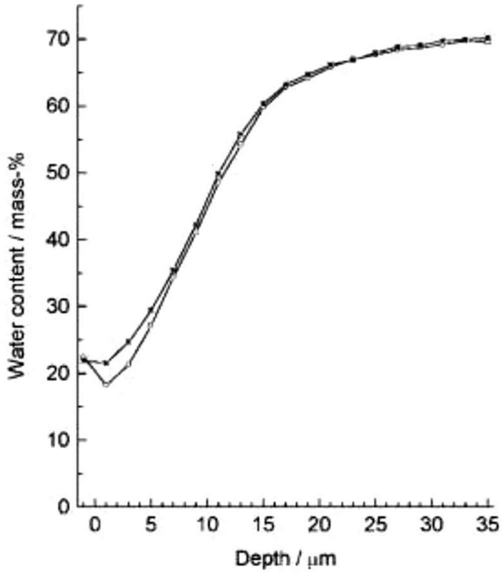

FIGURE 55.1 Consecutive in vivo water concentration profiles of the stratum corneum measured at one spot on the volar aspect of the arm: (○) from the skin surface towards the viable epidermis; (∗) from the viable epidermis to the skin surface. Experimental conditions: signal collection time; 3 seconds per data point; step size; 2 mm; laser power, 100 mW; excitation wavelength, 720 nm. (Reproduced from Caspers et al. 2000 with permission.)

of around 70% is reached. The discontinuity in the water content profile at the end of the SC water gradient yields an estimate of the location of the stratum corneum–stratum granulosum boundary and therefore the thickness of the SC (Caspers et al. 2001).

Caspers et al. (1998, 2001) provided a methodology for tracking intrinsic skin components crucial to its barrier function other than water. They showed semi-quantitative concentration (intensity)–depth profiles of the major constituents of NMF and some of its components, e.g., urea.

With the development of instrumentation designed for use with volunteers, a large number of publications illustrate the power of CRM for non-invasive investigation of human skin parameters. Several groups have proposed different algorithms for determination of the SC thickness from the water content–depth profiles obtained from volunteer studies. Egawa et al. (2007) used the first derivative of the water content profile to find the depth at which the rate of change of water content becomes almost zero, i.e., where the water content reaches an approximately constant value. Crowther et al. (2008) fitted average water content–depth profiles to a four-parameter Weibull model to determine the inflection point in the profile. Hancewicz et al. (2012) argued that no single method could be used for the variety of in vivo water content–depth profiles that can be obtained. They proposed a method that analyzes each given profile using five different logistic function models, yields a distribution of SC thickness values from inflection points, and determines the most likely value for each profile. To date, no consensus as to the most appropriate method has emerged. More recent studies have either fitted a model to the data (Dąbrowska et al. 2016) or approximated the SC thickness as the intercept of the two slopes in the water content–depth profile (Böhling et al. 2014; Mahrhauser et al. 2015; Binder et al. 2017; Richters et al. 2017; Sriram et al. 2018; Dancik et al. 2018; Bielfeldt et al. 2019). Through comparison with other techniques, a consensus has, however, emerged regarding the appropriateness of CRM for the estimation of the SC thickness. SC estimates by CRM are comparable to values obtained by optical coherence tomography (Crowther et al. 2008) and confocal reflectance microscopy (Hancewicz et al. 2012; Böhling et al. 2014). It should be noted, however, that the quality of comparisons depends on body site (Crowther et al. 2008; Böhling et al. 2014).