

# FICE

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Fuji Intelligent Chromo Endoscopy

**FUJINON**  
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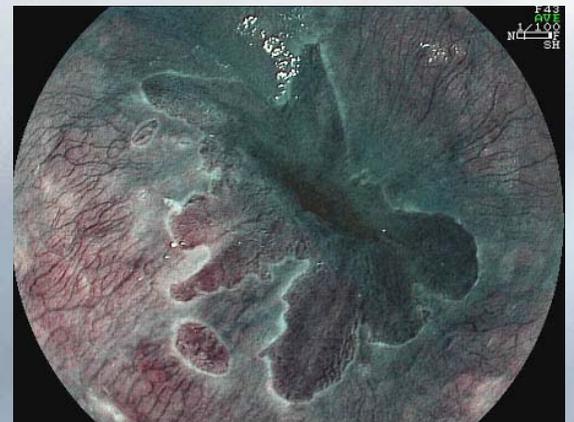
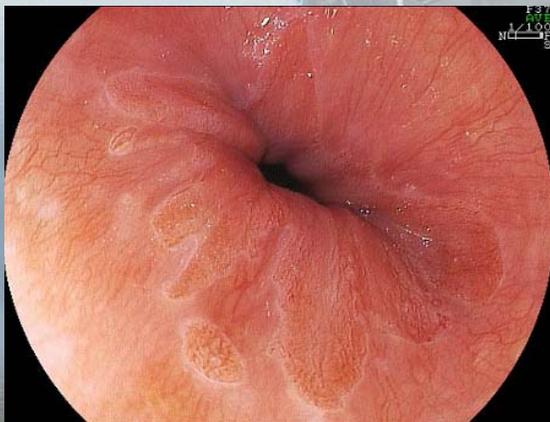
# FICE

The next generation of endoscopic diagnosis has arrived with Fujinon's new EPX-4400 video processor. F.I.C.E. (FUJI Intelligent Chromo Endoscopy, ) installed in the EPX-4400, is able to assist in dramatically enhancing accurate diagnosis of minute lesions.

As a basic principle, F.I.C.E. imaging is implemented based on Spectral Estimation Technology. Spectral Estimation Technology takes an ordinary endoscopic image from the video processor and arithmetically processes, estimates and produces an image of a given, dedicated wavelength of light. Now, for the first time ever, this technology is put to practical use in the field of endoscopy by Fujinon. The expected advantage of this new digital processing system is a dramatic enhancement in the detection and identification of pathologic changes. The F.I.C.E. system is expected to enable doctors to supplement differences in experiences and to diagnose clinical findings more accurately than ever before. In contrast to a system in which an optical filter is used, this digital processing system is able to switchover between an ordinary image and a F.I.C.E. image in a split second.

## CASE 1

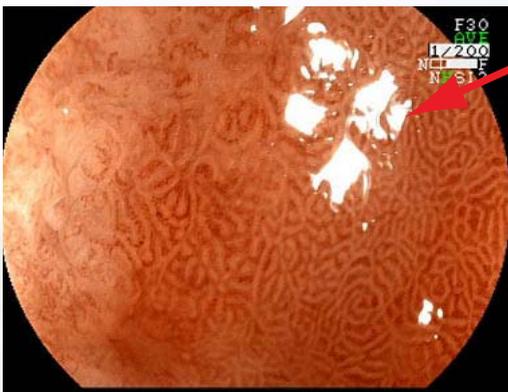
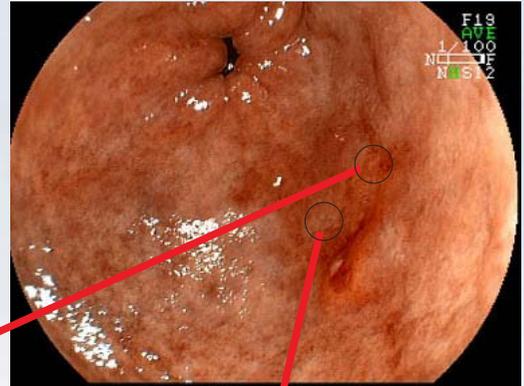
An example in which it became easier to observe tissue characterization on surface parts and capillary orientations become clearer



This is a processed image example of the cardiac portion of the esophagus. In this portion, blood vessel orientation conditions or continuity are important information for diagnosis. As using FICE can clarify blood vessel conditions, it contributes to the detection of abnormal points.

## CASE 2

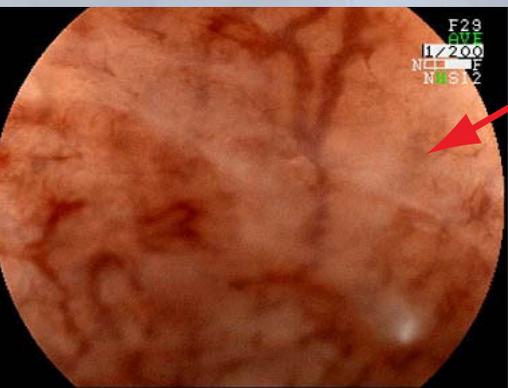
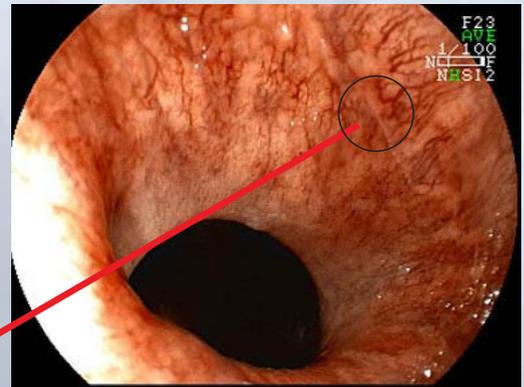
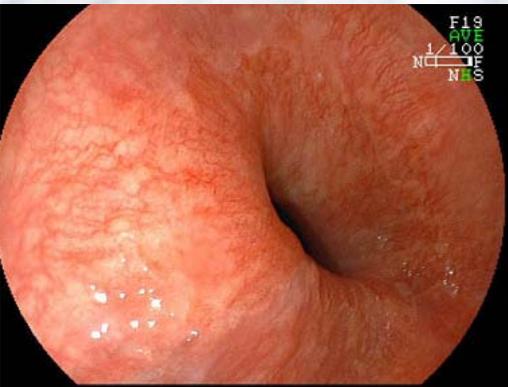
An example in which F.I.C.E. was effective in boundary diagnosis of stomach cancer IIc pathologic changes.



This is an example of combining F.I.C.E. with magnification endoscopy. The part that is clear in the cancer structure is the normal part, while the part with a disorderly structure is the abnormal part.

## CASE 3

An example in which it was easier to identify the continuity of palisade blood vessels fine long branching vessels.

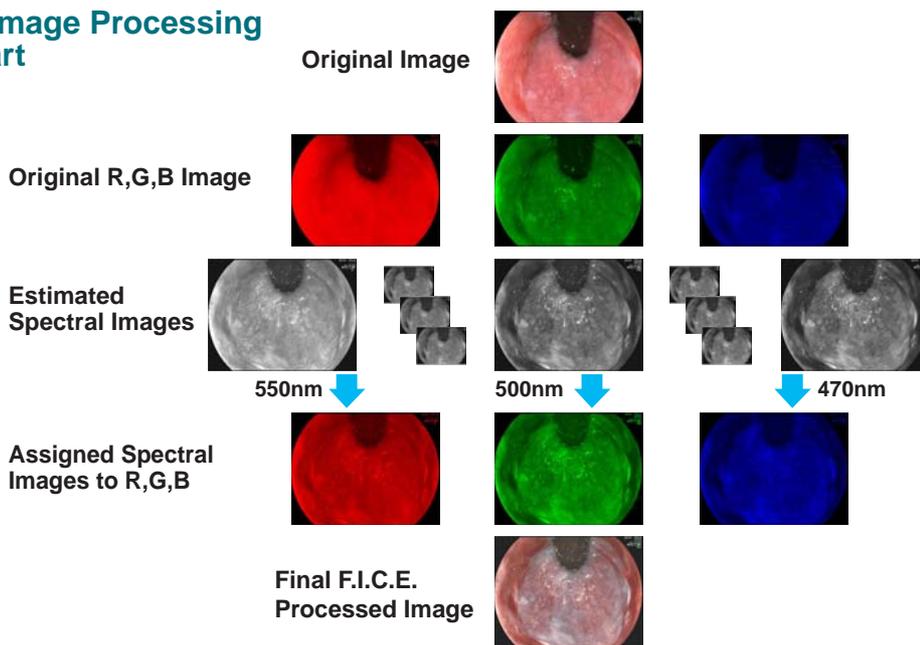


It is possible to observe blood vessel orientation, but the continuity is unclear and difficult to observe. It is possible to express blood vessels more clearly using FICE, and the continuity of blood vessels was recognized. Furthermore, it is possible to confirm with further magnification of the area.

\* These case photographs are shown by courtesy of Professor Kouzu of the Medical School, Chiba University.

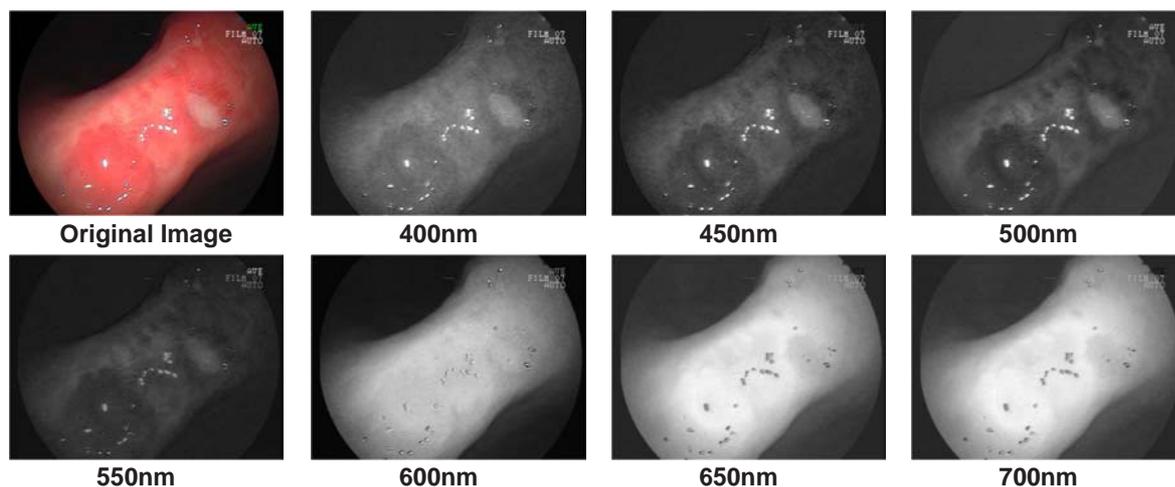
## The Principal and Flow Chart of F.I.C.E. Imaging

### F.I.C.E. Image Processing Flowchart



FICE is based on a Spectral Estimation Technology, a technology invented by Professor Yoichi Miyake of the Faculty of Engineering, Chiba University. An image captured by the Fujinon electronic scope is sent to the Spectral Estimation Matrix processing circuit in the EPX-4400. Here, various pixelated spectrums of the image are estimated. Since the spectrums by pixels are known, it is possible to implement imaging on a single wavelength. Such single wavelength images are randomly selected, and assigned to R (Red,) G (Green,) and B (Blue) respectively to build and display a F.I.C.E. enhanced color image.

### The Impact of Wavelength on the Imaging of Mucosal Membrane



Minute observation of superficial patterns and color differences, which are important for endoscopic diagnosis, depend on the characteristics of light diffusion and absorption. The image displayed differs entirely by wavelength applied to it during observation. For instance, shorter wavelengths around 400~500nm are said to be suitable for clarifying surface structures, and the wavelengths around 550nm are known as most suitable for visualizing of blood vessels because of the light absorption characteristics of hemoglobin.

F.I.C.E. makes it possible to select the most suitable wavelengths required due to its variable setting functions.

## Other New Features for Image Analysis

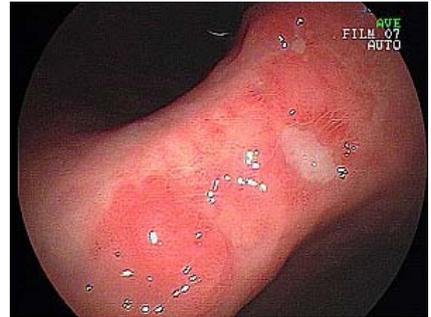
In addition to FICE function, following new features are available in EPX-4400 for better visualization.

### Hyper-Sharpness

Structural emphasis is a processing technique to emphasize fine patterns in the image. Unlike the conventional detail enhancement, it is possible to apply emphasis in all vertical, lateral and oblique directions without increasing the visible noise in the image.



Hyper-sharpness OFF



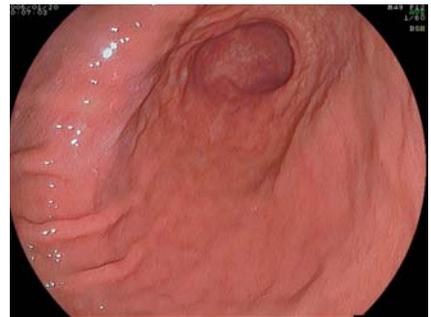
Hyper-sharpness ON

### Hyper-Tone

Bright parts remain unchanged, but the brightness of the darker portions is enhanced in order to improve overall visibility. It is characterized by the fact that there is no increase in the visible noise and the image retains its natural appearance. Conventional image processing is much less likely to maintain such a clear, natural image.



Hyper-tone OFF



Hyper-tone ON

### Color Emphasis

Fine color differences are magnified, and it makes it easy to detect any abnormal parts.

## The 4400 System - The System of Choice for Advanced Endoscopic Examination

Fujinon's 4400 System is designed to meet your needs for both traditional endoscopy and advanced endoscopic examination. The combination of traditional instruments and our advanced endoscopic products such as F.I.C.E. are only the start of our Research and Development. The 4400 System also offers Fujinon's exclusive Double Balloon Endoscopy (DBE) products that are making a spectacular impact in the diagnosis and treatment of small bowel disorders, and Fujinon's exclusive Super CCD technology. Super CCD technology offers ultra-high resolution magnification endoscopy (both optical and digital magnification) through an array of available endoscopes. Of course, all of our traditional and advanced endoscopes are equipped with Fujinon's ergonomically advanced G-5 control sections and improved insertion tube designs. The intent of these radical new design characteristics is to make every Fujinon endoscope more reliable, more efficient and more clinically acceptable than any other endoscope in the world.



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