

# ***Biologic monitoring***

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# EXPOSURE – DISEASE MODEL

- ◆ 1. substance in medium (Measure levels)



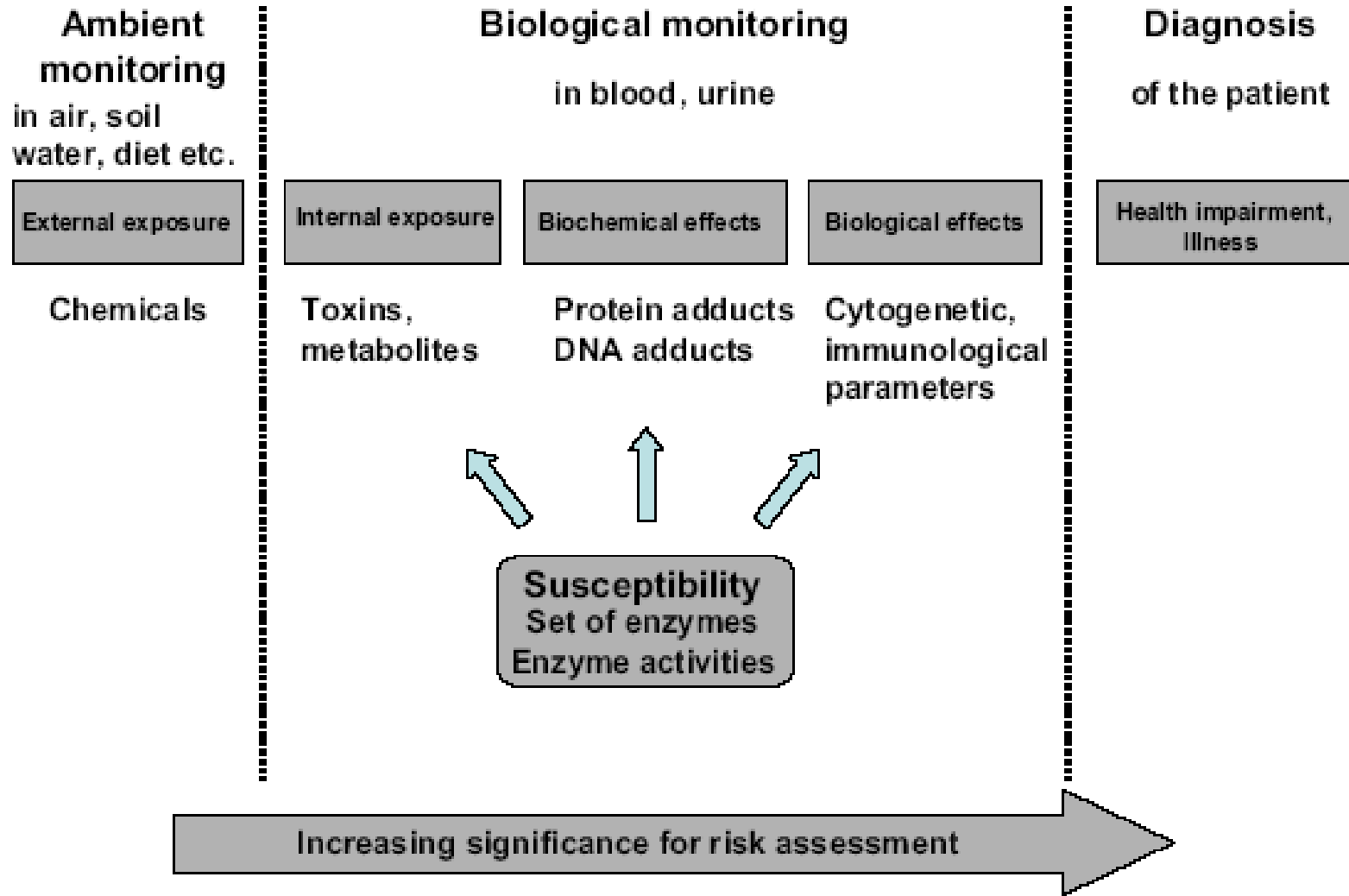
- ◆ 2. Internal Dose (Biologic monitoring of exposures)



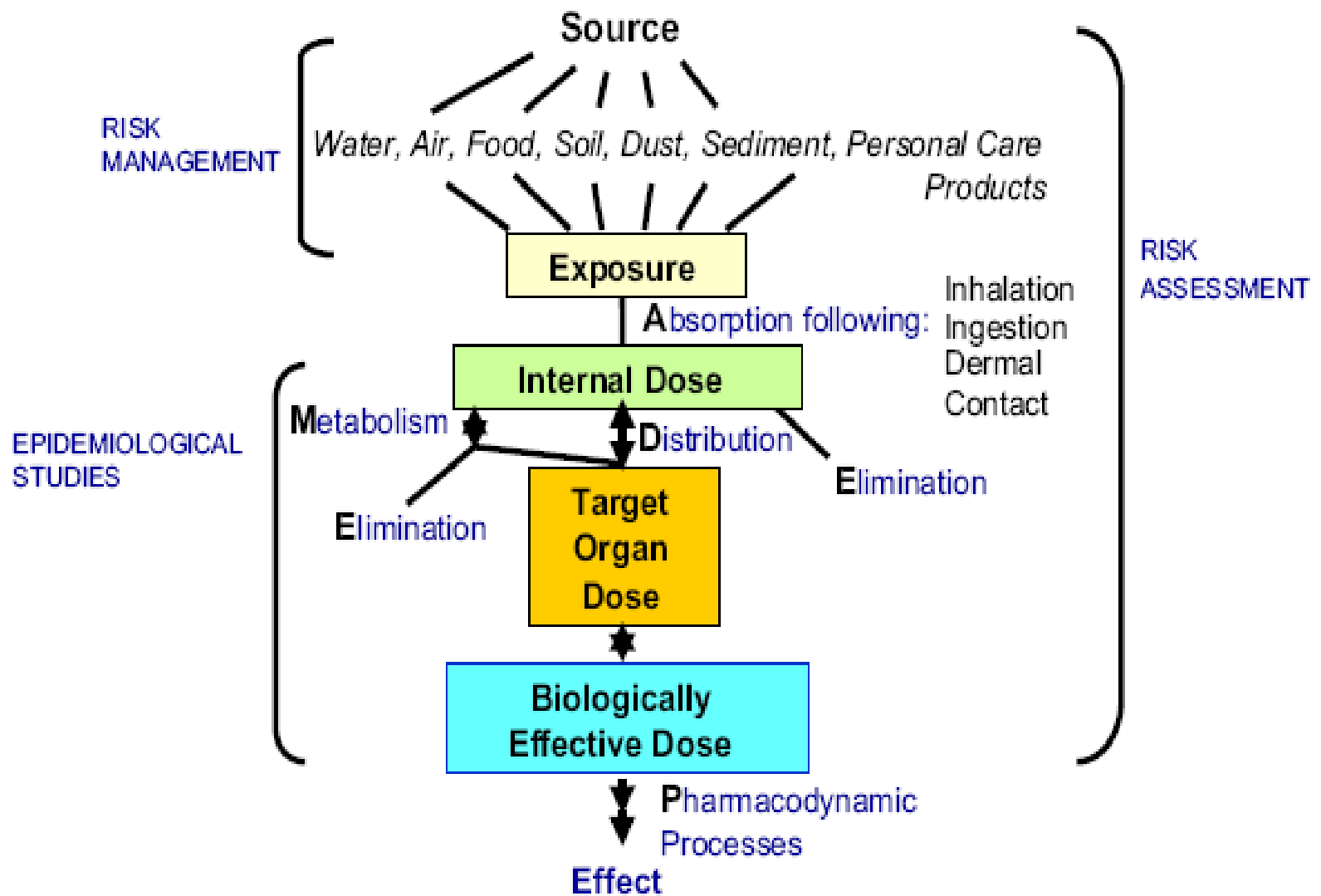
- ◆ 3. Biologic Effect (Biologic monitoring of effect)

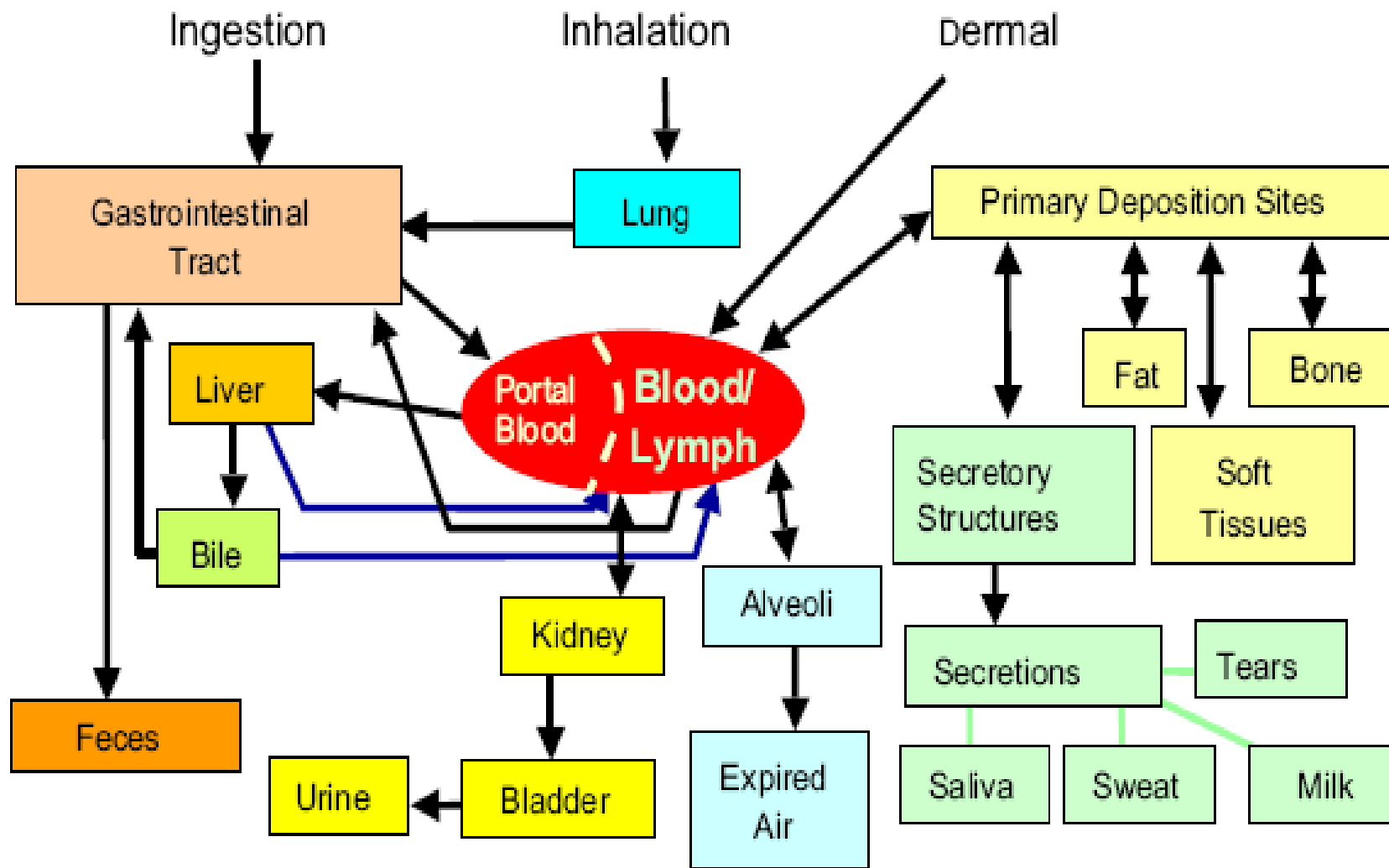


- ◆ 4. Clinical Disease (Diagnosis & Rx)

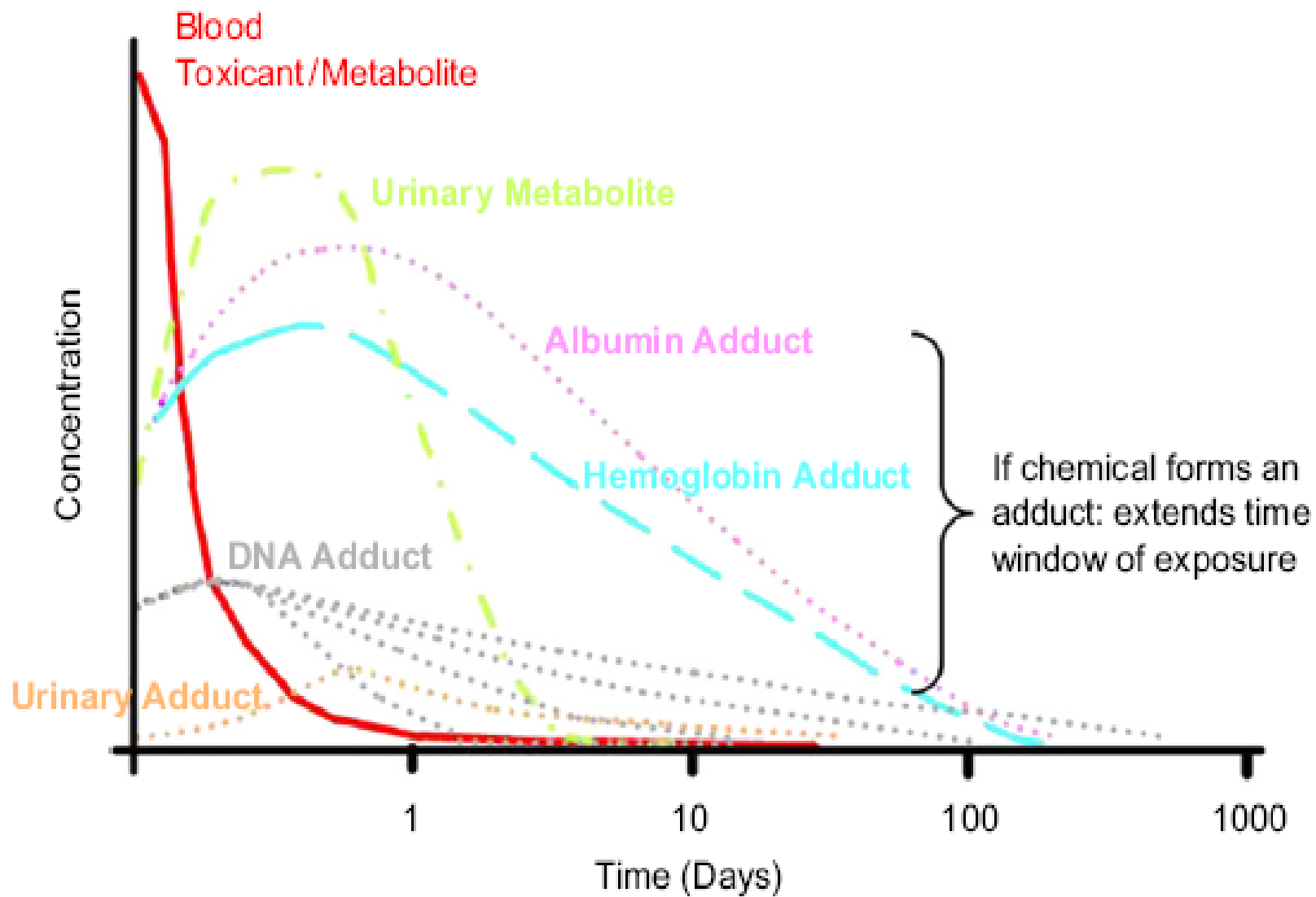


1. Scheme of ambient and biological monitoring (modified acc. DFG, 2002; Angerer and Gündel,





Needham et al. Neurotoxicology 26:547-53 (2005)



**Table 1.** Biomarkers of internal exposure in environmental medicine (blood, urine)

*(a) Metals*

Metals	Matrix blood (b), urine (u)	References
As; (Ba); Be; Cd; Co	u	CDC, 2005; GerES I-IV, 1985-2003
Cr; (Cs); (Cu); Hg; Mo; Pb		CDC, 2005; GerES I-IV, 1985-2003
Pt; Sb; (Se); Tl; V; U; (Zn)		CDC, 2005; GerES I-IV, 1985-2003
Ni	u	Wilhelm et al., 2004
Cd; (Cu); Hg; Pb (Se); (Zn)	b	CDC, 2005; GerES I-IV, 1985-2003

*(b) Polyaromatic hydrocarbons (PAH)*