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Photodynamic Diagnosis of Early Gastric Cancer Using 5-Aminolevulinic Acid; First Clinical Experiences

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Objectives: To study the feasibility of 5-aminolevulinic-acid (5-ALA)-induced photodynamic diagnosis (PDD) for the patients with early gastric cancer (EGC). Methods: A total of 25 patients with EGC underwent Endoscopic Submucosal Dissection (ESD). All patients received 5-ALA (20 mg/kg) orally 2 hours before ESD. To study the protoporphyrin IX (PPIX) accumulation after application of 5-ALA, in vivo PDD was performed during ESD using a fluorescence endoscopy on the market. To increase the sensitivity of photodetection, the emission spectra of 5-ALA-induced PpIX fluorescence was quantitatively measured the biopsy specimens obtained from cancer lesion and nonmalignant mucosa as a control are investigated by ex vivo spectroscopy respectively. All resected specimens by ESD were investigated by fluorescence microscopy. Finally, the resected specimens are histologically evaluated. Results In all 25 patients, 20 patients demonstrated fluorescence-positive endoscopic images and could be confirmed negative margins during ESD. EGC lesions resected by ESD method showed PPIX fluorescence under the PDD examination. The intensity of the 635-nm emission peak of PpIX was quantified in 25 patients by spectroscopy. Conclusions This is the first report of PDD for EGC using 5-ALA and a fluorescence endoscopy on the market. These initial results have demonstrated that PPIX is selectively enhanced in malignant tissue, an essential prerequisite of PDD. Additional studies are warranted to validate these preliminary data and the efficacy of PDD for EGC during ESD.

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Precision of Confocal Miniprobe Localisation Assessed By High-Field Magnetic Resonance Imaging

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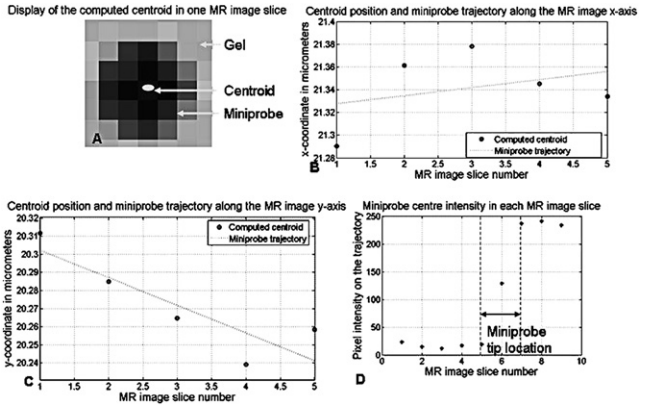
Purpose: The Cellvizio® (Mauna Kea Technologies, Paris, France) is a confocal fluorescence microscope for acquisitions of dynamic microscopic in vivo images of tissues with a miniprobe; it may be combined with a Magnetic Resonance (MR) scanner for localising the miniprobe tip in space. This combination would be interesting for MR-guided optical biopsy. The localisation method needs a precision of the same order as the microscopic image dimensions (about 500 μm × 500 μm). The aim of this study was to measure the precision with which the miniprobe can be monitored during MR imaging. Method: A confocal miniprobe with a diameter of 650 μm was inserted into an agarose-based jelly and scanned axially with a 9.4 tesla MR scanner using a Gradient Echo protocol (TE = 4.6 ms, TR = 184 ms, voxel resolution: 0.156mm × 0.156 mm × 1 mm). The centroids of the miniprobe were computed over 5 MR image slices (Fig. A). A linear regression was applied to these centroids in order to estimate the straight trajectory of the miniprobe along the slices (Fig. B-C). The precision error for the miniprobe localisation was measured as the root mean square error between the computed centroids and the straight trajectory. Results and Discussion: The miniprobe trajectory could be localised with an error of 31 μm and of 14 μm in respectively the x and y directions of the MR image. The miniprobe tip was between two slices at a distance of 2mm (Fig. D) along the trajectory. This localisation method assumed that there was no significant local intensity or geometric distortion in the MR image. Ideally, these distortions would be negligible if the computation was done with more than 5 centroids. Conclusion: The combination of the Cellvizio® with a high-field MR scanner may succeed in localising the miniprobe tip with a precision in the order of 10μm. Acknowledgments: Department of Health (UK) British Heart Foundation



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Analysis of EUS Elastography to Differentiate Mass Forming Pancreatitis and Pancreatic Cancer By Using Strain Ratio

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Introduction: Recently, EUS elastography has been reported to supplemental information which can be applied for the diagnosis of pancreatic diseases. However, there is limit in evaluation only for color, and quantification by numerical value is required. Aim: The aim of our study was to evaluate the ability of EUS elastography and quantification by using strain ratio(non mass area/mass area: SR) in order to distinguish mass forming pancreatitis(MFP) from pancreatic cancer (PC). Patients and Methods: The subjects were 105 patients performed an endoscopic ultrasound (EUS) for pancreas in our hospital till September 2006 to November 2008. The disease were 6 with mass forming pancreatitis (MFP), 5 with chronic pancreatitis (CP), 61 with pancreatic cancer(PC), 6 with neuroendocrine carcinoma (PNET),4 with auto immune pancreatitis (AIP), 5 with SCN,2 with SPN,1 with Schwanoma,1 with GIST,1 with renal cell carcinoma pancreatic metastasis, 7 with IPMN,1 with malignant lymphoma and 5 with normal control. A histological diagnosis by surgery or endoscopic ultrasonography fine needle aspiration (EUS-FNA) was performed except normal control. The ultrasound was used the HITACHI HI VISION900, and EUS scope was PENTAX EG-3630UR, EG-3670URK and EG-3870UTK. Strain ratio was subsequently performed to choose a mass area and a non-mass area, and the ratio was measured by calculating in real time. Results: Elastography for all PC showed intense blue coloration, which indicated that the mass lesions had malignant aspects. While MFP presented the coloration pattern of mixed green, yellow and low intensity of blue. Normal control was an even application of green to red. The mean SR of MFP and PC were each 23.08 ± 12.65 and 39.08 ± 20.54, respectively, which was significant difference($p < 0.05$). Conclusion: EUS elastography is potentially capable of further defining the tissue characteristics of benign and malignant lesions. This study suggested that it was useful for the quantification by using strain ratio to characterize the tissue hardness of pancreatic disease and distinguish MFP from PC.

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Eye Tracking Search Patterns in Expert and Trainee Colonoscopists: A Novel Method of Assessing Endoscopic Competency?

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Introduction: Colonoscopy training programs stress proficiency, but objective measures of competency are limited to numbers of procedures performed, trainer recommendations and examinations using endoscopy simulators. More complex competencies, such as active visual search and pathology recognition during colonoscopy are more difficult to measure, but the use of advanced computerized eye tracking technology allows this to be performed for the first time. Aim: To evaluate visual search patterns in expert and trainee colonoscopists to determine differences associated with increasing proficiency. Methods: The study included 6 physicians (3 experts and 3 trainees) who viewed 5 highly structured 1 minute colonoscopy videos each at a frame rate of 25 frames per second. Eye position was measured by an eye-tracker device [EyeLink II, SR Research, ON, Canada], which recorded the coordinates of the display pixel on which the gaze was fixed at a rate of 250Hz, and calculated an average value for each frame. Gaze trajectories were calculated, along with eye movement speed, number of fixations, average fixation duration and total time of fixations. Results were expressed as means and standard deviations. Results: Eye movement speed was faster in experts (33.3 pixels/frame ± 2.7) than in trainees (26.7 ± 1.0)($p = 0.03$) as were number of fixations per frame (0.08 ± 0.0017 vs 0.07 ± 0.0024)($p = 0.01$). In addition, average fixation duration was less for experts than trainees (11.1 frames/total frames ± 0.3 vs 12.6 ± 0.5)($p = 0.02$). In contrast, mean total fixation score time was similar in both groups (0.8385 frames ± 0.012 vs 0.8446 ± 0.019)($p = 0.31$). Conclusion: Colonoscopy experts and trainees display different visual search behavior patterns, and eye-tracking can provide automatic and objective metrics for their evaluation. This approach to perceptual skill evaluation of endoscopists may be a useful tool for inclusion in training programmes and a potential approach to proficiency based assessment.

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Feasibility and Safety of Peroral Videocholangioscopy for the Observation of Bile Duct Lesions

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Background and Aim: Recently, a newly developed peroral videocholangioscopy (PVCS) can yield large good quality images. The aim of study is to evaluate the feasibility and safety of PVCS for the diagnosis of biliary tract diseases. Patients and Methods: During a period of 4.5 years, 144 patients (80 bile duct cancers, 6 mucin-