Standerdization of RIA and Application to Mass Screening

(1) Standerdization of RIA

STANDARIZATION AND QUALITY CONTROL OF RIA BY WHO. Y.Sasaki. Toho University School of Medicine.

Since 1976 the World Health Organization (WHO) has carried out special programme "Standarization and Quality Control (QC) of Radioimmunoassay". The purpose of the programme is to establish the way to obtain comparable results of hormone assays between centers participating in the WHO programme of Research, Development and Research Training in Human Reproduction. As we have been a member of the participating countries I would like to report our experience in the programme of standarization and QC of RIA.

QC has a dual purpose. In the short term it allows critical analysis of dayly assay results and identifies bad individual result or a whole assay to be rejected on the basis of certain criteria. In the longer term it looks for the factors to contribute to the poor assay performance and by eliminating these factors it can improve the assay quality.

The programme proposes a unique way of internal quality control in that the precision of assays is assessed by response error relationship (RER) and precision profile (PP) and the change of bias is evaluated by monitoring three kinds of QC samples.

Each participating laboratory measures once a month two kinds of unknown samples sent by WHO in routine practice of 7 hormones. The reported data are summarized to be analyzed and sent back to each laboratory. We experienced diverged assay results among different laboratories even when the same assay system was used. Monitoring of our own assay results revealed marked improvement of an assay system in different years. Some of the data obtained using a commercial kit revealed a large bias constantly.

In the basis of our 7 years experience with WHO programme we believe importance of establishing adequate internal QC, participation in interlaboratory control survey and development of a raggid assay system on which various factors have little effects. Through these means the assay results using a same assay system can become comparable between laboratories. In order to allow interlaboratory comparison of data obtained using different assay system or kits standardization of reagents and /or correction of data using standard samples are neccessary.

PRACTICAL LABORATORY STRATERGY FOR QUALITY CONTROL OF RADIOIMMUNOASSAY —— A COMPREHENSIVE APPROACH. K.ICHIHARA OSAKA UNIV. MEDICAL SCHOOL, OSAKA

Methods for inter-assay quality control (QC) can be grouped into following 3 categories; 1) serial measurement of QC samples, 2) monitoring the position of standard curve (doses corresponding to 25, 50 and 75 % of full reponse; ED25, ED50 and ED75) and 3) monitoring the distribution of patients' test values. The first method is by far the most popular but its reliability is sometimes questionable since QC samples are usually not measured in sufficient number. Furthermore, QC samples of different concentrations often show inconsistent changes. These facts obviate the necessity of the latter 2 methods whose applicability had not been assessed until very recently. We found that ED25, ED50 and ED75 sensitively reflected changes in the standard, but that they were also affected by any change in nature of antibody which may not affect test results. Meanwhile, the third method, as we have recently documented, proved very useful in many RIAs. The "average of normals" very well reflects systematic change in test results within normal range, but dosen't give any information regarding bias outside of normal range. Thus we derived 2 new parameters; number of abnormal results just adjacent to lower or upper limit of normal range devided by number of test results within the normal range. They appeared to reflect a bias in the corresponding region of values. Hence, we obtained 3 mutually related QC parameters at each of 3 different concentrations. Plotting 3 parameters on single control chart gave better detectability of systematic change in test results. Any concerted change in at least 2 of the 3 parameters strongly points to true bias in measurement. Meanwhile, an isolated change may not be regarded as significant. Certain criteria, however, may be required to give a rational basis in this decision.

Problems involved in the establishment of a computerized total QC system were also discussed so that indivisual test results were stored and retrieved in a very elegant fasion.