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Imaging plate: Validation and First Experience with Quantitative Studies in Whole-Body Autoradiography during Drug Development

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The imaging plate technique (IP) is a fascinating new tool in whole-body autoradiography (WBAR). While being a standard technique for the qualitative evaluation of the distribution of new drugs for many years, WBAR has some major drawbacks preventing its broader use for quantitative studies (time consuming, difficult to standardize, very limited linearity, low sensitivity). Most of these problems are now solved by IP, thus offering the possibility to perform also quantitative distribution studies with autoradiographic methods (QWBAR). However, before using IP during drug development, a careful validation of the method has to be done. Main points are linearity for concentration and exposure time, reproducibility, as well as stability of information and resolution. Influences of exposure temperature, shielding and IP handling have to be standardized. By the use of internal standards and correction for self-absorption in different tissues, calibration was performed and compared to direct radioactivity counting in tissues. Some examples for the use of IP during industrial drug development are given. It is concluded, that the IP is a real break through from the scientific point of view. It clearly will replace WBAR with x-ray films. For its quantitative use, IP may combine the advantages of WBAR (high resolution, completeness of the distribution pattern) and the quantitative distribution studies (concentrations, accumulation factors, time course of elimination in organs and tissues). However, scientific and economical aspects have to be carefully evaluated before replacing the quantitative distribution studies as a whole by QWBAR. To date only a selective use of the IP for the evaluation of accumulation in substructures, placental transfer studies and urgent issues during drug development can be proposed.