Effect of some food colourant agents on the mouse chromosomes

Maysara Abu El-Abbas Mahmoud Salem

Food colourants are wide - spread all over the world and their globalproduction is about 7500 tons per year. The argumentation about theirmutagenic and clastogenic effects has become hot. The presentinvestigation was conducted in an effort to show the effects of four foodcolourants widely used in food products in Egypt; viz., erythrosine (xanthenegroup), ponceau 4R, sunset yellow FCF (azo group) and tartrazine(azopyrollazone group) on the chromosomal pattern of the Swiss albinomice (Mus musculus) to show their clastogenic effects if any.Bone marrow samples were obtained from 120 male Swiss albinomice which were classified as follow:1- Experimental animals which were classified into 2 groups:A) The first group which comprised 40 animals was classifiedinto 4 equal subgroups and each subgroup was subjected to asingle agent of the following food colourants, erythrosine,ponceau 4R, sunset yellow and tartrazine. The animals werefed diet mixed with single food colourant at a concentrationof 10 000 parts per million (l %) for 20 days.B) The second group which comprised 40 animals was classifiedas in the first group and subjected to the food colourants atthe same concentration but for 4 months.2) Control animals which were classified into 2 groups:A) The first group comprised 20 animals and was fed dietwithout any colourants for 20 days. Ten animals were keptas a negative control, the others injected with cyclophosphamide(endoxan) at a dose of 25 mg / kg body weight 24 hoursbefore sacrificing and were considered as a positive controlfor the first experimental group.B) The second group comprised 20 animals and was fed dietwithout any colourants for 4 months. Ten animals were keptas a regative control and the others were kept as a positivecontrol for the second experimental group.After 20 and 120 days the animals were sacrificed by cervicaldislocation and chromosomal study was done.The method of preparing metaphase spreads was used according toPalmer et a1. (1972) and Giemsa stain was prepared according to themethod described by Genest and Auger (1963).As endoxan causes a marked decrease in the mitotic index in bonemarrow, therefore to obtain a sufficient number of mitoses for analysis,an anaemia was induced in all animals by puncture of the infra - orbitalplexus 12 - 16 hours before the animals were killed to stimulate themitotic activity in bone marrow according to the method mentioned byHerbert (1973).For chromosomal analysis, 50 metaphases were examined for thepresence of any chromosomal anomalies either structural or numerical,and the results were tabulated and tested using the Student t test. Theresults of the present study

revealed that the means +SD for the structuralanomlies, hypoploidy and polyploidy were as follows:The first group (20 days) :a) Negative control : 1.3 + 0.67 , 1.2 + 0.92 and 1.1 + 0.99respectively.b) Positive control : 74.3 + 15 , 1.4 + 1.07 and 1.5 + 0.53respectively.c) Erythrosine subgroup 1.40 + 0.70 , 1.10 + 0.88 and1.00+0.67 respectively.d) Ponceau 4R subgroup 1.60 + 0.97 , 0.80 + 0.79 and1.10+1.10 respectively.e) Sunset yellow subgroup: 1.20 + 0.79 ,0.80 + 1.03 and0.90+ 0.74 respectively.f) Tartrazine subgroup : 1.40 + 0.97 ,0.90 + 0.99 and1.00+1.05 respectively.The second group (4 months)a) Negative control: 1.4 + 1.07 ,1.2 + 0.79 and 0.8 + 0.79respectively.b) Positive control: 67.3 + 13.81 ,1.1 + 0.99 and 1.3 + 0.95respectively.c) Erythrosine subgroup 1.50 + 1.18 ,0.80 + 0.79 and1.60+0.97 respectively.d) Ponceau 4R subgroup 1.70 + 0.67 , 1.2 + 1.69 and1.0+0.94 respectively.e) Sunset yellow subgroup: 1.50 + 0.71 , 0.80 + 1.63 and0.8±1.03 respectively.f) Tartrazine subgroup 1.60 + 1.07 , 0.90 + 0.57 and1.20+0.79 respectively.While the positive controls show highly statistically significantdifferences in the structural anomalies only in both first and 0.05).Thus one can conclude that the four colourants tested secondgroups (P havenot any c1astogenic effects on bone marrow cells either inrelatively short period or prolonged period even at high dosesbeyond the daily accepted doses and this reflects the safety ofthese four colourants as regards chromosomes. Therefore ac1astogenic hazard to man who uses these dyes in a much lowerdoses is not expected but effect on different organs has to beinvestigated.