Sobels, F.H. University of Leiden, The Netherlands. The induction of non-disjunction of compound second chromosomes in stage-14 oocytes by X-rays.

The findings recorded for the induction by X-rays in stage-14 oocytes are controversial. After exposure to 500 R, Day and Grell (Mutation Res. 3:503, 1966) obtained values similar to those expected from stage-7 oocytes, provided linear extrapolation from 4000 R data for stage-7 oocytes is correct. For both the X and the fourth chromosomes, Kiriazis and Abrahamson (Genetics 60:193, 1968) did not observe an increase over the control values. The latter result was confirmed by Traut (Mutation Res. 10:156, 1970), who categorically concludes that a dose of 400 R does not induce non-disjunction in either mature or immature (Mutation Res. 10:125, 1970) oocytes. More recently, however, Clark and Sobels (Mutation Res. in press) and Sobels and Clark (Abstr. 3rd Europ. Dros. Res. Conf. Milan, Sept. 1972, ed. Barigozzi), by making use of compound second chromosomes, were able to show that, in contrast to Traut's findings, exposures of 500, and even 250 R do significantly raise the non-disjunction frequency in stage-7 oocytes over that in the controls. A re-investigation of the induction of non-disjunction in stage-14 oocytes, using this method, seemed therefore indicated. Advantage is taken of the fact that compound reverse metacentrics (or isochromosomes) in females usually disjoin regularly, whereas in males they show disjunctional and non-disjunctional segregation with equal frequencies. Since disomic and nullosomic female gametes will result in viable zygotes after fertilization with nullosomic and disomic sperm, respectively, this system makes the quantitative recovery of non-disjunctional progeny from various states of oocyte development possible. It should be noted that disomics can only result from non-disjunction, whereas nullosomics, in part, also originate from chromosome loss following breakage.

Four-day old females of the genetic constitution C(2L)RM, $j^{63}$; C(2R)RM, px were exposed to 400 R and mated to C(2L)RM, bpr; C(2R)RM, vg males. To record stage-dependent sensitivity differences, egg samples were collected from 9:00 a.m. until 5:00 p.m., and from 5:00 p.m. until 9:00 a.m., over a period of 72 hours in total; in this context only the data for the first two broods, sampled during 24 hours after exposure to irradiation, are presented.

Pooled data of 7 replicate experiments.

| Brood | Hours after irradiation | No. of progeny | Disomic eggs no. | Disomic eggs % | Nullosomic eggs no. | Nullosomic eggs % |
|---|---|---|---|---|---|---|
| A | 0 - 8 | 682 | 6 | 0.88 | 11 | 1.6 |
| B | 8 - 24 | 2,734 | 26 | 0.95 | 24 | 0.88 |
| | Controls | 12,142 | 50 | 0.41 | 42 | 0.35 |
| | Stage-7 oocytes (500 R) | 7,393 | 70 | 0.94 | 33 | 0.44 |

Considering first the data for disomics, it may be noted that their frequency does not significantly differ between broods A and B, and hence the data of these two sampling periods were pooled. The frequency of 0.93% thus obtained, is significantly higher (at the 0.01% level, Kastenbaum and Bowman, Mutation Res. 9:527, 1970) than in the controls, and does not at all differ significantly from that found after exposing stage-7 oocytes to 500 R. The present data thus confirm earlier findings that there is no difference in radiosensitivity with regard to the induction of non-disjunction between stage-14 and stage-7 oocytes. Moreover, they are in line with the findings of Day and Grell for X-chromosome non-disjunction in stage-14 and slightly earlier oocyte stages, but different from those recorded by Kiriazis and Abrahamson, and Traut.

With regard to nullosomics, it can be seen that these appear to be induced at higher frequency in brood A, than in brood B, though the difference is not significant. The frequency obtained in brood A is significantly higher ($P < 0.01$) than in the controls, and that induced by 500 R in stage-7 oocytes. A similar result has been recorded by Traut, and the different findings for disomics and nullosomics clearly originate from the fact that chromosome breakage phenomena contribute to the induction of nullosomics, but not to that of disomics.

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