

## In Vitro Study of Fluorescence Detection for Protoporphyrin IX induced from 5-aminolevulinic acid in Cancerous and Normal Cells

김명화, 김경찬<sup>1</sup>, 이인선<sup>2</sup>, 이창섭

계명대학교 화학과, <sup>1</sup>디지털물리학과, <sup>2</sup>식품가공학과

TEL: +82-53-580-5945, FAX: +82-53-558-3408

### Abstract

To clarify the usefulness of fluorescent diagnosis for lung cancer, we investigated the optimal method of administrating 5-aminolevulinic acid(5-ALA) by analyzing fluorescence signal of Protoporphyrin-IX(PpIX) in the cultured normal and cancer cells. 5-ALA was injected as a photosensitizer to the cervico-uterine cancer cell line(HeLa) and in normal liver cells(Chang). Chang and HeLa cells were incubated with various concentrations of 5-ALA(0-800  $\mu\text{g}/\text{ml}$ ). The accumulation of PpIX induced by 5-ALA was in HeLa and Chang cells. The optimal concentration of ALA that induced maximum levels of PpIX was 200  $\mu\text{g}/\text{ml}$  in HeLa cell cured for 24 hours after 5-ALA injection. Fluorescence of PpIX in HeLa cell was excited at a wavelength( $\lambda = 404 \text{ nm}$ ) and showed an emission spectrum at 614 nm which could be related to the PpIX generation induced by the applied 5-ALA. The experimental results showed that fluorescence signal of PpIX was proportional to the concentration of 5-ALA in tumor cells, but not measured in normal cells.

### References

1. Gallegos, E. R., Rodriguez, I. D., Guzman, L. A. M., and Zapata, A. J. P., In Vitro Study of Biosynthesis of Protoporphyrin IX Induced By  $\delta$ -Aminolevulinic Acid in Normal and Cancerous Cells of the Human Cervix(1999), Archives of Medical Research, Vol(30), 163-170.
2. Ninomiya, Y., Itoh, Y., Tajima, S., and Ishibashi, A., In vitro and In vivo expression of protoporphyrin IX induced by lipophilic 5-aminolevulinic

- acid derivatives(2001), *Journal of Dermatological Science*, Vol(27), 114-120.
3. Krammer, B., and Uberrigler, K., *In vitro* investigation of ALA-induced protoporphyrin IX(1996), *Journal of Photochemistry and Photobiology B: Biology*, Vol(36), 121-126.
  4. Fuchs, C., Riesenber, R., Siegert, J., and Baumgartner, R., pH-Dependent formation of 5-aminolaevulinic acid-induced protoporphyrin IX in fibrosarcoma cells(1997), *Archives of Medical Research*, Vol(40), 49-54.
  5. Baumgartner, R., Huber, R.M., Schulz, Stepp, H., Rick, K., Gamarra, F., Leberig, A., and Roth, C., Inhalation of 5-aminolevulinic acid: a new technique for fluorescence detection of early stage lung cancer(1996), *Journal of Photochemistry and Photobiology B: Biology*, Vol(36), 169-174.
  6. Wyld, L., Burn J. L., Reed, M. W., and Brown, N. J., Factors affecting aminolaevulinic acid-induced generation of protoporphyrin IX(1997), *British Journal of Cancer*, Vol(76), 705-712.