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Abstracts

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Chromosomal aberrations in bank vole: risk assessment

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We investigated the rate of chromosomal aberrations (CA) in bone marrow cells of bank vole, *Clethrionomys glareolus*, from a cyclic population from the Middle Urals in the southern taiga (57°15'N, 58°44'E) in 1999–2011. A total of 22.553 metaphases (in 557 individuals) were examined and 383 cells with CA events were detected, thus its expected marginal rate is about 17 per mille. Competing models of logit regression (fixed effects, and dispersion parameter was estimate as $f=D/rdf=0.172$ – underdispersion) were ranked using (minQBIC) model selection. Relative importance ($w^+=\sum w_i$) and likelihood ratio statistics ($QLR=[2LL(\theta_i)-2LL(\theta_0)]/f$) for each culprit (risk factor) were assessed. Adjusted effects – odds ratio (since low frequency OR may be interpreted directly as risk ratio, $OR \gg RR$) of categorical (gender, reproductive status, phase of population cycle) and standardized continuous predictors (sunspot number, radio flux, geomagnetic field anomalies) on CA rate were estimated. We found four statistically significant ($p<0.01$) effects, three of them reasonably strong. “Gender” had a weak effect ($w^+=0.19$, $QLR(1)=7.09$), and males to females OR is 1.12 (95% CI: 1.03–1.22). Mature individuals ($w^+=1.0$, $QLR(1)=49.51$) exceed immature in 1.37 (1.11–1.69) times. In the increase ($w^+=1.0$, $QLR(1)=107.40$) odds are higher than in other phases by 1.86 (1.34–2.14). The risks are doubled 2.02 (1.79–2.33) from minimum to maximum of solar activity ($w^+=1.0$, $QLR(1)=112.73$). After accounting for any of two correlated ($r=0.99$) parameters (sunspot number or radio flux), the inclusion of geomagnetic activity in the models is redundant ($QLR(1)=0.19$, $p=0.66$).

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