Background: Induction of insulin resistance in rodents involves the use of Streptozotocin (STZ) or diets high in sucrose, fat or fructose; but the relative degrees of insulin resistance induced by each of these approaches are unclear. Aim and Objectives: We therefore compared the degree to which intraperitoneal STZ with or without high-fat or high-fructose diet would induce insulin resistance, glucose intolerance and islet β-cell dysfunction in Wistar rats. Materials and Methods: Subsets of STZ-injected rats administered streptozotocin at 30 mg/kg body weight for five successive days were fed normal diet (STZ), or diets high in fat or fructose for 30 or 60 days. Normoglycaemic rats on normal rodent chow, High Fat Diet (HFD) or High Fructose Drink (HFrD) constituted the control (CTR), HFD or HFrD groups, respectively. Rats were anaesthetized and sacrificed at 30 or 60 days of high fat or fructose feeding followed by measurement of fasting plasma glucose and insulin; and calculation of the HOMA-IR and HOMA-%β. Oral Glucose Tolerance Test (OGTT) was done 48 hours prior to killing the animals. Results: Glucose tolerance and islet β-cell function were most severely perturbed in the STZ-injected hyperglycaemic rats fed diets high in fructose or fat, as indicated by the significantly increased ($p<0.05$) HOMA-IR or decreased HOMA%β ($p<0.05$) at 30 or 60 days compared with the CTR, STZ or diet-only groups. Weekly blood glucose was

most markedly and significantly ($p<0.05$) elevated in these same (STZ+diet) groups, with impaired OGTT. Conclusion: The profound impairment of glucose tolerance and β-cell function in the STZ-induced hyperglycaemic rats fed high-fat or high-fructose diet support the continued use of such models in the characterization of the molecular events associated with insulin resistance, and the testing of novel therapeutic interventions.