

CHAPTER 3. OBJECTIVES

Because obesity often increases SNA and deranges several sympathetic nervous activators, elevated SNA is a candidate of the mechanisms of FAT-related BP elevation. In this thesis, the points described below were investigated in order to clarify in detail the SNS mechanism on BP elevation in FAT-fed rats.

(1) To investigate whether increased SNA contributes to BP elevation in FAT-fed rats (Study 1). 1: BP was measured by tail-cuff method in non-anesthetized conscious rats. 2: SNA was indirectly investigated by measuring urinary NE and Epi excretion in the rats.

(2) To investigate the participation of metabolic, hormonal and neural pressor factors in FAT-related BP elevation (Study 1). 1: Body fat content, plasma levels of insulin, glucose and leptin and urinary NE and Epi excretion were measured at before and after BP elevation in the rats fed the experimental diets.

(3) To investigate whether renal SNA is increased and renal functions are insulted in FAT-fed rats (Study 2). 1: Renal SNA was directly investigated by measuring basal efferent renal sympathetic nerve discharges. 2: Renal BF was measured by a laser-Doppler flow meter in surface of kidney. 3: Urinary sodium excretion rate in 24 h was measured.

(4) To investigate whether renal SNA is increased by leptin injection into WAT (Study 3). 1: Renal SNA was directly investigated by measuring efferent renal sympathetic nerve discharges after two doses of leptin or saline injections into WAT. 2: Plasma levels of leptin, insulin, glucose and lactate were measured after leptin or saline injections.

(5) To investigate the effect of insulin on skeletal muscle microcirculation (Study 4). 1: Skeletal muscle microvascular hemodynamic changes (vessel diameters and blood flow velocity) after insulin injection were measured by using intravital real-time confocal laser-scanning microscope system in combination with selective fluorescent labeling.

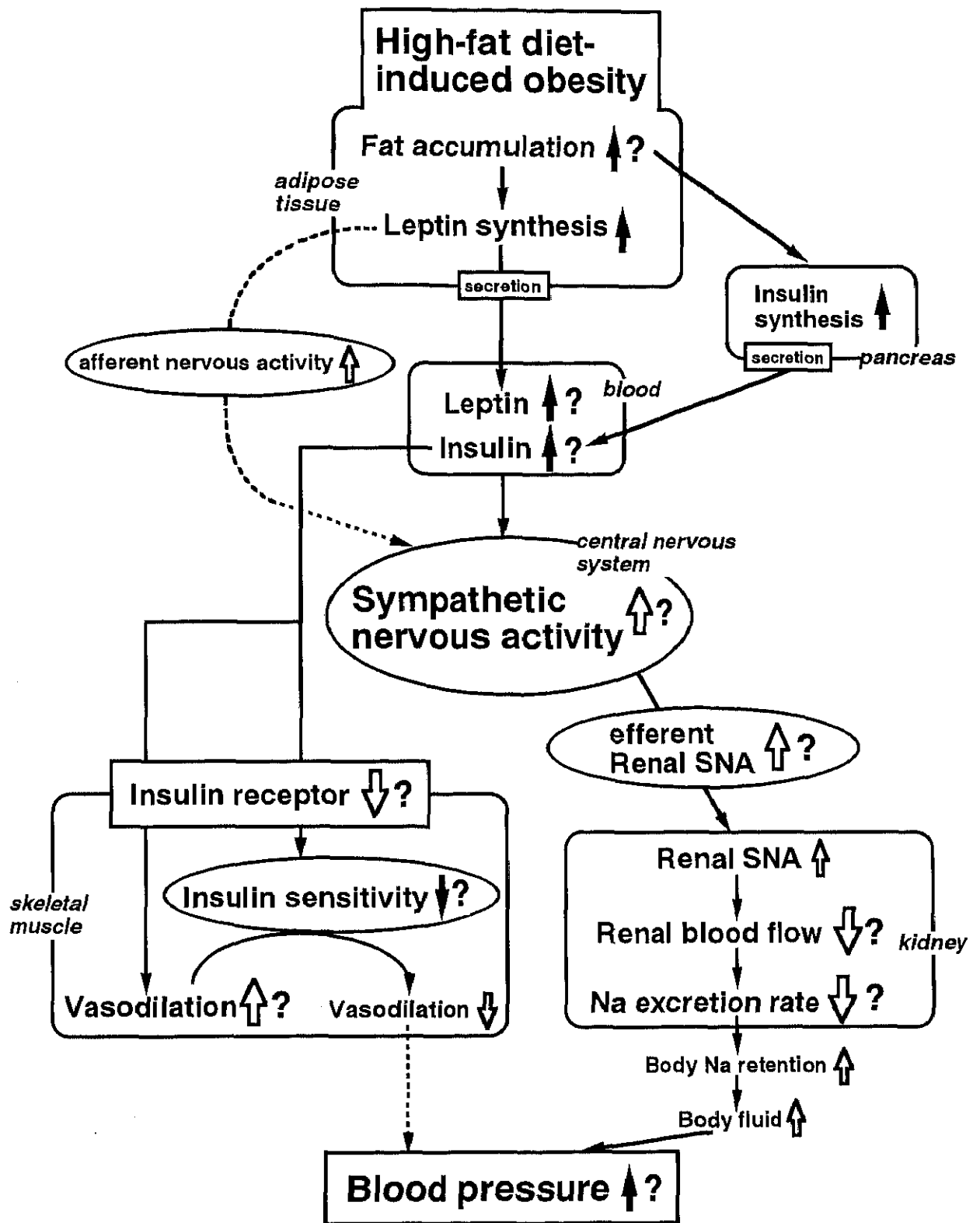


Fig. 1 A hypothetical mechanism involving elevation of sympathetic nervous activity and blood pressure in long-term high-fat diet-fed rats.