistance to the environment. Further investigations will be needed to confirm this hypothesis.