

## Performance study of a miniature gamma ray scintillation *vivo* probe for tumor localization

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We have developed a miniature  $\gamma$ -ray endoscopic probe consisting of dual BGO detector probes for tumor detection inside the body cavities. The dual detector system was coupled with random coincidence to decrease the distant background radiation and to improve its spatial resolution for tumor localization. *Method:* The performance of the probe was investigated with a point source and a water phantom. A solution of positron emitting  $^{18}\text{F}$  isotope was used as the source. Clinical trials of the probe were done to localize tumors on the skin surface of four subjects carrying tumors close to the body surfaces, into whom  $^{67}\text{Ga}$ -citrate and  $^{18}\text{F}$ -FDG radiopharmaceuticals were injected. *Results:* Measurements indicated that the spatial resolution of the dual detector probes is around 1.5 times better than the single detector probe, and both single and dual detector endoscopic probe systems are capable of localizing a tumor on a large photon background. *Conclusion:* The endoscopic probe may be easier to insert inside body cavities due to the small crystal size and the flexible light guides. A single detector probe with higher sensitivity may be useful in searching for tumors over a wide intracavity area but a dual detector probe can be used for precise tumor localization. The detector probe may also be suitable for intraoperative observation.

**Key words:** dual probe, random coincidence technique, scintigraphy, body cavity