
Rodent Management – Session 2

Low frequency of warfarin resistance in Norway rats in China after 30 years usage of anticoagulant rodenticides

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The first generation anticoagulant rodenticides (FGARs), such as warfarin and diphacinone, have been widely used in rodent control in China for over 30 years and resistant Norway rats have been reported. The genetic basis of warfarin resistance has been studied in Norway rats in many European countries, but is an untouched area for Norway rats in China. Mutations in the vitamin K epoxide reductase complex subunit 1 (Vkorc1) gene confer anticoagulant resistance in rodents. In this study, we analyzed the Vkorc1 polymorphisms of 681 Norway rats collected in Zhanjiang and Harbin City in China from 2008 to 2015 and evaluated the warfarin resistance frequency. Analysis results revealed 4 mutations including 3 not previously reported. Two new synonymous mutations His68His and Leu105Leu are not associated with warfarin resistance. One new nonsynonymous mutation Ala140Thr was found in Zhanjiang rat samples collected in 3 different years with low frequencies (3.3%-4.0%) and is likely associated with warfarin resistance. No Vkorc1 mutation related to warfarin resistance was detected in rats in Harbin. Laboratory resistance tests suggested low warfarin resistance frequencies in rats from Zhanjiang (4.9%-17.1%) and Harbin City (0-2.5%). Therefore, both genetic analysis and laboratory resistance tests suggested low warfarin resistance frequencies in rats from Zhanjiang and Harbin City, which is likely owing to the absence of Vkorc1 mutations resistant to second generation anticoagulant rodenticides (SGARs), as well as different strategy of anticoagulant usage from Europe. The alternative usage of FGARs and SGARs might represent an effective strategy against the development of warfarin resistance in Norway rats in China.

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and
16th Rodens et Spatium

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