Fatty Acid Consumption Link with Mammary Carcinogenesis

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Both the Taconic Sprague Dawley (SD) Model and the Barry Levin Charles River SD DR/DIO Model were used in order to test the association of diet and adiposity as well as environmental agents such as carcinogens. It was seen in preliminary studies that high fat safflower (40 kal% fatty acid) oil, an n-3 fatty acid, enhanced carcinogenesis, as measured by the average number of tumors formed per animal and percent incidence of cis (ductal carcinoma in situ) lesions over the a paired low fat cohort (10 kcal% fatty acid), and decreased tumor latency (the day after administration of DMBA in which first tumor is palpated). This observation was seen regardless of obesity level in these first preliminary cohorts. In the Taconic model, female animals were examined at 90 days after initiation at weaning after a maternal equilibration in a "cultural diet" model (described previously) on diets described above. These animals did not become obese, as predicted, but had a measurable and significant reaction to 34mg/kg DMBA versus corn oil, attributable to FA, alone. Interestingly, high and low fat cohorts from these pups weighed statistically more and less respectively than the control diet at the day of weaning, but at later ages, showed no difference in percent growth over control diets. By contrast, preliminary data from DR and DIO rats (Levin Model, described previously) show a statistically separated and predictable weight gain and BMI shift among the low and high fat safflower diets of the same composition. At 50 days of age, after a 30 day equilibration on the diet, the low and high fat safflower groups were treated with either a corn oil gavage (vehicle) or were gavaged with 14 mg/kg DMBA. (n=10). At 147 days, a statistical difference was also seen for both weight and BMI between the low and high fat groups of both the obese and lean rats (n=10). DMBA was seen to decrease weight and BMI regardless of diet. Our preliminary data indicate that the DIO females in the high fat diet group showed the trend of having more cis tumors than in the lean DR group on the same high fat diet or those in the matched DIO group and on the low fat diet. By Q-PCR, high fat regimens are seen to increase levels of the inflammatory markers, COX2 and NFK-B, after just 30 days. This may contribute to the enhanced carcinogenic response which has been observed independent of animal obesity level.