Major Albumin-Associated Fluorescent Substance in Uremic Serum

H.	Hisao	Mabuchi
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Department of Internal Medicine and Nephrology, Nishijin Hospital, Kyoto, Japan

Hisao Mabuchi, MD, Department of Internal Medicine and Nephrology, Nishijin Hospital, Kamigyo-Ku, Kyoto 602 (Japan)

Dear Sir,

The accumulation of endogenous fluorescent substances in uremic sera is well documented [for example, see ref. 1], but the nature and the origin of these substances are conflicting. It is important to distinguish the nondialyzable albumin-associated fluorescent substances from the dialyzable fluorescent substances which are found in dialysate or hemofiltrate [2]. The albumin-associated fluorescent substances are thought to be a source of the analytical error in the electrophoretic analysis of creatine kinase in uremic patients [3, 4].

In addition, these fluorescent substances may be drug-binding inhibitors retained in uremic serum [5, 6]. Schwertner [6, 7] has isolated the albumin-associated fluorescent ligands which have an emission maximum of 415 ± 5 nm. Lichtenwalner et al. [8] have reported that 2-hydroxybenzoylglycine is a drug-binding inhibitor in uremic serum and it has a fluorescent emission maximum of 425 nm. However, Suh et al. [9] have recently reported that the serum concentrations of 2-hydroxybenzoylglycine are only below 0.006 mMin uremia.

We have recently demonstrated that a major endogenous ligand retained in uremic serum is 3-carboxy-4-methyl-5-propyl-2-furanpropanoic acid (CMPF) and it inhibits the binding of phenytoin to plasma protein [10]. CMPF has a strong affinity for serum albumin [manuscript submitted] and its serum concentrations are approximately 0.2 mMin patients with uremia [11]. CMPF is a fluorescent substance as shown in figure 1. The characteristics of its fluorescence are similar to those of the albumin-associated fluorescence reported earlier [5–7]. These findings suggest that CMPF may be a major albumin-associated fluorescent substance in uremia.

390	460	510	570	630
EMISSION WAVELENGTH (nm)				
550	410	470	630	690
EMISSION WAVELENGTH (nm)				

Fig. 1. Fluorescence emission spectra of CMPF excited at 350 nm (a) or 400 nm (b).

Most fluorescent substances retained in uremic serum are the dialyzable non-protein-bound forms, and the contribution of CMPF to the whole serum fluorescence in uremia is negligible [12; and our unpublished observations].

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