MOUSE HYBRID STERILITY GENES: A MAPPING OF EPISTATIC INTERACTIONS

Hybrid sterility is an important postmeiotic reproductive isolation barrier. The phenotype of mouse hybrid sterility includes decreased testes weight and an absence of sperm. It occurs only in F1 males from PWD/Ph (PWD; Mus musculus domesticus) x C57BL/6J (B6, M. m. musculus) cross but not reciprocal B6 x PWD F1 males (FOREJT & IVÁNYI, 1974; FOREJT et al., 1991). Nowadays we know that the phenotype of hybrid sterility is controlled by the PWD/B6 allelic combination on chromosome 17 at Prdm9 locus is needed and by the PWD allele on chromosome X at Hstx2 locus. This combination of two loci is necessary but not sufficient obtain full sterility (MIHOLA et al., 2008; FOREJT, JIŘÍ, pers. comm.), so another genes must play role.

In this experimental work I prepared the F2 cross from B6 and PWD mouse strains and I genotyped the males of F2 crosses and I carried out the QTL analysis. Extended QTL analysis was carried out with all animals carrying Prdm9PWD/B6 – Hstx2PWD allelic combination. The results showed unexpectedly low number of sterile males in F2 generation (1.90 %), and significant QTLs on chromosomes 17 (in Prdm9 loci) and X (different from Hstx2) in sperm, no other significant peak on any chromosome was found. These results indicate a more complicated control of hybrid sterility, where probably more genes (therefore invisible in QTL analysis) play role. I also compared my results to the results from the backcross to the B6 strain (which was done in our lab in parallel). The difference between the two experiments could be explained by the absence of PWD/PWD allelic combination in the backcross, by some unspecified epigenetic interaction or by the different origin of Y chromosome.

Keywords: hybrid sterility, genotyping, QTL mapping, mouse laboratory strain C57BL/6J, mouse laboratory strain PWD/Ph.