

The image guiding system for minimally invasive surgery

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The endoscope is widely used for various diagnoses and treatments in Minimally Invasive Surgery (MIS), such as hysteroscopy, laparoscopy and colonoscopy. However, the limited field of image of the endoscope is often the most problematic issue faced by surgeons and medical students, especially for those inexperienced physicians, which leads to difficulty during surgical operations. To reduce the difficulties of MIS with respect to endoscope function, the proposed technique provides the angle and distance from the surgical instrument to the lesion. The in-time guiding information provides global positioning information by tracking the lesion position during surgery. The whole system has been successfully validated in animal *in vivo* experiments. As the view of the scope is limited by the endoscope, and when the surgical instrument moves, the lesion and instrument relating location information is lost. As the global position information is lost, the surgical risk increases. Hence, the proposed technique of this current research provides the angle and distance from the surgical instrument to the lesion. This can help the doctor obtain the needed global positioning information. The risk situation occurs when the surgical three-dimensional positioning information is lost. Hence, the image guiding requirement is urgently needed for increased precision in surgical operations, such as in heart and brain surgeries. The proposed in-time image guiding technique applies to the HSV object-tracking method. This technique provides the distance and angle information in order to help doctors perform successful surgical operations. The guiding information prevents the surgical errors from occurring due to the limited image of field of the endoscope. The proposed technique can also be adopted to decrease the training cost of new doctors. During a survey of the previously published researches, to our knowledge, there are no similar works in image guiding for MIS.

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Linalool, derived from *Cinnamomum camphora* (L.) Presl leaf extracts, possesses molluscicidal activity against *Oncomelania hupensis* and inhibits infection of *Schistosoma japonicum*

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Background: *Schistosomiasis japonicum* remains a considerable economic and public health concern in China, the Philippines and Indonesia. Currently available measures to control the unique intermediate host *Oncomelania hupensis* are frequently associated with severe side effects. Previous studies have demonstrated that linalool-rich extracts from various plants exhibited promising biological activities including cytotoxic, anti-microbial and anti-parasitic properties.

Methods: We identified the components of leaf extracts from *Cinnamomum camphora* by gas chromatography coupled to mass spectrometry (GC-MS) and investigated molluscicidal and larvicidal effects of linalool against *O. hupensis* and *Schistosoma japonicum*. The ultrastructural alterations in gills, salivary gland, stomach and hepatopancreas of snails were observed under the light microscope and transmission electron microscope, and lesions to tegument of cercaria were examined under a light microscope and fluorescence microscope. We then evaluated the effects of linalool on skin penetration and migration of schistosomula and adult survival by measurement of worm burden and egg counts in Balb/C mice infected with linalool-treated cercariae.

Results: In the present work, 44 components were identified from the leaf extracts of *C. camphora*, of which linalool was the most abundant constituent. Linalool exhibited the striking molluscicidal and larvicidal effects with $LC_{50} = 0.25$ mg/L for *O. hupensis* and $LC_{50} = 0.07$ mg/L for cercaria of *S. japonicum*. After exposure to linalool, damage to the gills and hepatopancreas of the snails, and to the tegument and body-tail joint of cercariae was apparent. In addition, linalool markedly reduced the recovered schistosomulum from mouse skin after challenge infection, and therefore decreased the worm burden in infected animals, but not fecundity of female adults of the parasite.

Conclusions: Our findings indicated that linalool might be a novel chemotherapeutic agent against *S. japonicum* and the snail intermediate host.

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