

Routine Ultramicro-Measurement of Human Growth Hormone in Plasma by Solid-Phase Radioimmunoassay and Its Clinical Application

N. OGAWA

*Third Department of Internal Medicine,
Okayama University School of Medicine, Okayama*

The development and application of the method for the ultramicro-measurement of human growth hormone (HGH) in plasma based on the solid-phase radioimmunoassay (RIA) by using antibody-coated disposable microtiter trays was reported. By further reduction in the amount of antibody with corresponding increase in the period of incubation, greater sensitivity has been achieved. 'This method' has adequate sensitivity and precision for routine ultramicro-measurements of plasma HGH concentration, and is relatively simple to perform. The lower limit of sensitivity for purified HGH was 25 pg/ml ($P < 0.05$). The precision of the measurement of HGH in plasma has been calculated, and the quantitative sensitivity of the method derived from the results given by its routine use was 56.8 pg/ml ($P < 0.05$). The HGH level of normal pooled plasma in 10 replicates was 1,515 pg/ml (± 126 ; 1 SD), and the coefficient of variation was 8.3%.

By using this method, an attempt was made to differentiate patients with hypopituitarism from normal subjects on single basal plasma samples, although it had been hitherto generally accepted that determination of basal plasma HGH levels had not been of much value in the diagnosis of hypopituitarism. The mean basal plasma HGH

level after an overnight fasting in 23 normal males was 2,100 pg/ml ($\pm 1,491$; 1 SD) by this method and 2,036 pg/ml (1,643; 1 SD) by double-antibody RIA, and in 23 normal females, 2,589 pg/ml ($\pm 1,189$; 1 SD) and 3,300 pg/ml ($\pm 1,690$; 1 SD) respectively; there was no statistical significance between the basal HGH level obtained from this method and that from double-antibody RIA in normal subjects. On the other hand, the mean basal plasma HGH level after an overnight fasting in 21 hypopituitary patients was 484 pg/ml (± 282 ; 1 SD) by this method, and this was significantly lower ($P < 0.001$) than 1,376 pg/ml (± 498 ; 1 SD) by double-antibody RIA. These data show that determination of basal plasma HGH levels by this method is of much value in the diagnosis of hypopituitarism.

Plasma HGH concentrations were determined by this method during standard oral 50g glucose tolerance tests in normal subjects, and there was a distinct decline but not reaching the subnanogram range. Thus high concentrations of blood glucose could not suppress completely HGH secretion in normal subjects. This suggests that the mechanism of HGH secretion in normal subjects is thoroughly different from that in hypopituitary subjects.