

The scheme of OPLC separation using off-line and on-line radioactive detection is summarized in Fig. 6. This complex procedure for metabolite separation, isolation, and identification using multidimensional chromatography combined with various spectroscopic methods proved to be useful in metabolic research (62).

C. Biochemical Investigations

Thin-layer chromatography combined with various radioactivity detection methods has been applied successfully in many fields of biochemistry. Using TLC, a simultaneous assay of several samples can be carried out in a short period of time. Both normal-phase and reversed-phase chromatography may be applied for this purpose (e.g., 64,65). A further application is the ion-exchange TLC separation of ^{32}P -postlabeled DNA adducts (66).

V. COMBINATION OF PLANAR CHROMATOGRAPHY USING RADIOACTIVITY DETECTION WITH OTHER SEPARATION METHODS

Because there is a continuous increase in the demand for methods of analysis of complex mixtures, the coupling of two (or several) analytical techniques is a common practice. For example, TLC is often combined with another separation method such as gas chromatography or HPLC. Compound characterization (UV, IR, mass, and NMR spectrometry) techniques both in situ and after

Table 4 Summary of Important Aspects of Combined CFA, TLC-DAR, OPLC-DAR, TLC/OPLC-PIT, HPLC-RD, and GC-RD Radiochromatographic Techniques

Aspect	Technique used for separation and detection of radioactive compound						
	CFA ^a	TLC-DAR ^a	OPLC-DAR ^{a,b}	OPLC-RD ^c	TLC/OPLC-PIT ^a	HPLC-RD ^c	GC-RD ^c
Detection of different radioisotopes	++	++++	++++	+++	+++	+++	+
Simplicity	++++	++++	+++	++	+++	++	++
Speed of process	+	+	++++	+++	+++	+++	+++
Sensitivity	+	+++	++++	++	+++	++	++++
Resolution	++++	++	+++	++++	+++	++++	++++
Reproducibility	++	++	++++	++++	++	++++	++++
Linearity range of detection	+	++++	++++	+++	+++	+++	+++
Separation mode							
Two-dimensional	++++	++	++++	—	++++	—	—
Preparative	+++	++	+++	+++	+++	++++	—
On-line sample collection	—	—	++++	++++	—	++++	—
Cost of operation	++	+++	++++	++++	++++	++	++
Cost of instrumentation	++++	++++	+++	+++	++	+	+
GLP/GCP conformity	++	++	++++	++++	++++	++++	++++
Applicability in pharmacokinetic research	+	+	+	++	+	++++	++++
Applicability in metabolism research	+++	+++	++++	++++	++++	++++	+
Overall applicability	+	++	++++	++++	+++	+++	+++

+ Low/expensive; ++ good/fair; +++ high/acceptable; ++++ excellent/inexpensive.

^aOff-line operation.

^bWith HPTLC layer.

^cOn-line operation.

CFA, contact film autoradiography; PIT, phosphor imaging techniques; OPLC, overpressured layer chromatography; DAR, digital autoradiography; RD, radioactive detector.

Source: Refs. 11, 62, 63, 68.