

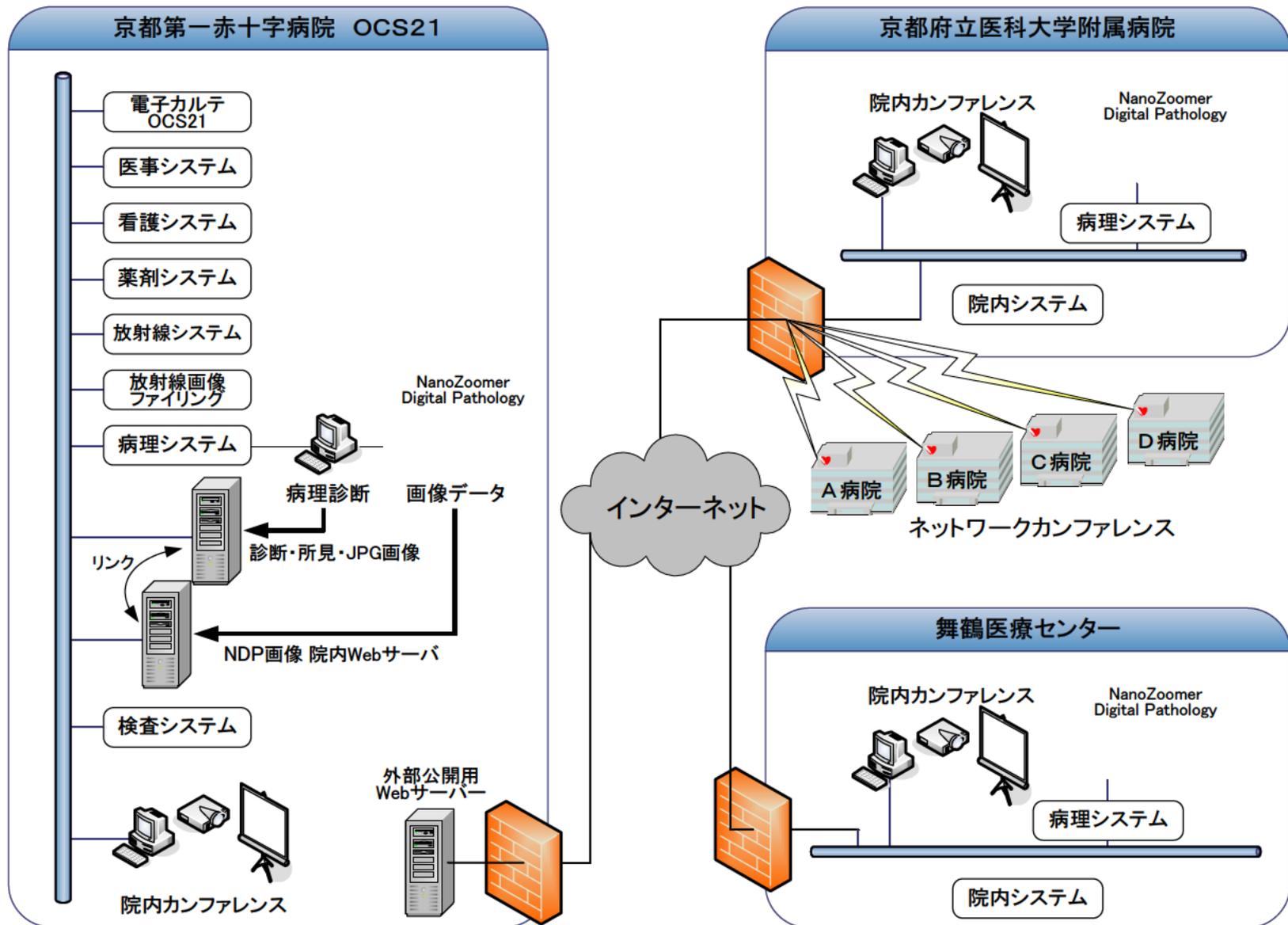
デジタル病理診断に用いる

8 Kモニターに必要な機能

済生会滋賀県病院 参与

加藤元一

デジタル病理診断の経験



デジタル病理画像に影響する要素

1) H&E標本



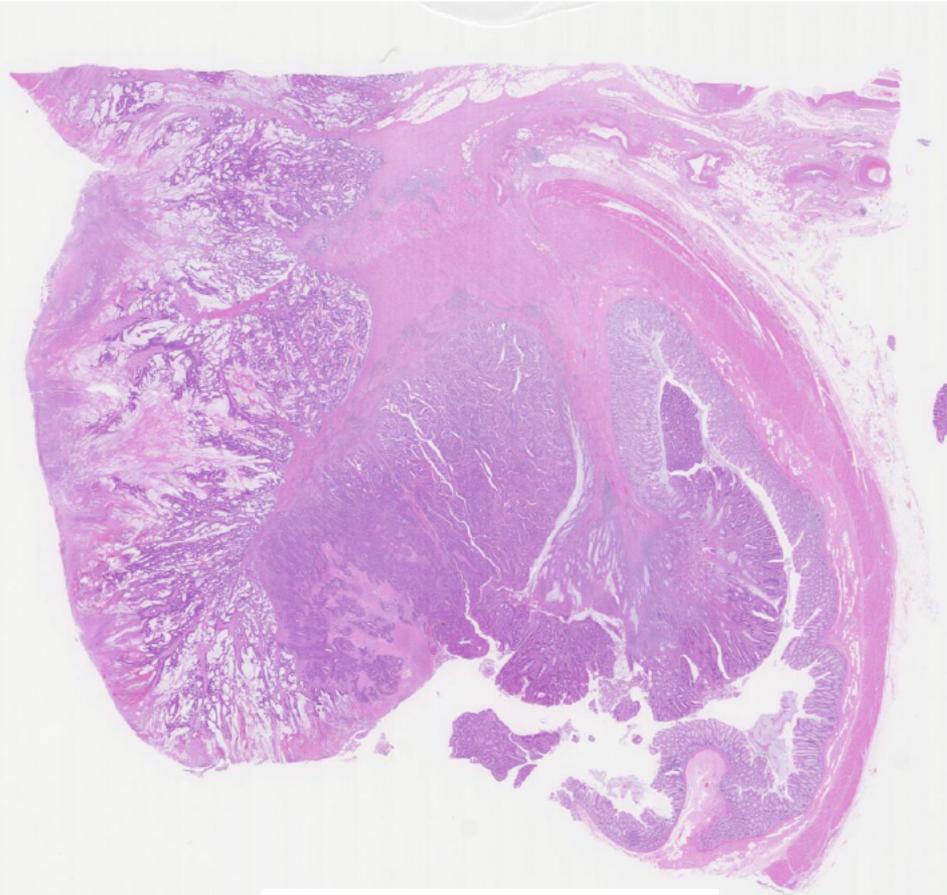
2) 撮影装置



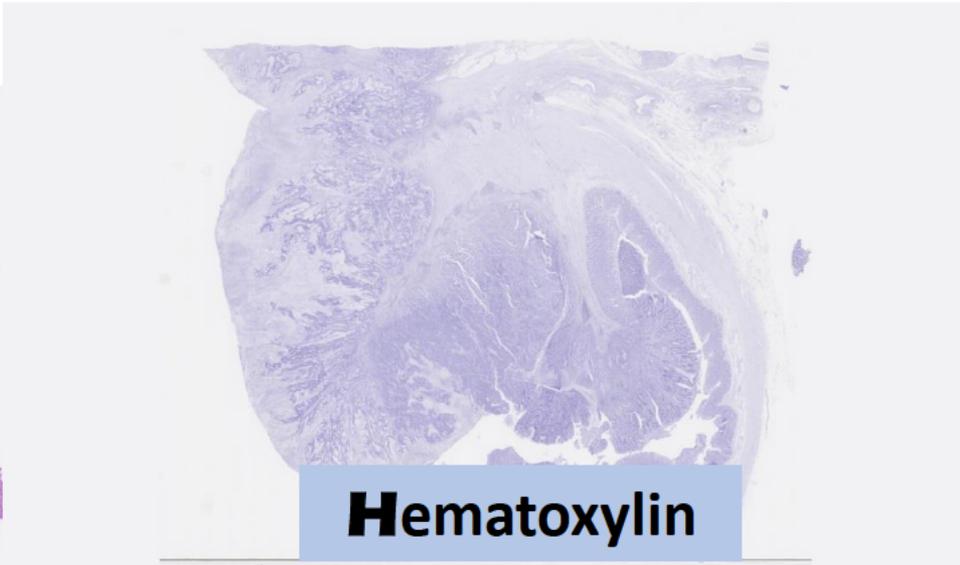
3) モニター



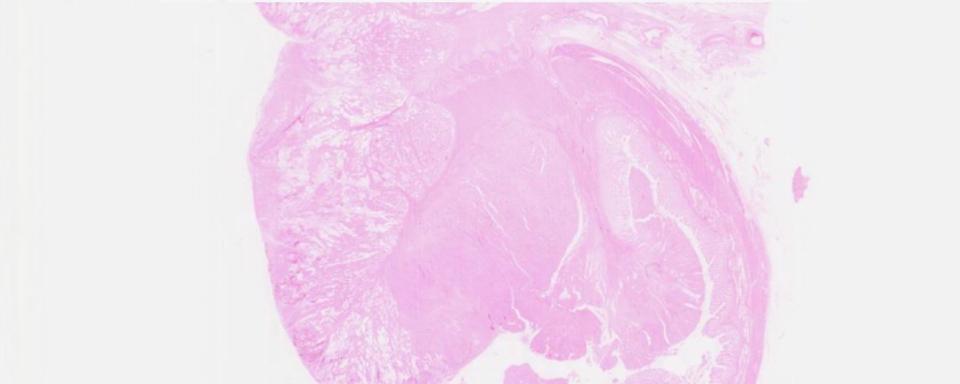
病理診断に用いる H&E標本



H&E 染色



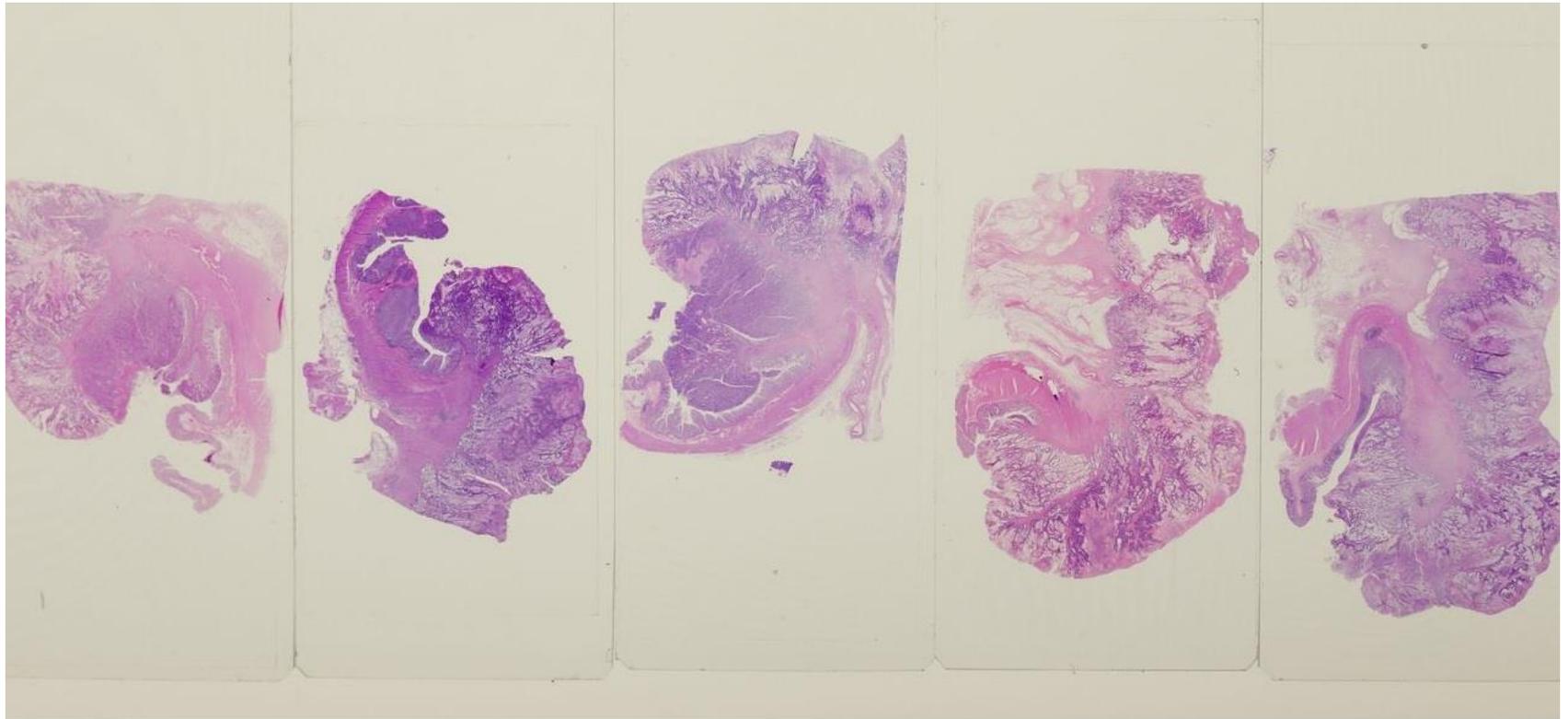
Hematoxylin



Eosin

施設によるH&E標本の色調の違い

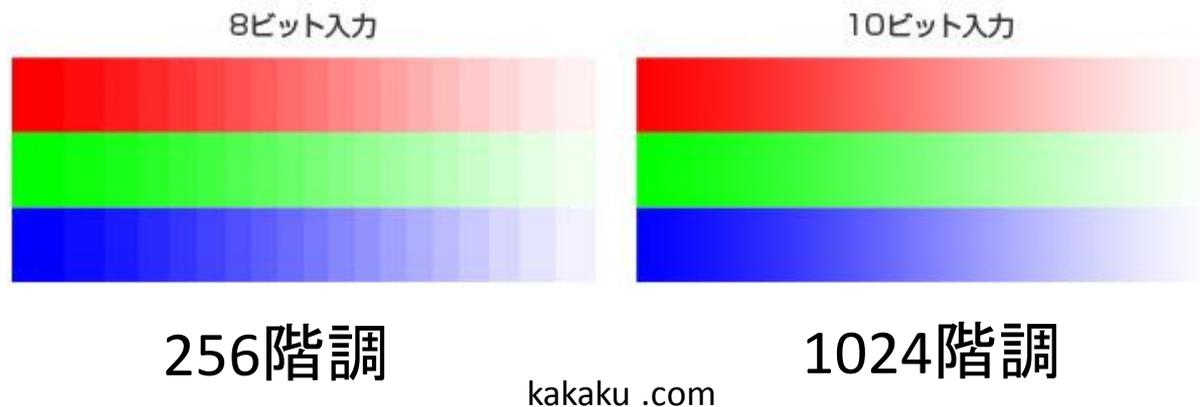
同一病変



色合いの変化を正確に表現できること

色諧調

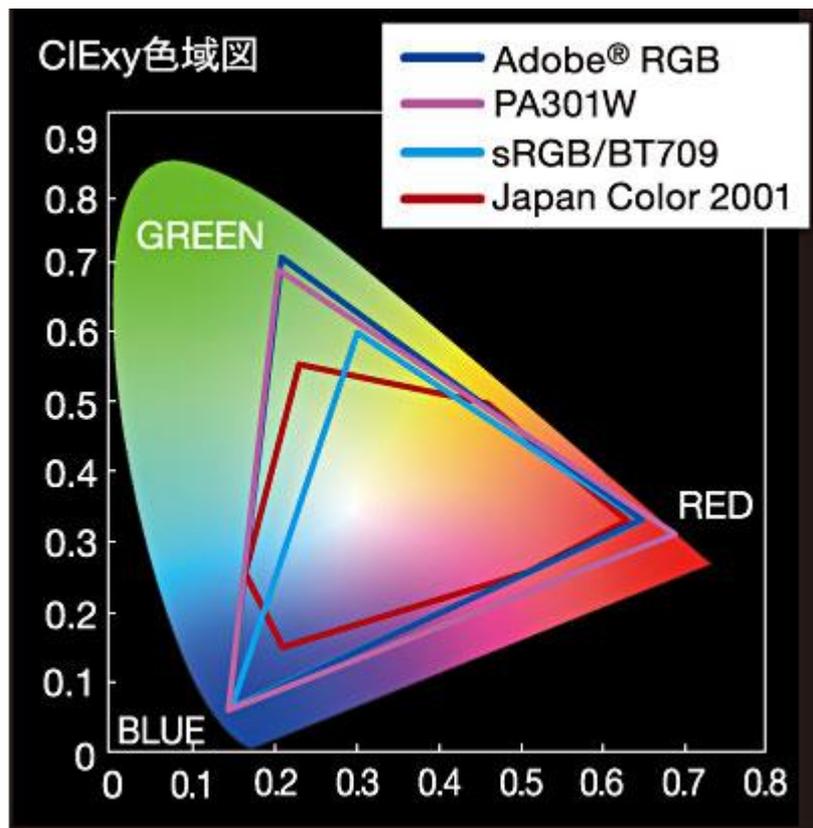
デジタル化



色域

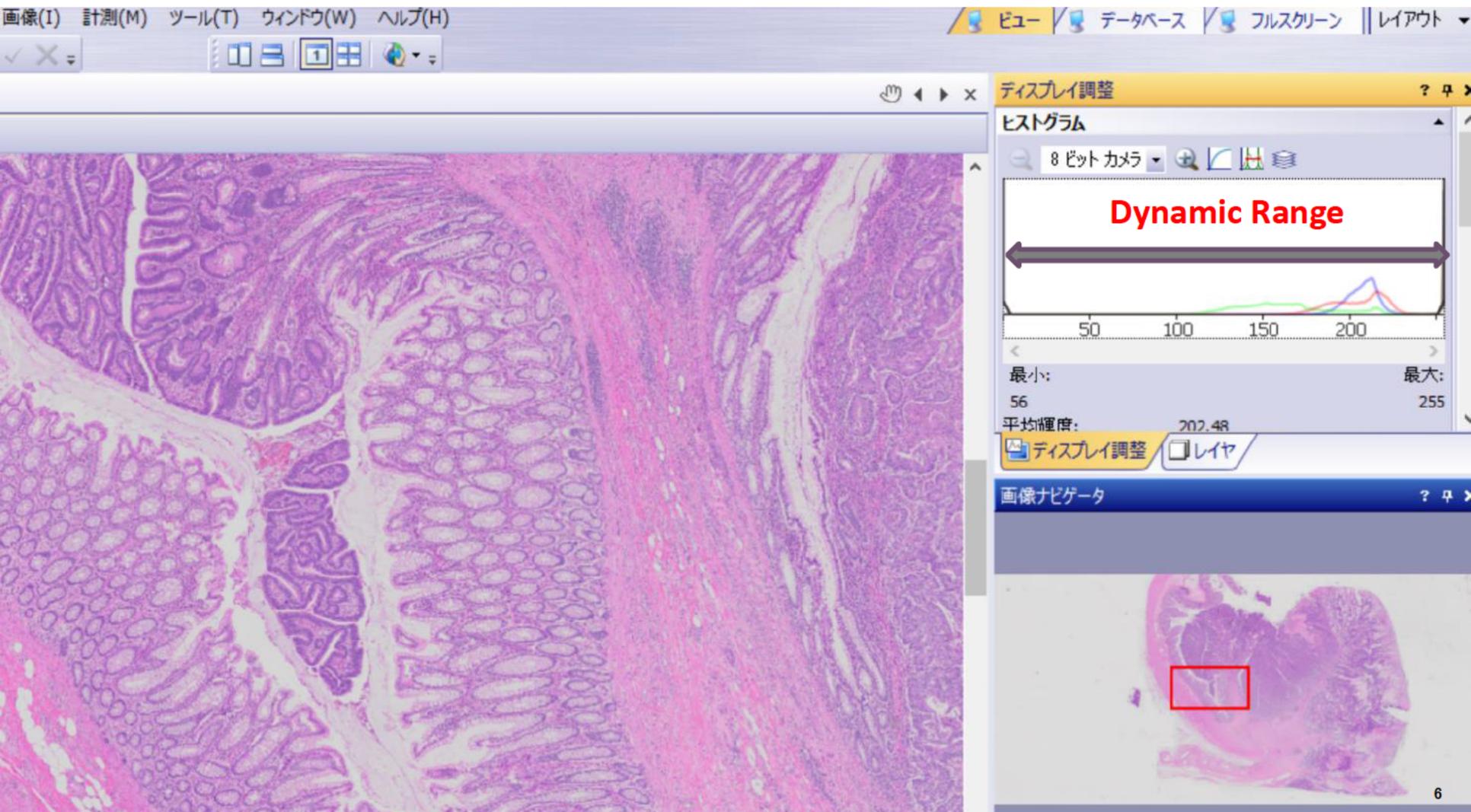
PCモニター: sRGB

色調整モニター:
Adobe RGB



RGB Dynamic Range 調整前

(Dynamic range: CCDが検知できる最も明るい部分と最も暗い部分の範囲)



RGB Dynamic Range 調整後

(Dynamic rangeを実画像近くによせて、諧調の幅を小さくする)

The screenshot displays a medical image viewer interface. The main window shows a histological slide of a tissue section, likely a cross-section of a glandular organ, stained with hematoxylin and eosin (H&E). The image is displayed in a large window, and a smaller inset window shows a histological slide with a red box highlighting a specific region of interest.

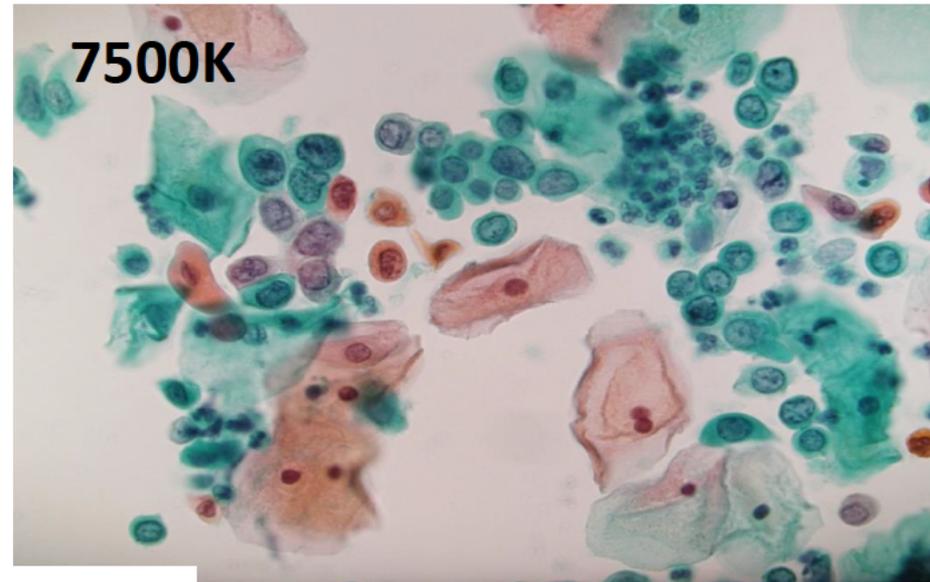
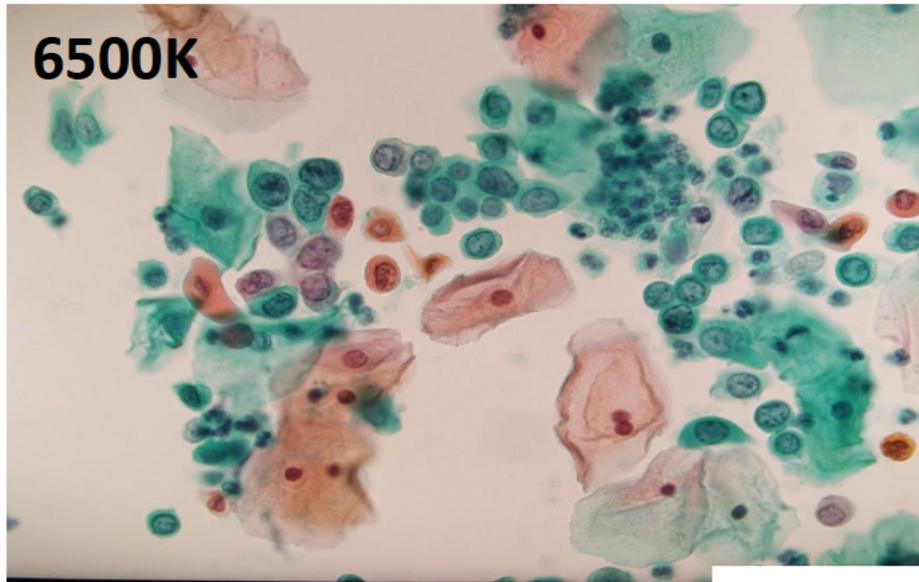
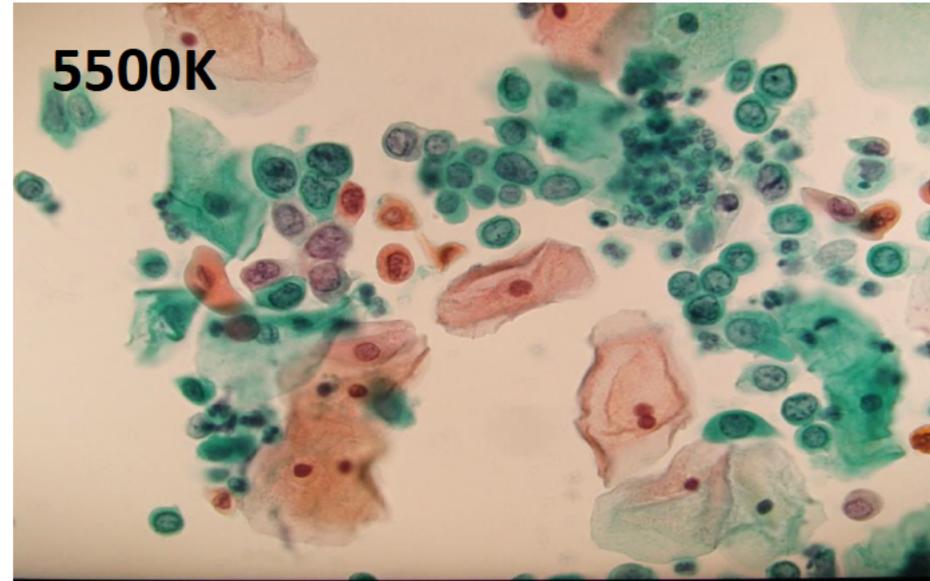
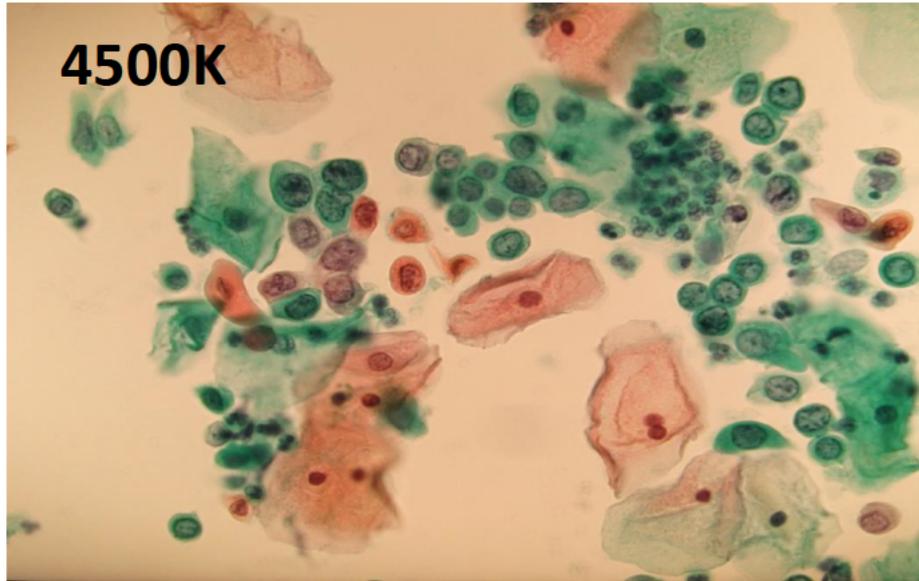
On the right side, there is a panel titled "ディスプレイ調整" (Display Adjustment). This panel contains a histogram window titled "ヒストグラム" (Histogram). The histogram shows the distribution of pixel intensities for the image. The x-axis represents intensity values from 50 to 255, and the y-axis represents the number of pixels. The histogram shows three curves: a green curve for the original image, a blue curve for the adjusted image, and a red curve for the adjusted image. The blue curve is narrower and taller than the green curve, indicating a reduction in dynamic range. The red curve is also narrower and taller than the blue curve, indicating further adjustment. A blue arrow labeled "対数スケール" (Logarithmic Scale) points to the histogram, suggesting that the adjustment is being applied on a logarithmic scale.

Below the histogram, the following statistics are displayed:

- 最小: 56 (Minimum)
- 最大: 255 (Maximum)
- 平均輝度: 191.64 (Average Brightness)

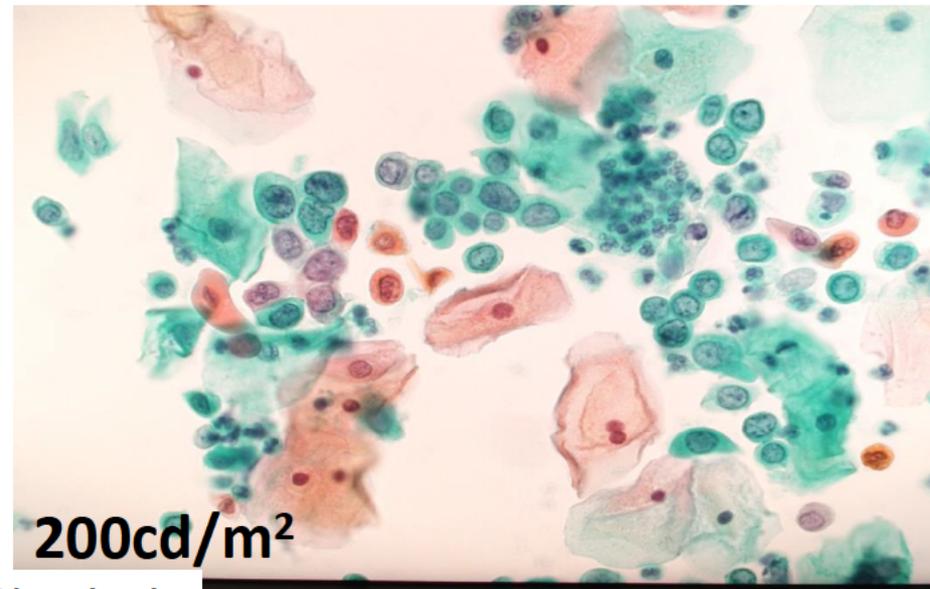
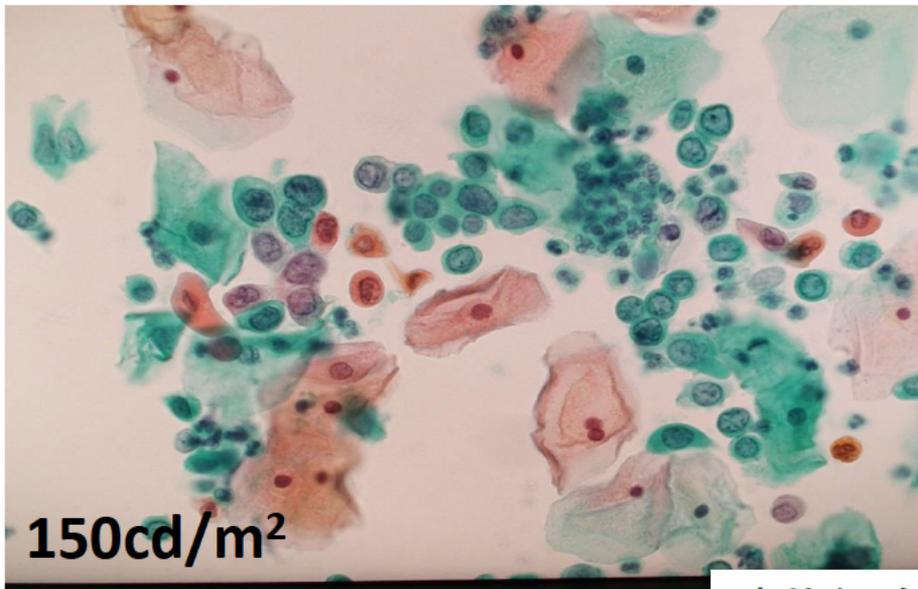
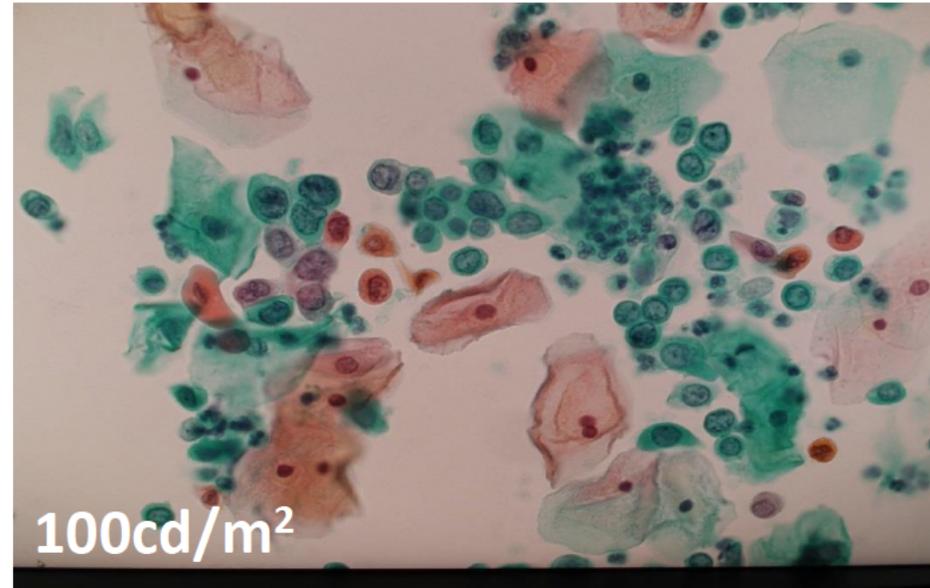
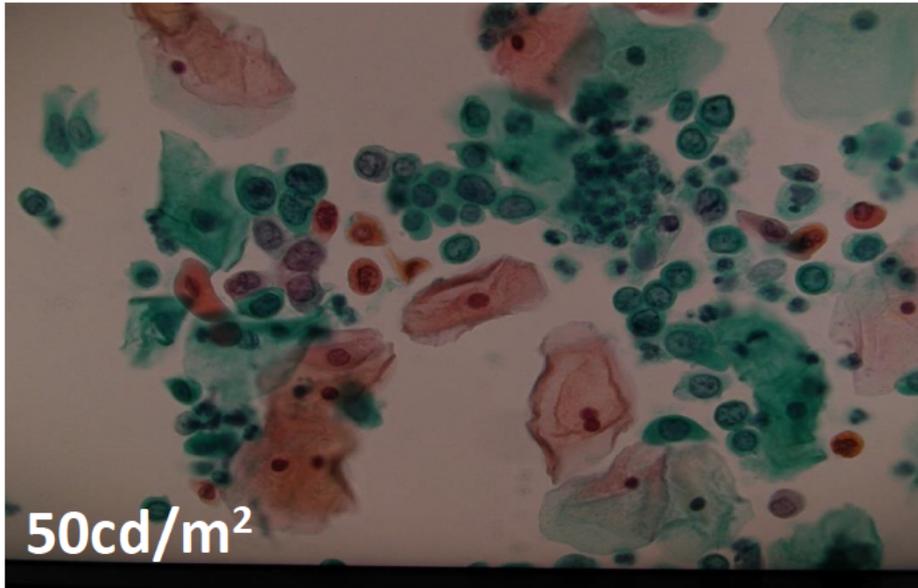
The histogram panel also includes a "ディスプレイ調整" (Display Adjustment) button and a "レイヤ" (Layer) button.

光源の色温度



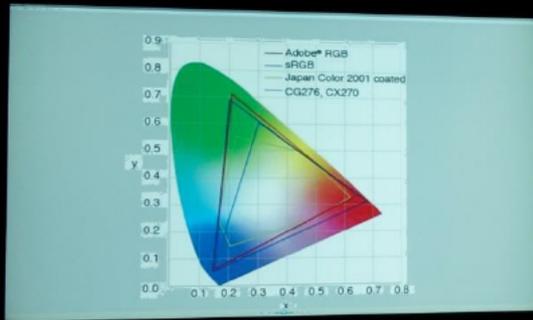
液状細胞診の標本

光源の明るさ



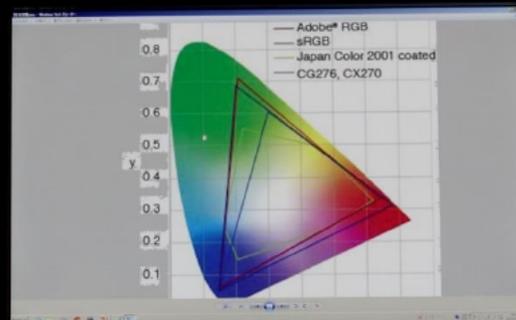
液状細胞診の標本

モニターの特性



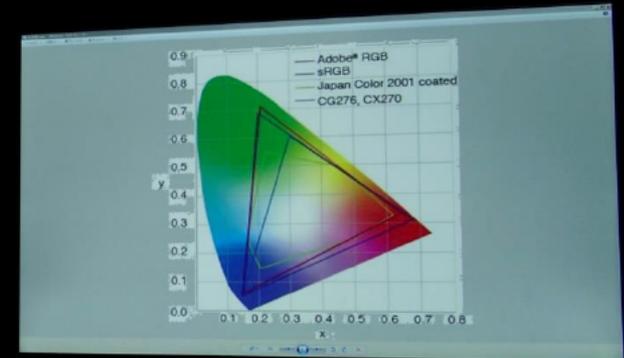
一般的PCモニター

1K
sRGB
8bit



色調整PCモニター

1K
Adobe RGB
10bit



色調整不可4Kモニター

4K
sRGB
8bit

精細さ より 正確な色

色調整可能な4Kモニター

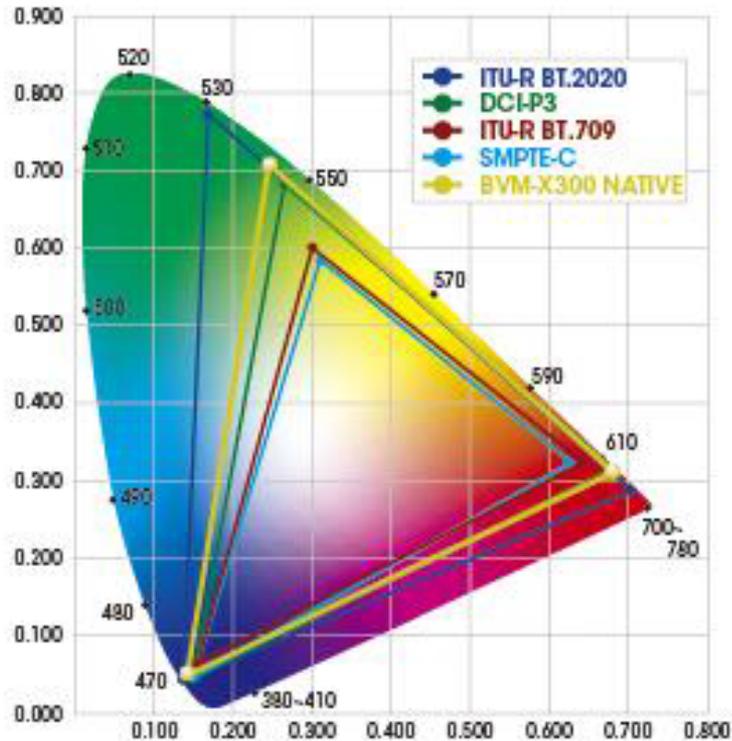


Eizo CG248-4K



詳しい評価は 第14回日本デジタルパソロジー研究会総会

デジタル病理診断に用いる 8Kモニターに必要な機能



Sony.jp

基本仕様(総務省)

空間解像度 7680 × 4320

符号化画素ビット数 10

表色系 ITU-R勧告 BT.2020

必要な機能

モニターの色調整