

VIII. SUMMARY

The aim of the doctoral thesis was to determine the relationship between the concentration of adiponectin (AD) and irisin (IR) in the blood and the parameters of bone tissue under the conditions of feeding with food of different fat content and to demonstrate the possibility of using IR and AD as possible vital indicators determining the relationship between diet-induced obesity and the parameters of bone tissue. For a period of 10 weeks, 24 female Wistar rats were fed with a diet of different fat content (low-fat, normal and high-fat) and the share of energy from fat: gr. D5 -5.5% kcal% fat, gr. D10 - 10% kcal% fat, gr. D45 - 45%kcal%fat). Using the DXA method, body composition (fat tissue mass, lean mass), total mineral density (TotBMD) and total mineral content (TotBMC) of the skeleton, as well as BMD and BMC of isolated long bones were measured. The strength parameters of long bones were examined in a three-point bending test. The morphology of the growth cartilage and cancellous bone of the distal femur were assessed. The location and intensity of the immunohistochemical reaction for AD, IR and sclerostin in the growth cartilage and bone trabeculae of the metaphysis of the distal femur were determined. The concentration of AD, IR, sclerostin, bone metabolism markers (osteocalcin, bALP, and NTx), and biochemical parameters were determined in blood plasma. In addition, the rats' body weight, feed consumption, and the weight and length of isolated bones were assessed. The examination results show that the high-fat diet has a positive effect on the metabolism of bone tissue, stimulating the processes of bone formation and mineralization, which is manifested by an increase in the values of densitometric and bone strength parameters. There was no effect of the applied diet on the concentration of osteocalcin and NTx, however, an increase in bALP concentration was observed in rats of groups D10 and D45 compared to group D5. This increase combined with a growth in the values of densitometric parameters and the ultimate force of long bones, indicates an intensification of bone formation processes in rats receiving a diet with a higher proportion of fat and energy. Feeding with a high-fat diet resulted in an increase in the concentrations of IR and AD in the blood, which were correlated with each other. Significant relationships were found between AD concentration and densitometric parameters after feeding with low-fat diet, as well as AD and IR concentrations with the above-mentioned parameters in rats fed with a high-fat diet. Strong correlation between the IR concentration in the blood and the values of most densitometric parameters of bone in rats receiving high-fat diet indicates that IR can be used as a vital

indicator determining the relationship between diet-induced obesity and densitometric parameters of bone tissue.