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Induction of Triglyceride Accumulation in the Liver of Rats by Perfluorinated Fatty Acids with Different Carbon Chain Lengths: Comparison with Induction of Peroxisomal β -Oxidation

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The potency to accumulate triglyceride (TG) was compared between perfluorinated fatty acids (PFCAs) having different carbon chain length in the liver of male and female rats, in comparison with induction of peroxisomal β -oxidation. In male rats, either perfluoroheptanoic acid (C7) or perfluorooctanoic acid (C8) had no effect, although perfluorononanoic acid (C9) and perfluorodecanoic acid (C10) markedly accumulated TG. In female rats, C7, C8 and C9 did not cause TG accumulation, whereas C10 caused TG accumulation at the same level as those in male rats. TG accumulation induced by C9 was regulated by the level of testosterone in male rats. In contrast with TG accumulation, peroxisomal β -oxidation was induced by C8, C9 and C10 in male rats and by C9 and C10 in female rats. Only slight difference was observed in the induction by C9 between male and female rats. The induction of TG accumulation by these PFCAs was in a dose-dependent manner and significantly correlated with hepatic concentrations of PFCA regardless of their carbon chain length, as was observed with induction of peroxisomal β -oxidation. There is, however, a striking difference in hepatic concentration of PFCA required to cause induction between TG accumulation and peroxisomal β -oxidation. Namely, the concentration of PFCA that is required to induce TG accumulation is much higher than that to induce peroxisomal β -oxidation.