Recent advance in Radioassay

RECENT ADVANCE IN RADIOIMMUNOASSAY FOR LOW MOLECULE PEPTIDES. H. Saito The University of Tokushima School of Medicine, Tokushima

For accurate estimation of the concentrations of low molecule peptides in the biological materials by radioimmunoassay (RIA), it is necessary to investigate 1) the region of antigenic determinant of the prepared antibody, 2) the mode of existence and characteristics of the immunoreactive substances in samples and 3) the evaluation of errors in RIA system due to non-specific interference and the countermeasures to avoid them.

Recently, we established sensitive and specific RIAs for measuring somatostatin, atrial natriuretic polypeptide, buserelin (an analog of LH-RH) and growth hormone-releasing hormone in the plasma and obtained the following findings.

Somatostatin (SS): In normal subjects the fasting plasma SS concentration were 13.3 ± 5.3 pg/ml (mean ± SD). Very high values of plasma SS, ranging from 125.0 – 400.0 pg/ml, were found in all four patients with medullary carcinoma of the thyroid examined and such SS levels were changed in parallel with their clinical course after resection of the tumor. In addition, in the preoperative state of medullary thyroid carcinoma, an exaggerated response in SS release was observed after the intravenous arginine infusion suggesting that SS was released from the tumor.

Atrial natriuretic polypeptide (ANP): ANP is a novel peptide hormone which is thought to act directly on the kidney via general circulation. However, the basal plasma level of ANP in normal subjects was considerably low (19.3 ± 1.0 pg/ml; appox. 5x10^9/M) and the peptide was easy to be inactivated by protease in the plasma (stability at 37°C for 30 min was less than 50%). From this, it was known that blood samples should be collected in the chilled test tubes containing protease inhibitor such as aprotinin to prevent the peptide from degradation.

Buserelin: Recently, buserelin (a super agonist of LH-RH) has been given subcutaneously or intranasally for treatment of various diseases such as prostate cancer and endometriosis. Therefore, to clarify the pharmacokinetics and bioavailability of this compound, we set up RIA for buserelin. The half disappearance time of buserelin (118 ± 26 min) was much longer than that of authentic LH-RH (3–6 min). There was no difference in the area under the curve for plasma levels between the groups of subcutaneous injection of 5 μg and intranasal administration of 450 μg.

Growth hormone-releasing factor (GRF): The fasting plasma levels of GRF in normal adults were 10.3 ± 4.1 pg/ml (mean ± SD) and there was no sex difference. A marked increase of GRF release could be detected in the peripheral circulation just before the GH surge that is observed in the initial slow wave stage of sleep at night. In 18 out of 23 patients with idiopathic pituitary dwarfism studied, the GRF was undetectable in plasma (<4 pg/ml), suggesting that primary lesion was at the level of the hypothalamus, not the pituitary.