

# Figure Handling

성균관대학교 의과대학 삼성서울병원 내과 이준행

# 왜 내과의사가 그래픽을 강의하나?

## 이준행 소화기내과 (serioso.pe.kr)

### 소화기학 정보마당

1. **Monthly Endoscopy School 2004** : [introduction](#), [위암](#), [내시경사진](#), [내시경 영상의 저장과 이용](#), [소화성궤양](#), [소장질환](#), [achalasia](#)
2. [천기누설](#) - 치료내시경 Q and A
3. [Upper GI Tract](#) - [EMR](#)
4. [Lower GI Tract](#)
5. [Molecular Biology](#) - [MSI](#), [apoptosis](#)
6. [Miscellaneous](#) - [의학통계](#), [기생충](#)
7. [Medical Links](#)
8. 짧은 노트 : [endoscopy](#), [stomach](#), [Hp](#), [bowel](#), [quality](#), [news](#), [memo](#)

### [방명록/게시판\(BBS\)](#)

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# 왜 내과 의사가 그래픽을 강의하나?

SKT 3G 오전 11:31

← → endotoday.com/inde: 16 ★

## EndoTODAY

Private Lesson from *Homo endoscopiscus*

1. [EndoTODAY - 구독신청](#)
2. [EndoATLAS](#)
3. [Mobile SMCGI](#)
4. [조기위암 내시경치료 \(beta\)](#)

@ Jun Haeng Lee ([CV](#)/[Mail](#)/[Link](#))

SKT 3G 오전 11:31

### Endo TODAY [Gastric metastasis]

다양한 악성질환이 위로 전이할 수 있습니다. 수년 전 Elsevier에서 나오는 GI & Hepatology News (Korean Edition)에 기고한 내용입니다.

위전이의 내시경 소견



다양한 원발 병소에서 위로 전이된 암의 내시경 소견들

↑ [흑색종 위전이]



# DEN

## Digestive Endoscopy

For Gastroenterologists and Endoscopic Surgeons



### Digestive Endoscopy

© Japan Gastroenterological Endoscopy Society



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World Congress of GI Endoscopy



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please visit  
[www.endo-2017.org](http://www.endo-2017.org)

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Host

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# Digital mind? (Digital image mind?)

- Digital camera를 월 1회 이상 사용?
- Photoshop을 월 1회 이상 사용?
- BMP file과 JPEG file의 차이?
- Lossy / lossless compression의 차이?
- Bitmap image와 vector image의 차이?
- Powerpoint file을 만들 때 file 크기에 신경을 쓴다.

# 그래픽의 기본을 배우는 이유 (1/2)

- 우리는 digital native가 아니다. 자라면서 배우지 못했기 때문에 필요한 사람은 찾아서 익혀야 한다.
- 모든 발표는 PowerPoint를 이용해야 한다.
- 논문에 들어갈 그림이나 사진을 "Combination halftones, 600 dpi, TIFF without compression, CYMK"와 같은 알 수 없는 형식의 파일로 만들어 보내야 한다.

# 그래픽의 기본을 배우는 이유 (2/2)

- 복잡한 작업은 컴퓨터 그래픽 전문가에게 의뢰하는 것이 나을 수 있다.
- 사소한 작업까지 전문가의 도움에 기대는 것은 비효율적이다.
- 원본 자료를 허술하게 관리한 상태에서 그래픽 전문가에게 부탁한들 별 도움을 받지 못하는 예가 많다.
- **아는 것이 힘이다.**

# 오늘 강의가 끝난 후 여러분은...

- 논문 투고규정에 적합한 graphic image를 만들 수 있습니다.
- 적절하게 조절된 image file을 이용하여 PowerPoint file을 만들 수 있습니다.



# 강의 내용

- 해상도란 무엇인가?
- 비트맵 이미지와 벡터 이미지
- 논문제출을 위한 적절한 해상도는?
- **[Tip]** PowerPoint 이미지를 TIFF로 바꾸는 방법
- **[Tip]** 사례 검토. 흠집 찾기

## Topic 1

# 해상도란 무엇인가?

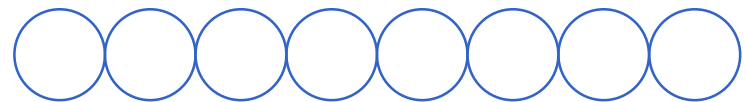
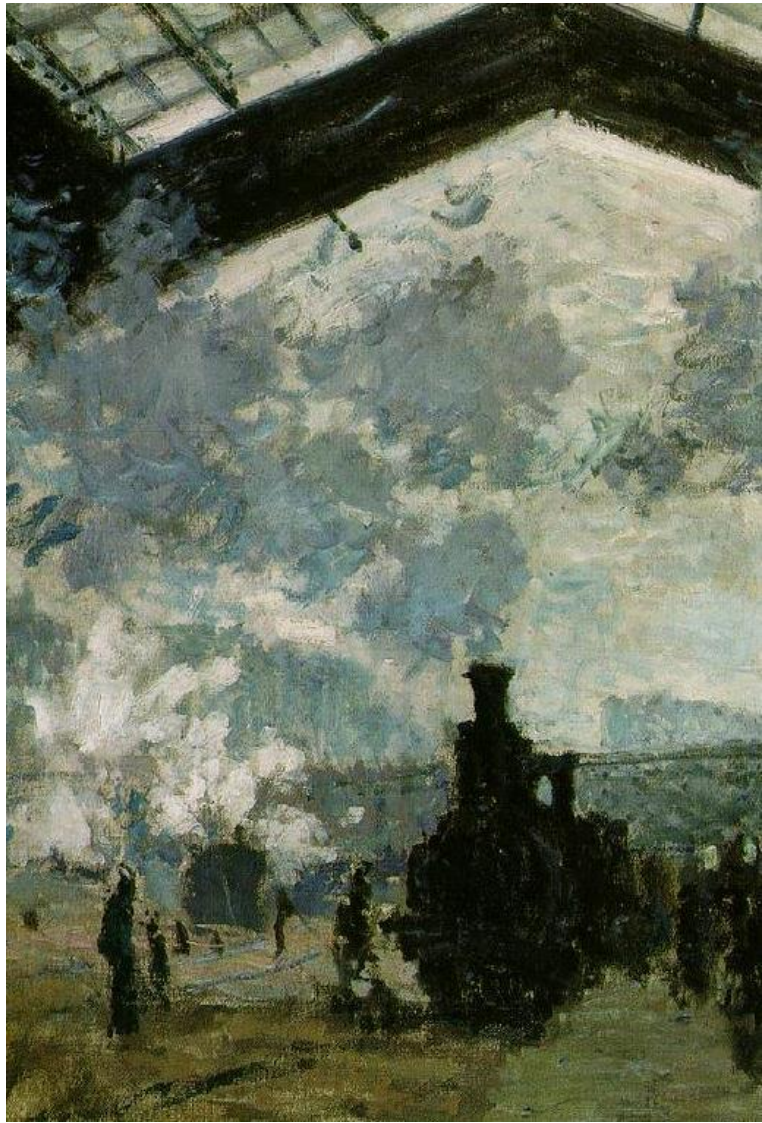
성균관대학교 의과대학 삼성서울병원 내과 이준행

# 논문의 그림은 4 가지 종류가 있다

- Statistical graphs, charts, and simple diagrams
  - Photographic images (color photos, radiographs, ultrasound images, CT scans, MRI scans, electron micrographs, and photomicrographs)
  - Illustrations
  - Videos
- 4 형태에 모두 **해상도**라는 개념이 들어가야 한다.

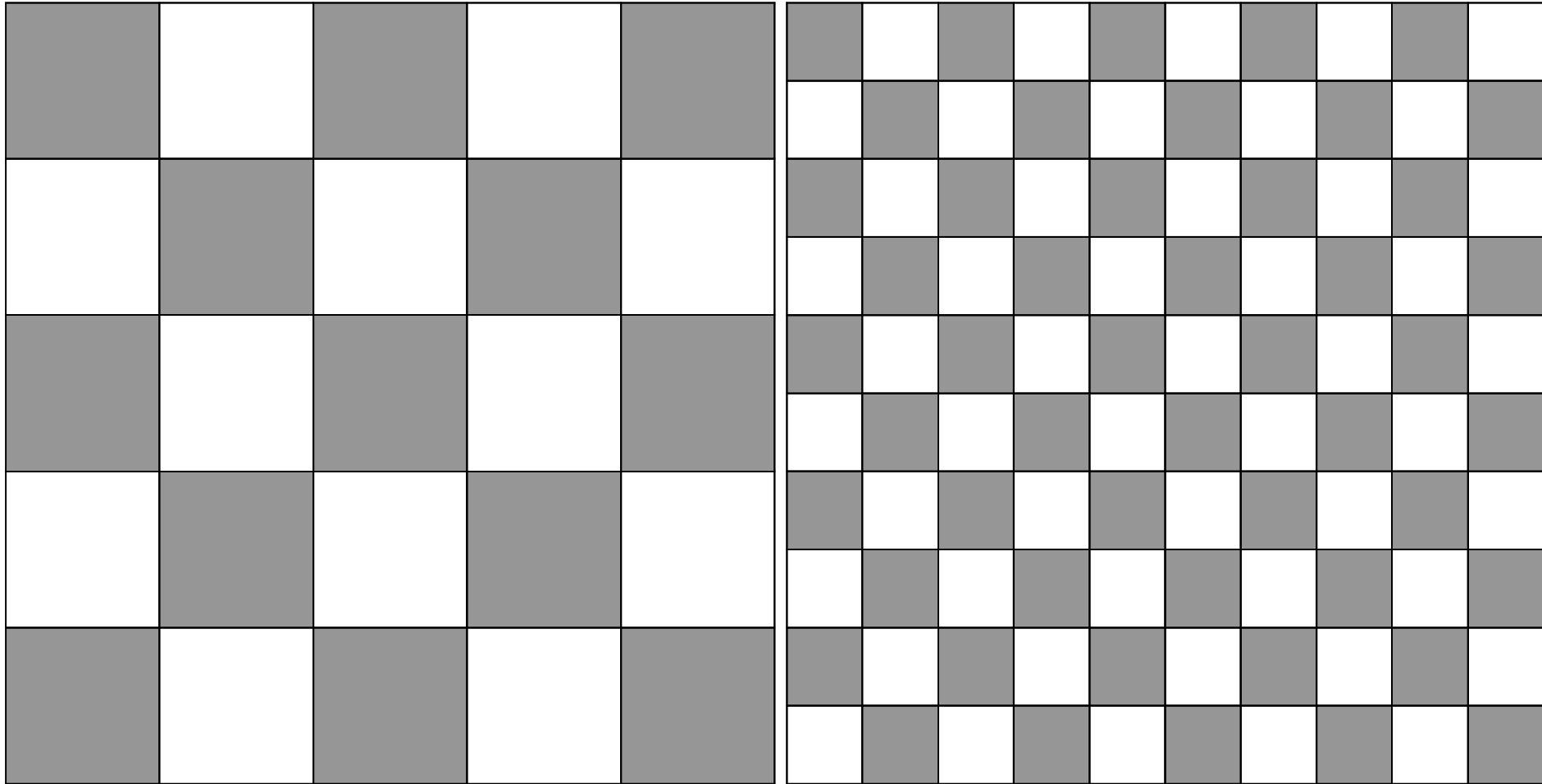
# 해상도란 무엇인가?

- 해상도(解像度)는 어느 일정한 단위 안에서 얼마나 더 자세하게 그 내용을 표현하는가를 나타내는 용어이다.
- 일정한 물리적 길이 단위인 1인치(25.4mm) 안에 표현되는 화소(pixel)의 수를 말한다. 단위로 dpi(dots per inch)가 쓰인다. 예를 들어, 72 dpi라고 하면 1인치 안에 72개의 점이 들어간다는 뜻이다.



<http://www.ibiblio.org/wm/paint/auth/monet/paris/>

출력시 크기가 같다면 pixel의 수가 많을수록 해상도가 높다 (높은 DPI 값)

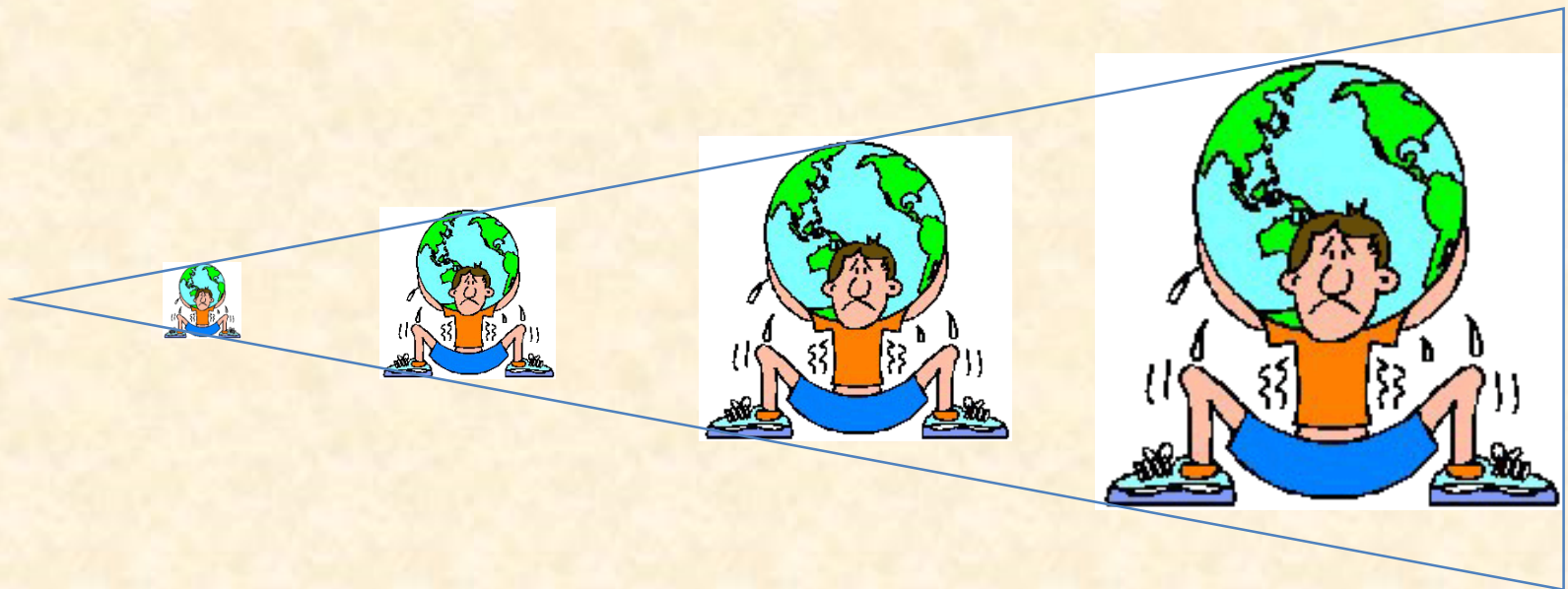


DPI = Dots / Inch

반드시 분모가 있어야 한다

# Digital image에서 DPI는 무슨 의미가 있는가?

- A digitally stored image has *no inherent physical dimensions*, measured in inches or centimetres.



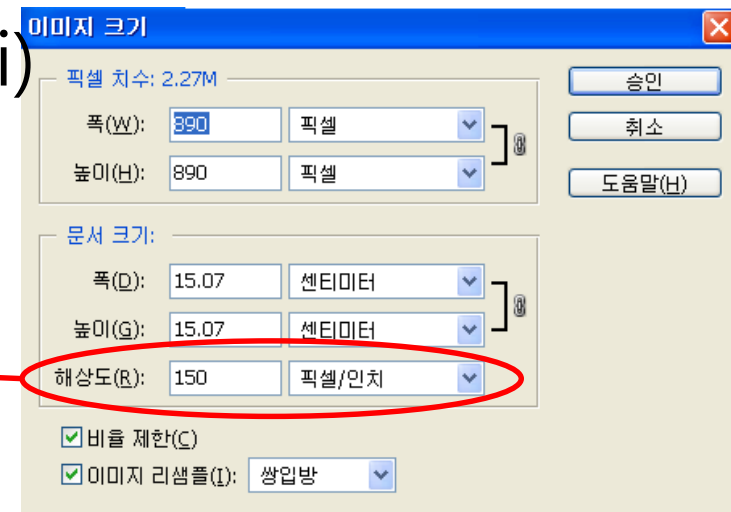


# DPI는 출력을 전제로...



- sungkyunkwan.jpg
- 85,109 byte
- $890 \times 890 = 792,100$  pixels
- Resolution: dots per inch (dpi)

출력을 하지 않는  
한 아무런 의미가  
없는 숫자이다



# Information amount in a bitmap image

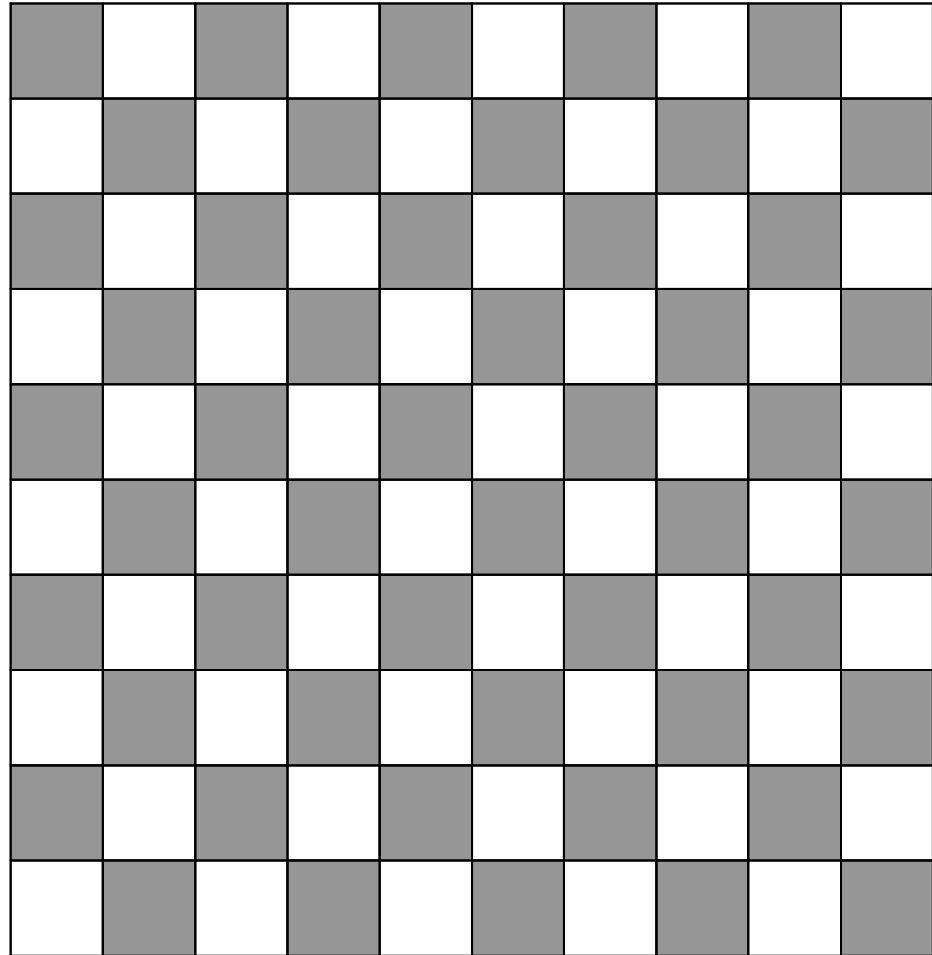
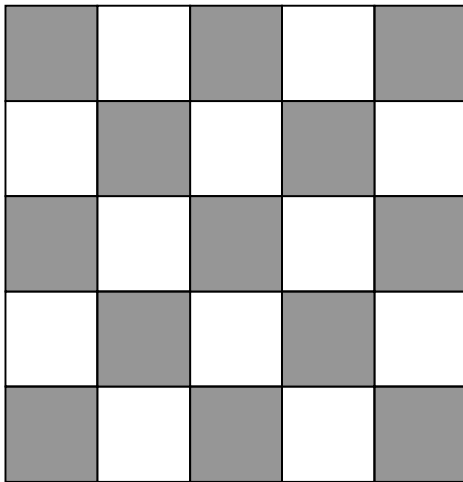
- Determined by the number of pixels
- Size (inches) x resolution (dpi) = pixel numbers



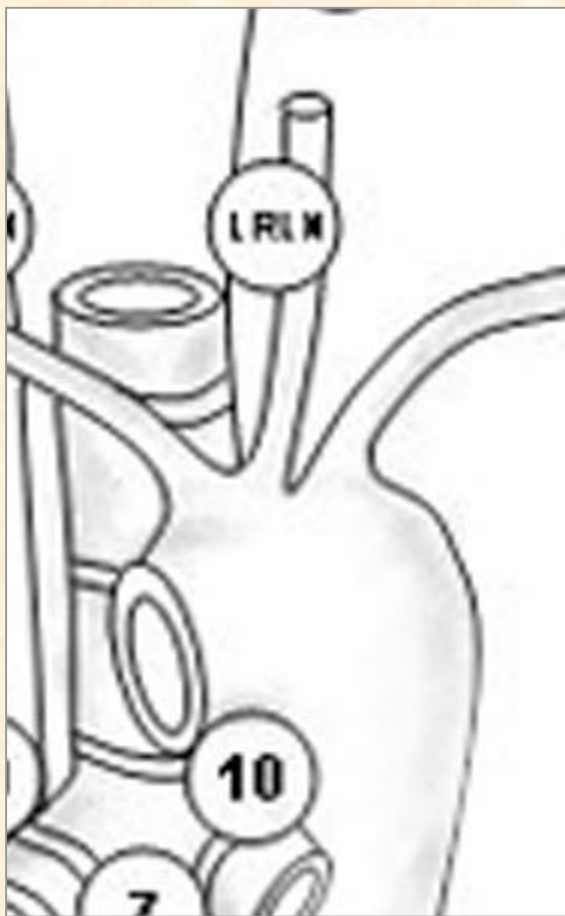
Width 1000 pixels

= 4 inches x 250 pixel/inch

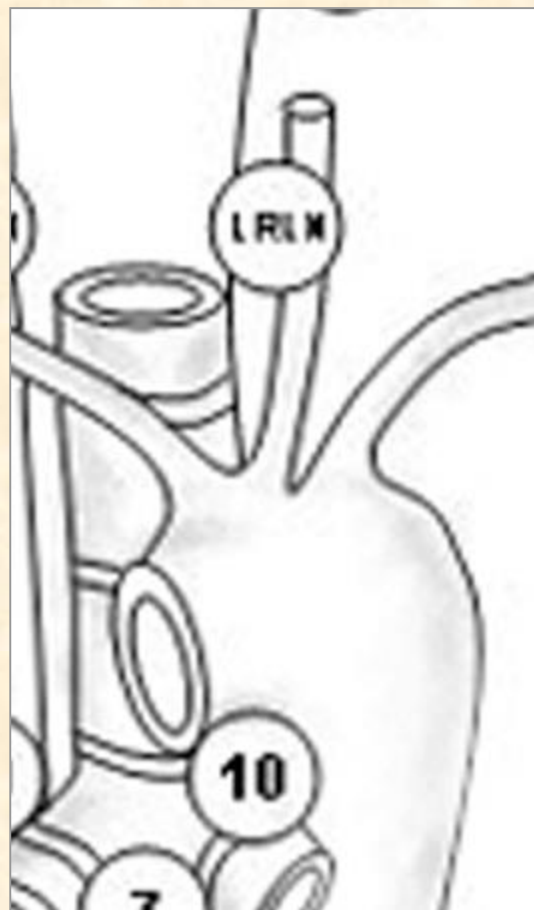
**Digital image**에서는 pixel 수가 많을수록  
정보량이 많다 (높은 해상도)



# Pixel 수가 많다고 항상 고해상도는 아니다



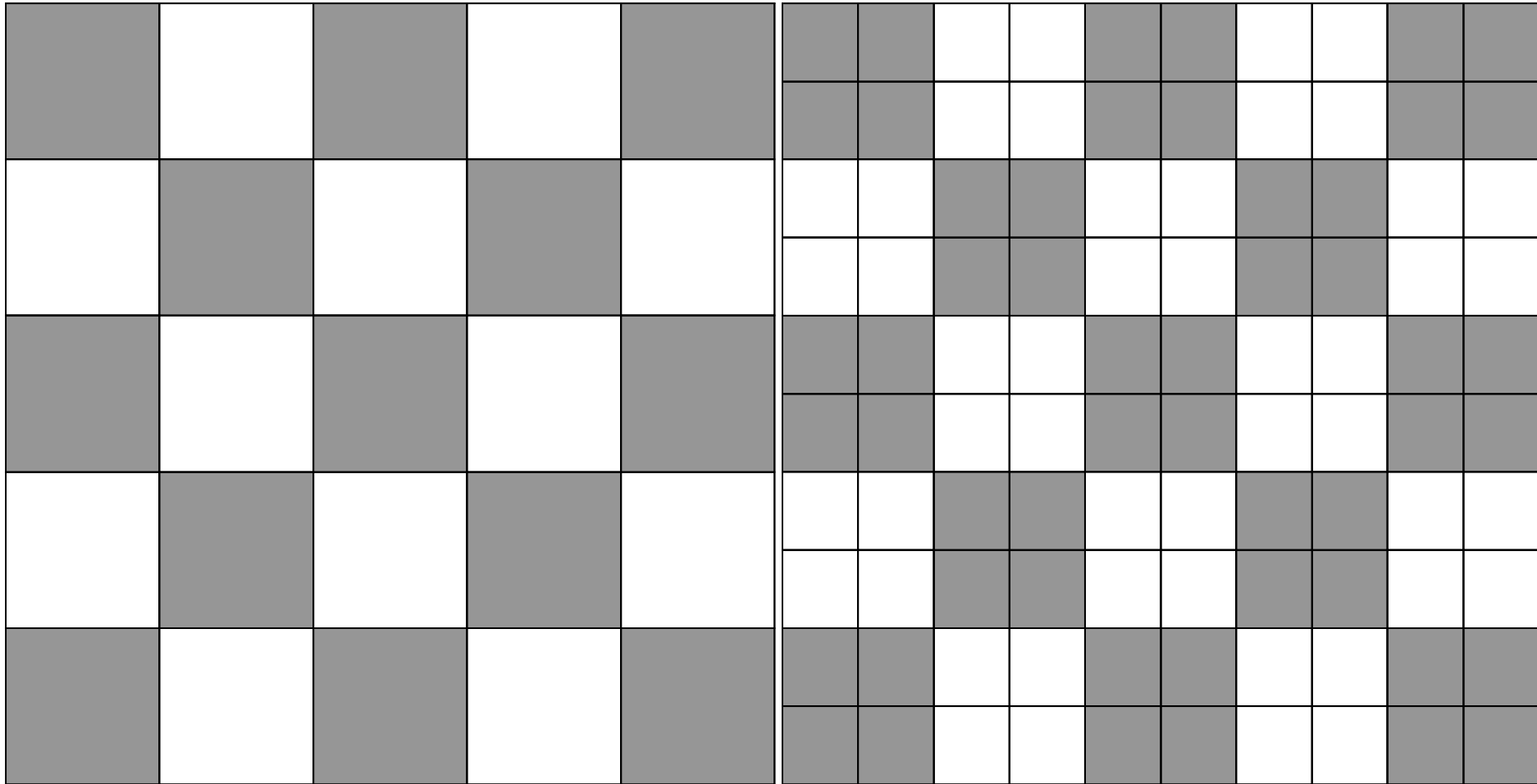
1.14 inch, 300 dpi



*4 inch, 900 dpi*

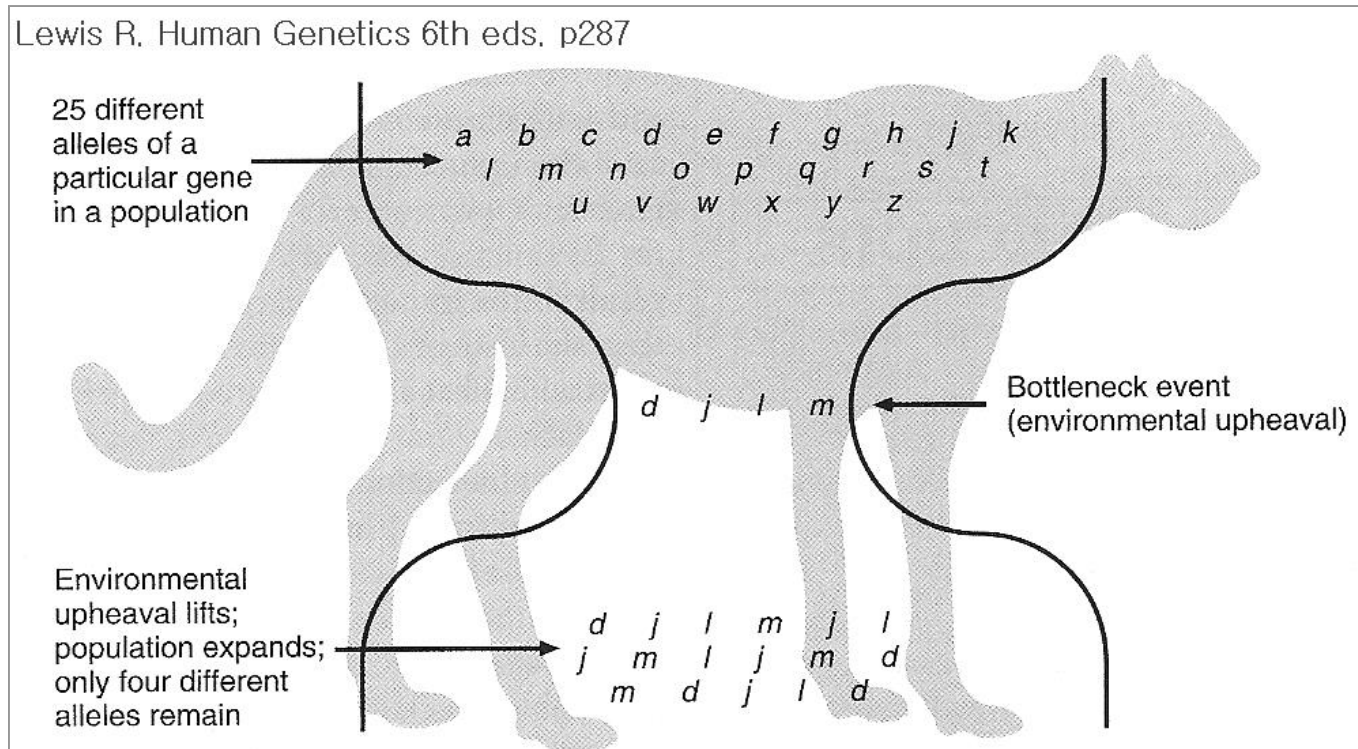
# 한번 줄인 pixel 수는 되돌이킬 수 없다

- 억지로 pixel 수를 늘려도 정보의 양은 늘지 않는다



# Population bottleneck

- *an important concept from evolutionary biology*



**3 different locations**

# 요약 - 해상도

- 디지털 이미지의 정보는 pixel의 수로 결정된다.
- 이미지의 정보양을 증가시킬 방법은 없다.
- 이미지의 변형은 항상 해상도의 저하를 동반한다. 원본이미지를 확실하게 보관하자.
- 질문: 그래픽 이미지에는 항상 해상도가 있나요?



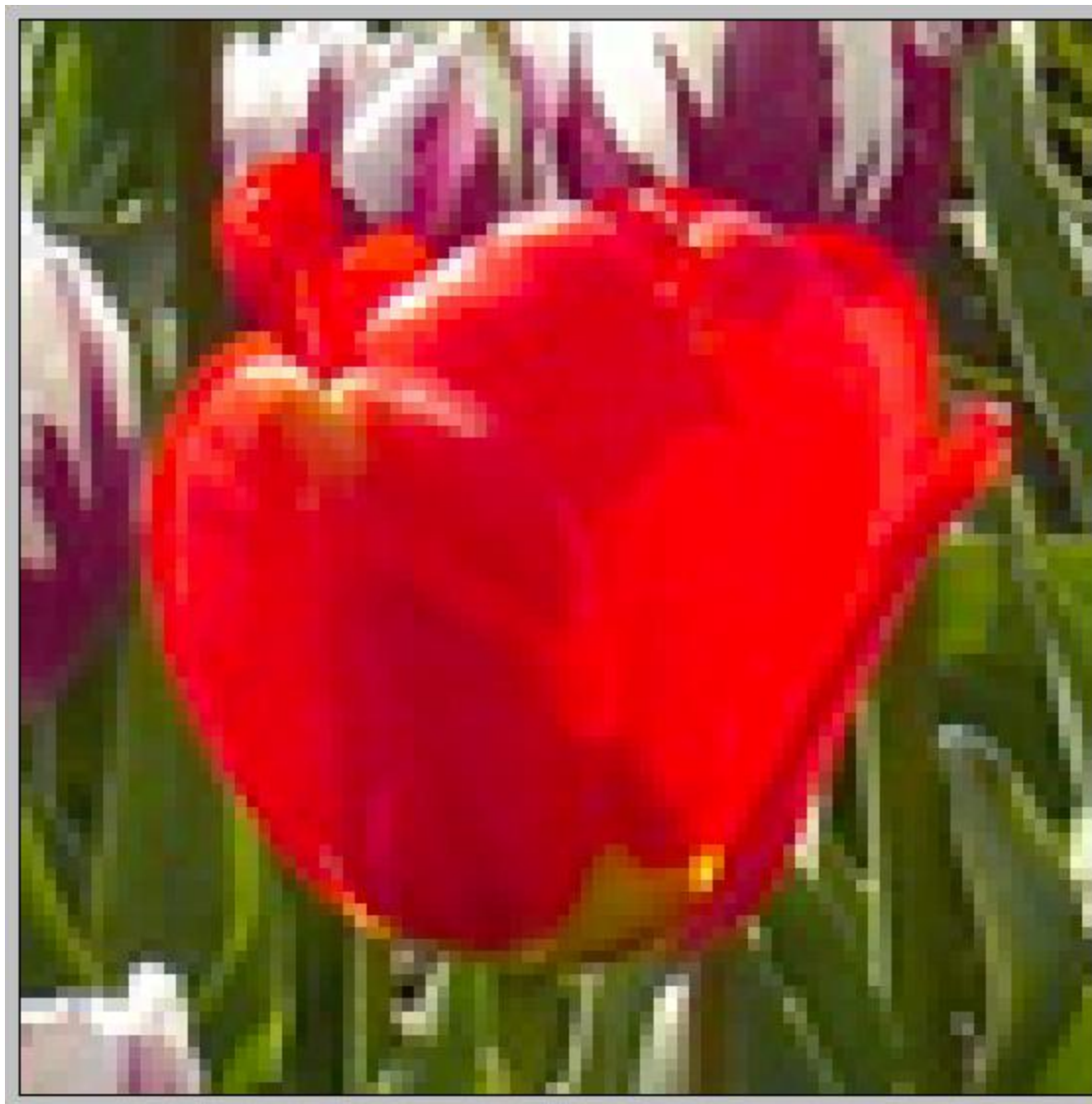
## Topic 3

# Vector image란 무엇인가?

성균관대학교 의과대학 삼성서울병원 내과 이준행

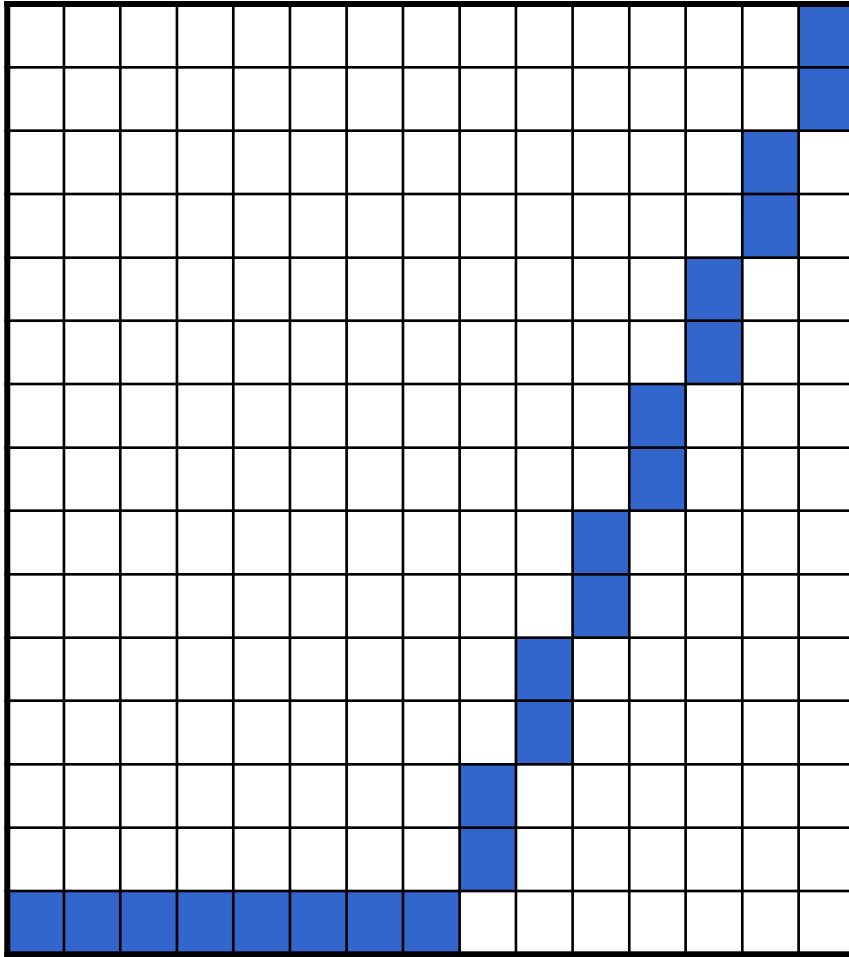


Digital camera로 찍은 image는 전형적인 bitmap image다.  
확대를 하지 않으면 매우 자연스럽게 보인다.

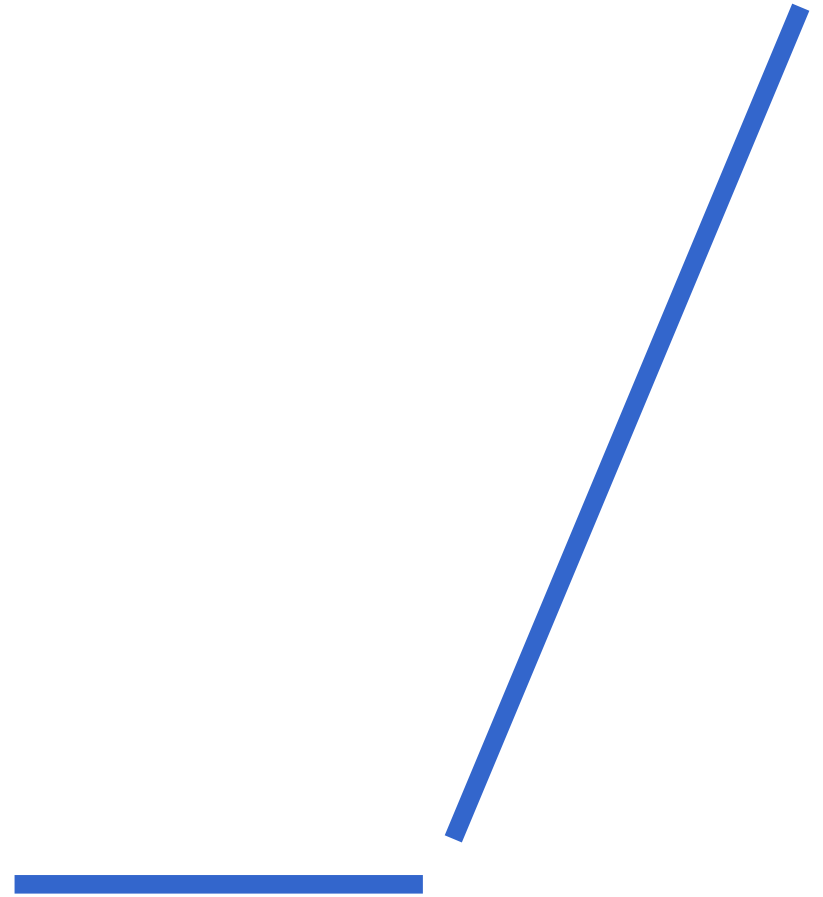


Pixel이 보이도록 크게 확대하면 격자구조를 볼 수 있다.

# 선을 그리는 두 가지 방법



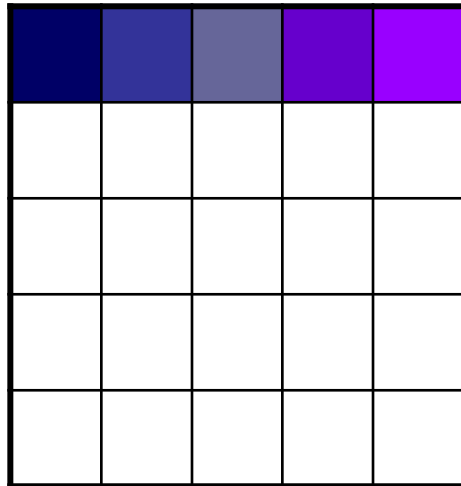
Bitmap (=raster) image



Vector image

# Raster image (=bitmap image)

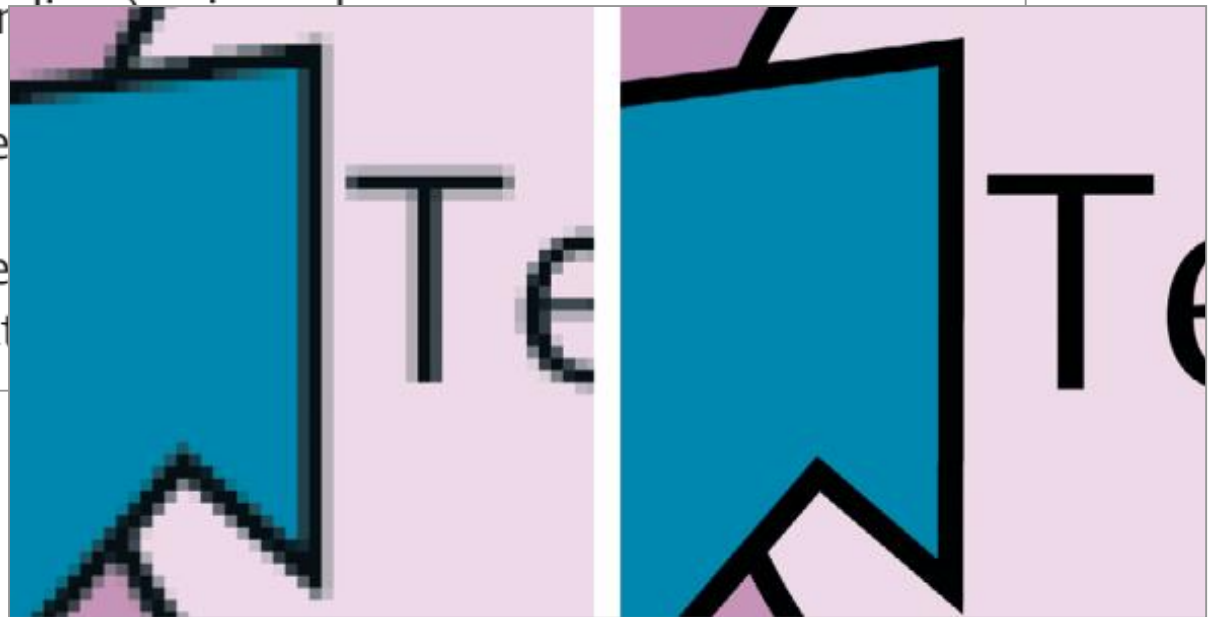
- A "raster" is a grid-like organization of image elements.
- Standard raster format: TIFF
- Raster image file has all the information for every pixel (picture element).



## Is my image a vector file?

To ensure that your image is a vector drawing please conduct the following test:

- 1 In the document zoom in to the diagram 500% or more.
- 2 Check if lines such as curves have lost any quality, are appearing pixelated (made up of small squares rather than clear lines).
- 3 If they are the same file as the one mentioned in the previous slide, check that



# 우리가 흔히 사용하는 format은 대부분 bitmap (=raster) image file format이다

File Format	Pertinent Application
<u>DICOM</u>	PACS
<u>JPEG</u>	PowerPoint, web-based display
<u>TIFF</u>	Print output, journal publication
<u>PSD</u>	Print output, when arrows or labels are necessary
<u>GIF</u>	Web-based display
EPS	Vector graphics
PDF	Distribution, web-based or otherwise
PICT	Some Macintosh applications use this format though it is largely replaced by the other formats
<u>PNG</u>	New format, may replace JPEG eventually

Note.—PICT = PICTURE; PNG = portable networks graphics; PSD = PhotoShop document.

# Some journals may requires vector drawings

## Accepted file types

- For graphs and diagrams we prefer to accept vector drawings. These files would ideally be created in a program such as Adobe Illustrator or Corel Draw and saved as an encapsulated postscript (**.eps**) or portable document format (**.pdf**) files for uploading on-line.
- Other accepted vector files are Corel Draw (**.cdt**) and Adobe Illustrator (**.ai**). Please email these directly to the article editor as these formats are not supported for uploading.

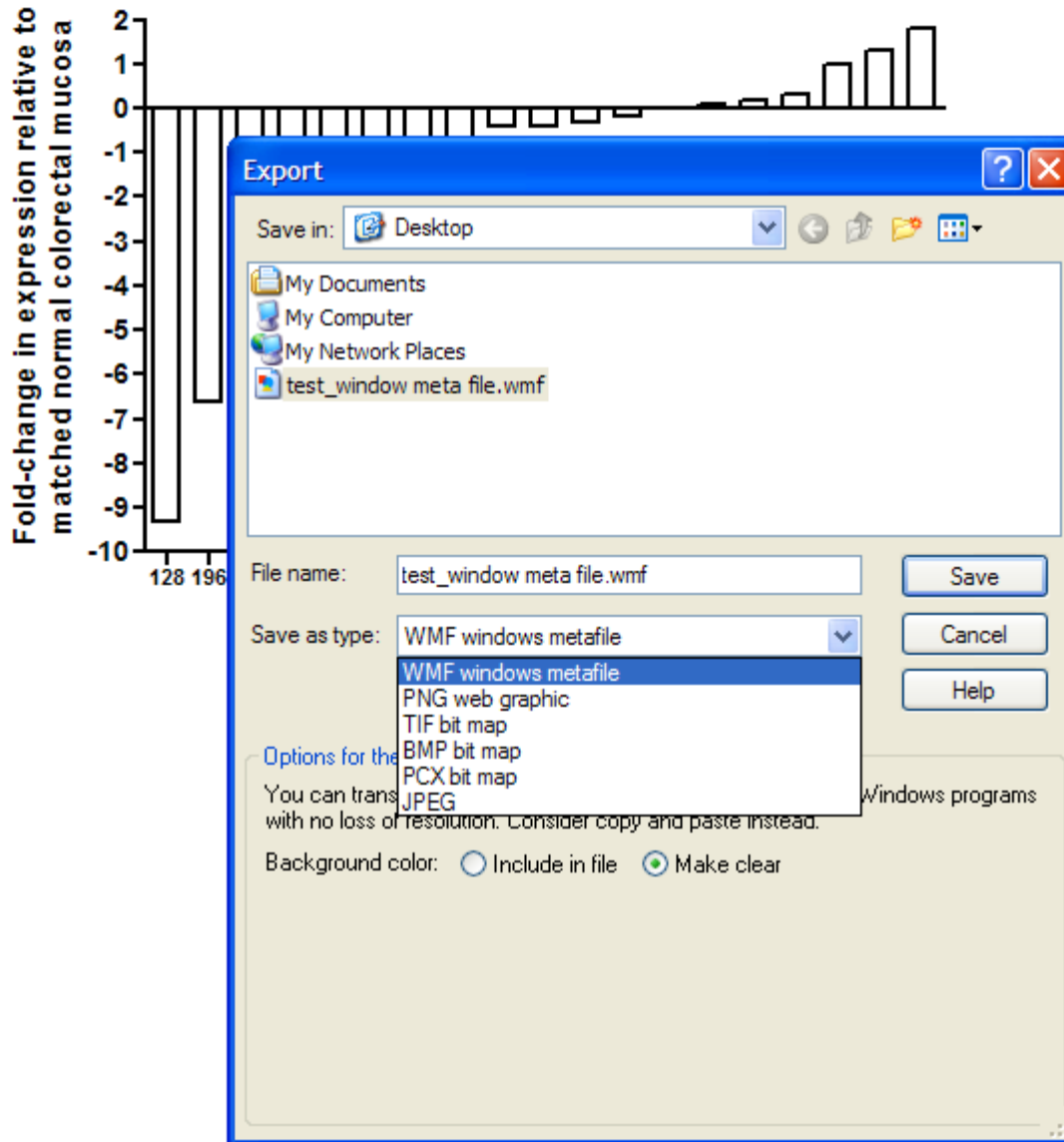


# Selecting programs for **vector images**

- 우리가 사용하는 프로그램/도구는 대부분 bitmap임

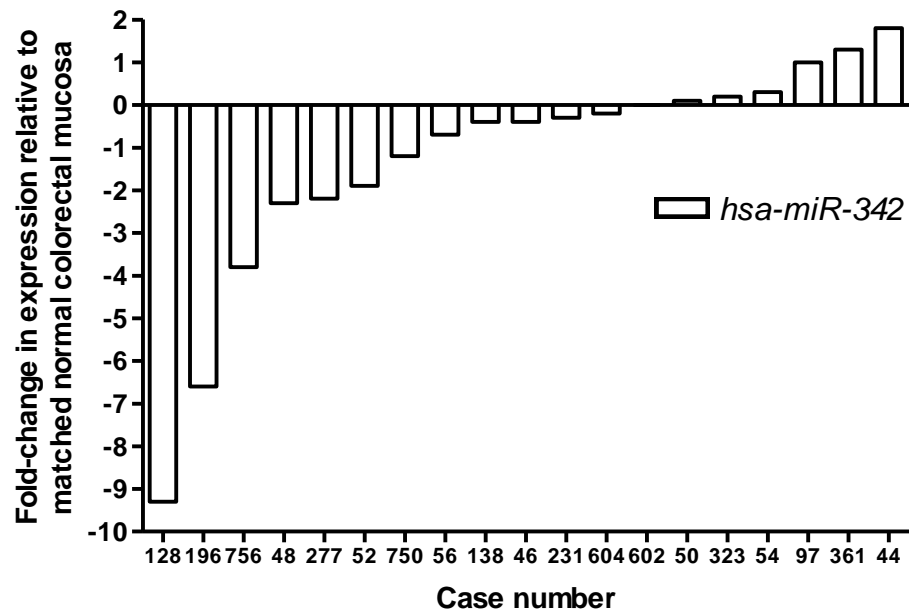
- Bitmap (=raster) image
  - Photoshop
  - Cameras
  - Scanners
- Vector image
  - **Adobe illustrator**
  - Corel draw

# Making a vector file in Prism



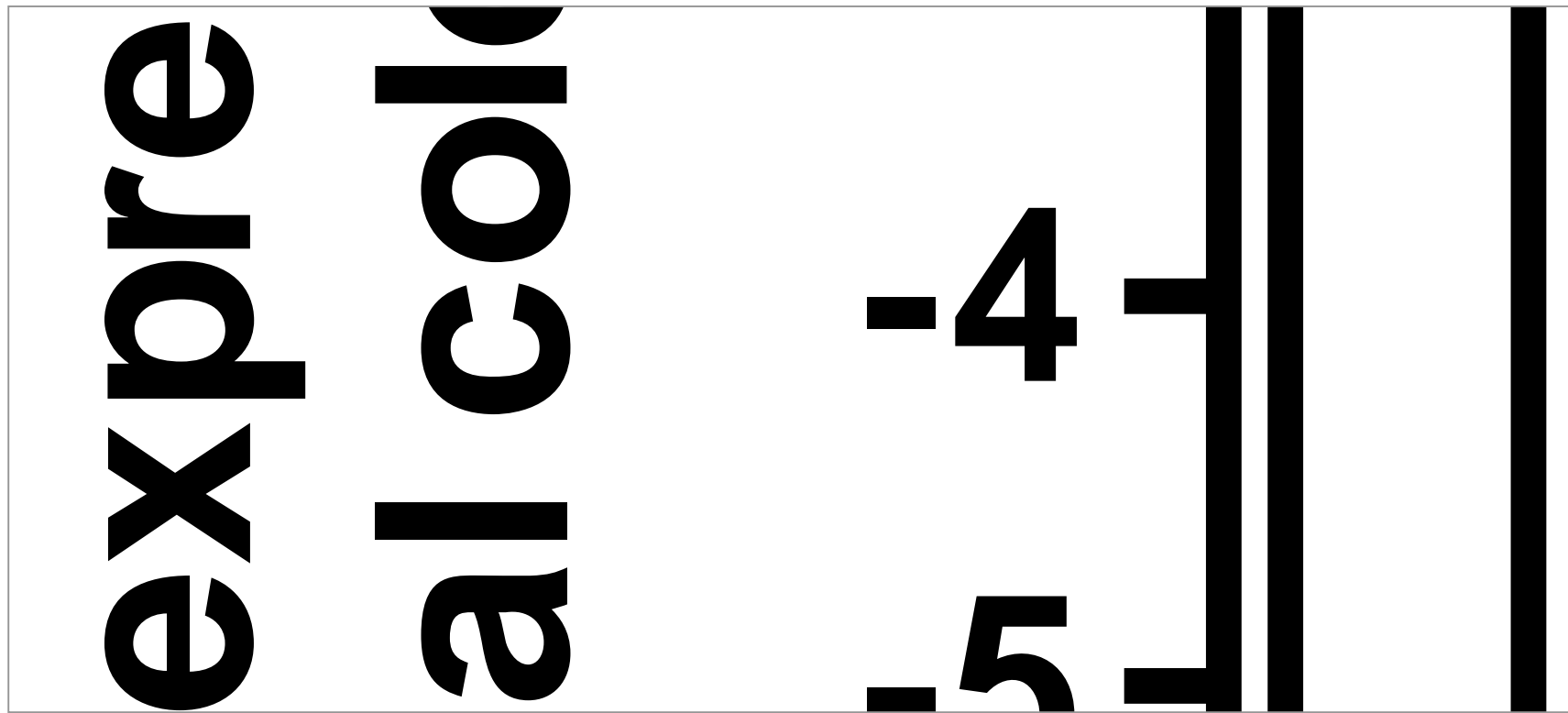
# Insertion of the WMF file

- *File size: 5,158 bytes*

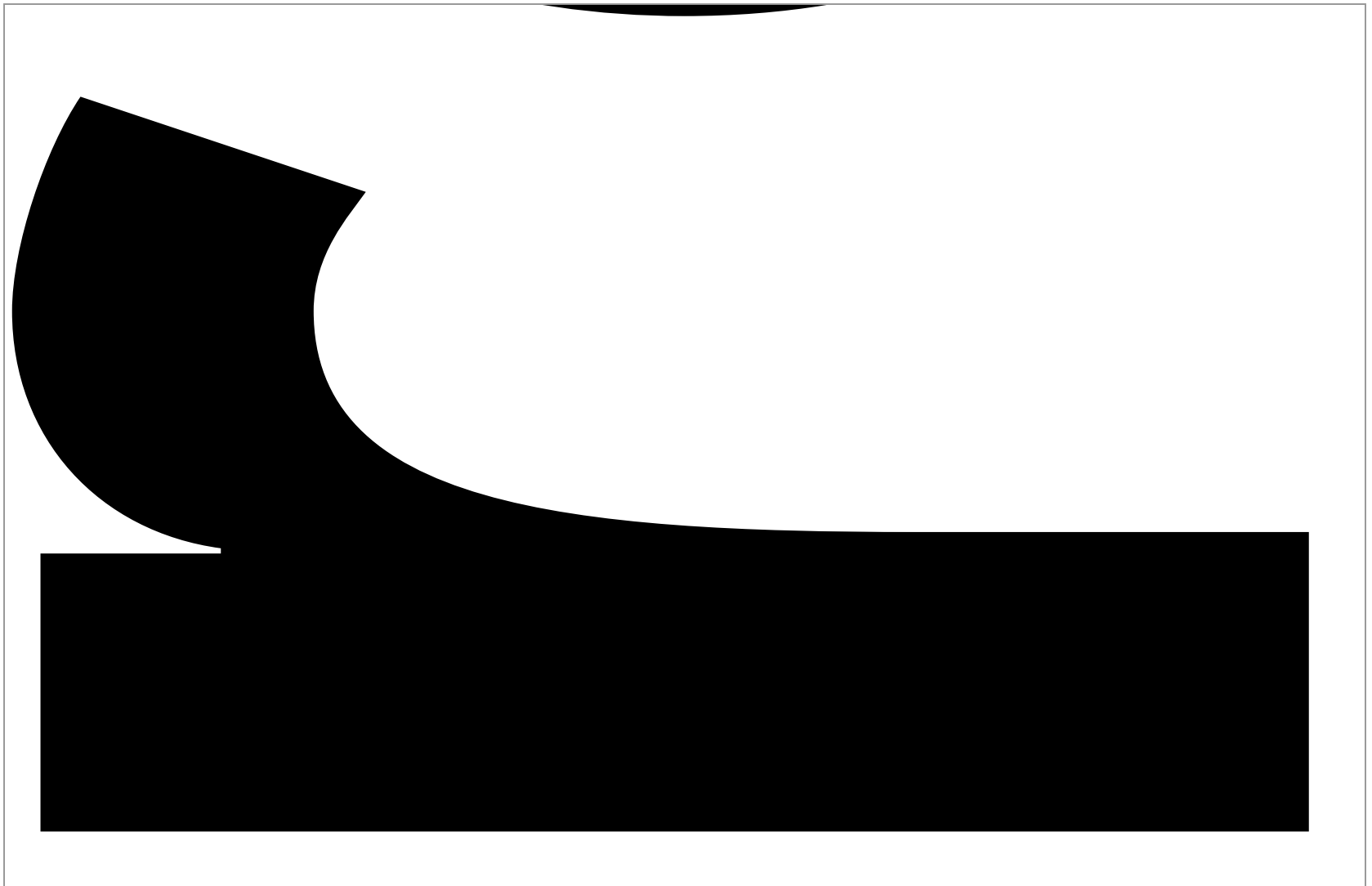


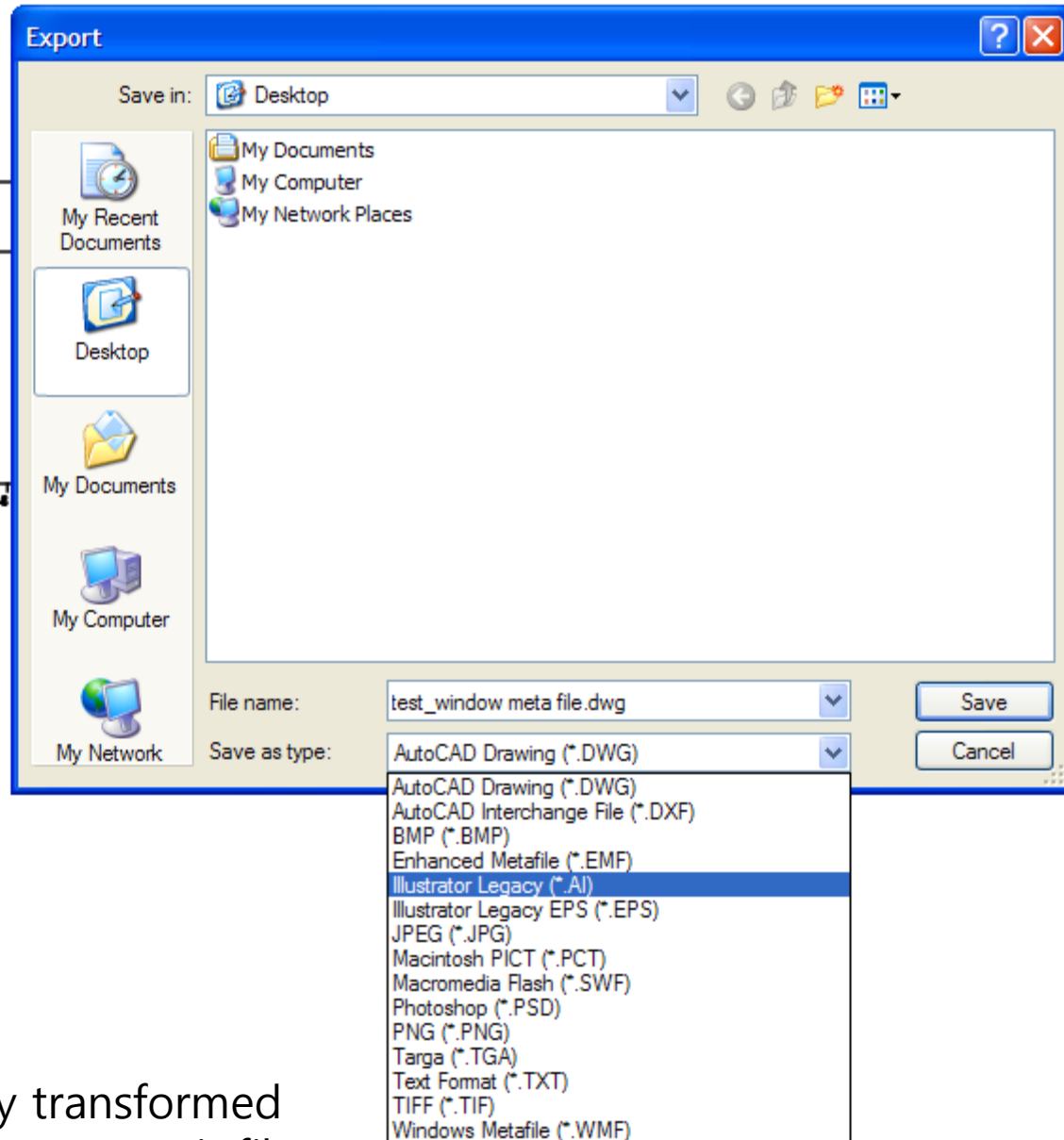
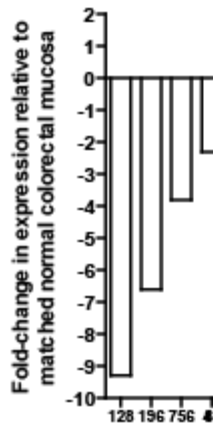
**Windows Metafile (WMF)** is a vector graphics format which also allows the inclusion of raster graphics.

# X10 enlargement of the inserted WMF file



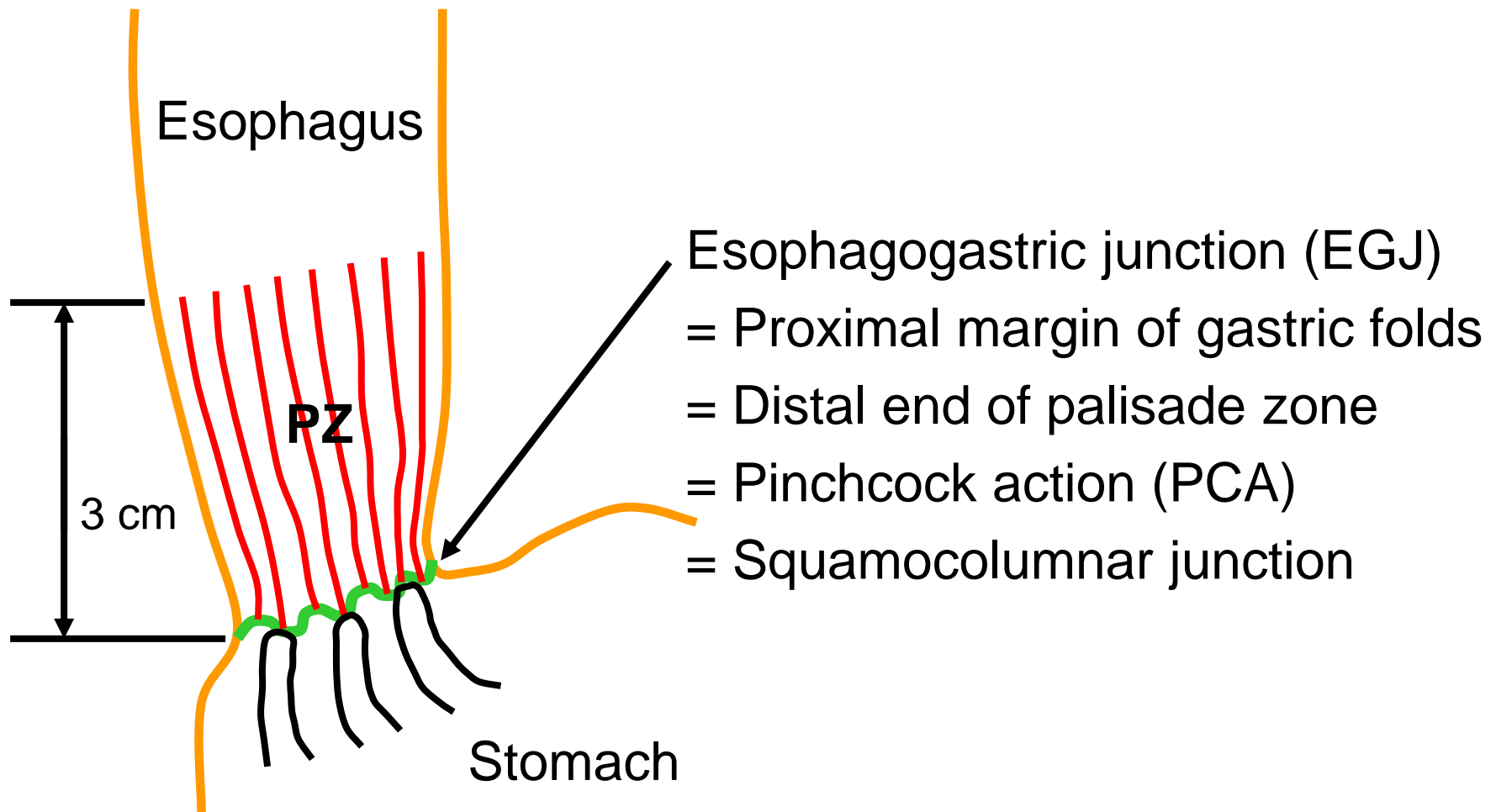
# X100 enlargement of the inserted WMF file





WMF can be easily transformed into an Adobe illustrator (.ai) file.

# PowerPoint에서 구현하는 vector



# 요약: vector image

- 선을 그리는 방법은 두 가지: Raster와 vector
- Vector에서는 확대하여도 격자구조가 발생하지 않는다.
- 최고의 해상도를 얻기 위해서는 vector program 을 이용하여 figure를 작성한 후 마지막에 필요한 해상도의 bitmap 파일로 변경하는 것이 좋다.



## Topic 3

# 논문 제출을 위한 적절한 해상도?

성균관대학교 의과대학 삼성서울병원 내과 이준행

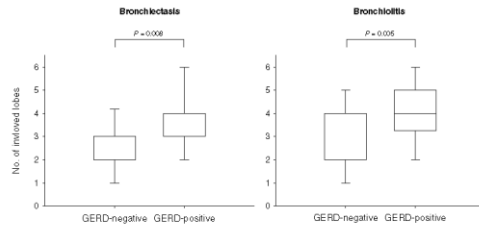
# 출판을 위한 해상도 선정 원칙

- Color: 300 dpi
- Gray scale: 300 - 600 dpi [required for photos, without text]
- Combination art (combo): 600 - 900 dpi [required for photos and text]
- Line art (monochrome 1-bit image): 900 - 1200 dpi [B&W text only]

DPI = Dots / Inch

반드시 분모가 있어야 한다

# 최종 편집된 페이지에서 어떤 크기?



**Figure 1.** Box-and-whiskers graph of the quantitative imaging analysis showing the number of involved lobes with bronchiectasis and bronchiolitis. Bronchiolitis is defined as the presence of centrilobular small nodules (< 10 mm in diameter) or branching nodular structures (tree-in-bud pattern) on HRCT. The ends of the boxes indicate the 25th and 75th percentiles, and the lines in the bars indicate the median value. The 10th and 90th percentiles are indicated with whiskers. In the patients without GERD, the median numbers of involved lobes with bronchiectasis and bronchiolitis are both 3. In the patients with GERD, the median numbers of involved lobes with bronchiectasis and bronchiolitis are both 4. Bronchiectasis and bronchiolitis were observed in more lobes in patients with GERD than in patients without GERD ( $p = 0.008$  and  $p = 0.005$ , respectively).

In addition, patients with GERD were more likely to have AFB-positive sputum smear results in comparison with patients without GERD. These findings suggest that further studies to investigate the nature of the association between GERD and NTM lung disease are needed. If GERD is causative, its treatment may be critical. If GERD is secondary to more advanced lung disease, its treatment may be less important in managing the lung disease.

Our study had some limitations. First, this study did not include a control group. However, our principal goal was to investigate the prevalence of GERD in patients with the nodular bronchiectatic form of NTM lung disease, and ours is the only study to use 24-h pH monitoring to determine this.

Second, a significant proportion (34 of 92 patients, 37%) of screened patients did not perform 24-h esophageal pH monitoring. Then, the study group did not accurately reflect total population of patients with NTM lung disease. In particular, the study group had a significantly higher proportion of patients with *M. abscessus* infection than the total group. This is very significant because it has been shown that patients with *M. abscessus* infection have a higher rate of gastroesophageal abnormalities.

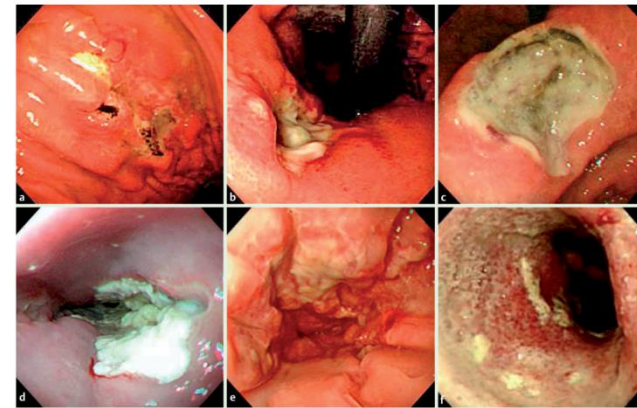
Third, we used accepted criteria used by gastroenterologists for the diagnosis of GERD, but these may not apply for a person to be susceptible to NTM infection by possible aspiration. For example, it is not known if someone has to have a pH 4 for > 4% of the study time to place NTM in his or her lungs. Also, the patients were only studied for

24 h, which does not exclude that aspiration may have occurred at other times not studied.

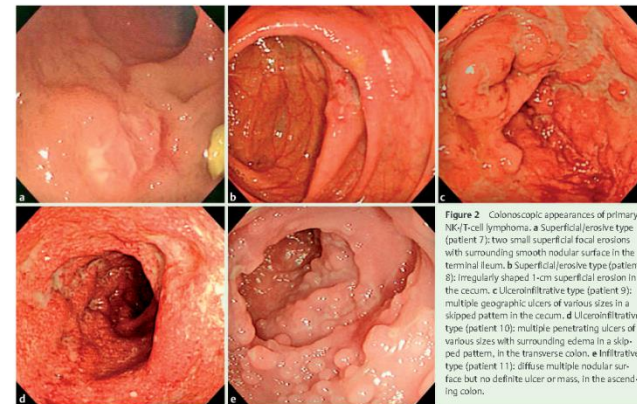
Although we showed that GERD is prevalent in patients with NTM lung disease, the nature of this relationship remains uncertain. Our study was not designed to investigate a possible causal association between GERD and NTM lung disease. Our data are consistent with GERD causing or contributing to the development or progression of NTM lung disease via recurrent exposure of the pulmonary parenchyma to the acidity of the refluxed gastric contents. Alternatively, GERD might be a secondary phenomenon. Patients with NTM lung disease might be at increased risk for abnormal reflux because of the increased pressure gradient across the diaphragm during frequent coughing and changes in pulmonary mechanics.

In addition, non-acid reflux as well as acid reflux may be present in patients with NTM lung disease. The measurement of acid reflux using esophageal pH monitoring is just a marker for possible aspiration but may not be related to the pathogenesis of NTM infection. In fact, it is possible that the increased use of acid suppressants with a resultant aspiration of relative alkaline pH into the esophagus may actually make the environment more favorable to NTM infection and the relative alkaline pH exacerbate further aspiration.

In conclusion, our study showed that patients with the nodular bronchiectatic form of NTM lung disease have a high prevalence of GERD. However, most patients with NTM lung disease and GERD lacked the typical symptoms of heartburn and regur-



**Figure 1.** Endoscopic appearances of primary upper gastrointestinal NK/T-cell lymphoma. a Superficial/erosive type (patient 1): several superficial erosions of various sizes in a continuous focal pattern in the body of the stomach. b Ulcerative type (patient 2): a round 1.5-cm well defined deep ulcer in the body of the stomach. c Ulcerative type (patient 3): round 2-cm well defined deep ulcer at the angle of the stomach. d Ulcerative type (patient 4): a long irregular 4-cm well defined deep ulcer in the mid esophagus. e Ulceroinfiltrative type (patient 5): diffuse ill defined ulcers of various sizes in a continuous pattern in the lower esophagus. f Ulceroinfiltrative type (patient 6): diffuse ill defined ulcers of various sizes in a continuous pattern in the second portion of the duodenum.



**Figure 2.** Colonoscopic appearances of primary NK/T-cell lymphoma. a Superficial/erosive type (patient 7): two small superficial focal erosions with surrounding smooth nodular surface in the terminal ileum. b Superficial/erosive type (patient 8): irregularly shaped 1-cm superficial erosion in the cecum. c Ulceroinfiltrative type (patient 9): multiple geographic ulcers of various sizes in a skipped pattern in the cecum. d Ulceroinfiltrative type (patient 10): multiple penetrating ulcers of various sizes with surrounding edema in a skipped pattern in the transverse colon. e Infiltrative type (patient 11): diffuse multiple nodular surface but no definite ulcer or mass, in the ascending colon.

# 불친절한 Science

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**Fig. 4. Left** Original HRG image (img\_16504002, E-66, range 915 km). **Middle** Deconvolved image. **Right** HRG contour image (img5004020) showing the location of the HRG field above the large lobe of the nucleus. Arrows indicate projected directions to the Sun and Earth.

because they are optically thin, relatively dark material.

Theoretical calculations of scattering by icy grains (SOM text) show that the predominant scattering grains must be smaller than 10  $\mu\text{m}$ . However, >100% of the surface brightness can be accounted for by extrapolating the chunks to a size of 0.4  $\mu\text{m}$ , implying that the chunks are fluffy aggregates or clusters of  $\sim 1$ - $\mu\text{m}$  solid grains. Either most of the aggregates of order 1  $\mu\text{m}$  have broken up, or they mimic the scattering of the small grains. This result is very similar to the result obtained at Tempel 1 after the impact (ice was observed before the impact). These grains were predominantly micrometer-sized (27). The similarity between excavated material from Tempel 1 and ambient outgassing from Hartley 2 suggests that the constituent grains of solid ice are on order of a micrometer in most comets. On the basis of calculations of lifetimes (>30-30 yr for the  $\sim 10$ - $\mu\text{m}$  solid components, the ice must be nearly pure for the grains to persist.

The detection of strong absorption by ice, the detection of very large chunks in the coma, the concentration of all species other than H<sub>2</sub>O vapor away from the waist of the nucleus, and the relatively smooth surface of the waist lead us to suggest that the material at the waist has been redeposited as a mixture of dirty grains and fluffy, icy aggregates that have not yet sublimated. The warmth of the dirty grains then leads to sublimation of the icy grains just below the surface. We conclude that this aspect of the chemical heterogeneity of the nucleus of Hartley 2 is probably evolutionary.

To determine the absolute abundance ratio, we considered a spectral map made three fire rotations (55 hours) earlier, when both the previous nucleus and minimum. The lower portion of Fig. 7 shows images of the CO<sub>2</sub> and H<sub>2</sub>O from the spectral maps. The red line indicates the position of the nucleus as defined by the peak thermal print. Close inspection shows that CO<sub>2</sub> is more sunward (up in the figure) than H<sub>2</sub>O from the nucleus. The scale is arbitrary, but we assume an outflow speed of 1 km s<sup>-1</sup>. We found average production rates Q(H<sub>2</sub>O) = 1.0  $\times 10^{28}$  s<sup>-1</sup> and Q(CO<sub>2</sub>) = 2.0  $\times 10^{28}$  s<sup>-1</sup> for >20% of the fraction of CO<sub>2</sub>. This is higher than the fraction obtained in previous measurements of the global production of CO<sub>2</sub> in this comet (31–35).

most certainly primordial, unlike the ambiguous interpretation for the heterogeneity of Tempel 1 (34).

**Summary and Conclusions**

Comet 1019/Hartley 2 differs in many ways from 997/Temple 1 and is an ideal example of hyperactive comets, ones that produce more H<sub>2</sub>O per unit time than should be possible by sublimation from the small surface area of their nuclei. Super-volatiles, specifically CO, in the case of Hartley 2, are the primary drivers of activity. The super-volatiles dig out chunks of nearby pure water-ice, which then sublime to provide a large fraction of the total H<sub>2</sub>O gaseous output of the comet. Other hyperactive comets include 46P/Wirtanen and 21P/Giacobini-Zinner.

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RESEARCH ARTICLES

## O-Glycosylated Cell Wall Proteins Are Essential in Root Hair Growth

Silvia M. Velazquez,<sup>1</sup> Martiniano M. Ricardo,<sup>1</sup> Javier Gloazze Doroz,<sup>2</sup> Paula V. Fernandez,<sup>2</sup> Alejandro D. Nadra,<sup>2</sup> Leticia Pol-Fachin,<sup>2</sup> Jack Egelund,<sup>2</sup> Suscha Gilie,<sup>2</sup> Tessa Nahouli,<sup>2</sup> Mariana Caracas,<sup>2</sup> Hugo Venti,<sup>2</sup> Markus Paulig,<sup>2</sup> Antonio Bacic,<sup>2</sup> Carl Erik Olsen,<sup>2</sup> Peter Ulvinkov,<sup>2</sup> Bent Lasse Petersen,<sup>2</sup> Chris Sonnerville,<sup>2</sup> Roberto D. Jansen,<sup>3,4</sup> Jose M. Estevez<sup>1</sup>

Root hairs are single cells that develop by tip growth and are specialized in the absorption of nutrients. Their cell walls are composed of polysaccharides and hydroxyproline-rich glycoproteins (HRGPs) that include extensins (EXTs) and arabinogalactan-proteins (AGPs). Proline hydroxylation, an early posttranslational modification of HRGPs that is catalyzed by prolyl 4-hydroxylases (PH4H), defines the subsequent O-glycosylation sites in EXTs (which are mainly arabinoylated) and AGPs (which are mainly arabinogalactoylated). We explored the biological function of PH4H, arabinoyltransferases, and EXTs in root hair cell growth. Biochemical inhibition or genetic disruption resulted in the blockage of polarized growth in root hairs and reduced arabinosylation of EXTs. Our results demonstrate that correct O-glycosylation on EXTs is essential for cell-wall self-assembly and, hence, root hair elongation in *Arabidopsis thaliana*.

Plant cell walls are complex and dynamic structures composed mostly of high-molecular-weight polysaccharides and high-glycosylated proteins (1, 2). During plant growth, cells may expand up to 200 times their original length. During this process, the cell wall maintains its thickness through the addition of newly synthesized polysaccharides and proteins. These, in turn, provide sufficient tensile strength to withstand enormous turgor pressures (the driving force for growth) and involve controlled chemical modifications of wall constituents and wall networks. Approximately 1% of the *Arabidopsis* genome represents genes encoding putative enzymes that catalyze such modifications (3). Although the catalytic activity of the encoded protein is inferred from the predicted peptide sequence, the precise enzymatic function and biological role of many of these putative cell-wall-modifying genes are unknown (1, 2).

Cell walls contain abundant hydroxyproline-rich glycoproteins (HRGPs), a superfamily that encompasses extensins (EXTs) (4), proline-rich proteins (PRPs) (5), and arabinogalactan proteins (AGPs) (6, 7). These proteins undergo extensive posttranslational modifications, which include the modification of proline residues by hydroxylation (Hyp) by membrane-bound prolyl

4-hydroxylases (PH4H) (8). Nucleus HRGPs are O-glycosylated (with arabinose and/or galactose) by glycosyltransferases (GTs) in the Golgi and endoplasmic reticulum (ER) (9–11) and are cross-linked into the wall by peroxidases through alternate Tyrosyl residues to form a covalent network (12, 13).

**Root hair growth and proline hydroxylation.**  
To study the function of HRGPs, we focused on root hairs because they represent a single cell type that plays an important role in nutrient absorption, and the growth morphology is easily

**Fig. 1. Arabidopsis root hair growth is modulated by PH4H.** (A) Localization of GFP-tagged PH4H2, PH4H1, and PH4H3 enzymes. GFP-tagged PH4H2 and PH4H1 are expressed in trichoblast cells (T), and GFP-tagged PH4H3 is expressed in both trichoblast and arabisoloblast (AB) root cells. Absence of GFP signal is indicated by asterisks. Scale bar, 200  $\mu\text{m}$ . (B) Shorter root hairs in *ph4h1* mutant. Scale bar, 100  $\mu\text{m}$ . (C) Root hair length (black bars) and Hyp content (red bars) in roots of WT Col-0 (WT), *ph4* intercalation mutants, silenced artificial microRNAs (amiRNAs), and rescued mutants. Complementations of each *ph4* mutant was achieved by the corresponding WT PH4 driven by either its own endogenous promoter or the 35S promoter. *P* values of one-way analysis of variance (ANOVA) are shown. \**P* < 0.01, \*\**P* < 0.001.

**Fig. 3. EXT-associated arabinoyltransferases.** (A) Root hair length (mean  $\pm$  SEM) in *root-3leg1/2/3* mutants and their complemented lines. *P* values from one-way ANOVA test are shown. \**P* < 0.01, \*\**P* < 0.001. (B) and (C) Mass spectra of EXT O-glycans (Hyp-arabinosides, HA1-HA5) analyzed with ESI-MS on WT or mutant (B) seedlings and (C) roots. Hyp-arabinosides were detected as follows: HA5, Hyp-Ha5; HA4, Hyp-Ha4; HA3, Hyp-Ha3; HA2, Hyp-Ha2; and HA1, Hyp-Ha1. Note important for the interpretation of the results are highlighted in red (isotopes containing up to two arabinose residues) or in blue (isotopes lacking or containing one to five arabinose units) which are clashing or notably reduced in the mutants.

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observed with light microscopy. A link between PH4Hs, glycosylation, and root hair phenotype was first suggested by results from an *in vivo* biochemical experiment that analyzed root hairs from plants carrying a green fluorescent protein (GFP)-tagged HRGFP transgene (LeAGP1-GFP) (14) that were treated with either ethyl-3-(3-dimethylphenyl)-2-thioethyl carbodiimide (EDHIB), which binds to the active site of APH4Hs (Fig. S1A) (15), or *in situ*-dibipryl (DBP), which chelates the cofactor Fe<sup>2+</sup> (16, 17). This treatment caused an up to 50% inhibition of root hair growth at 48 to 216 h (Fig. S2) and the accumulation of the non-glycosylated  $\sim 42$  kD form of LeAGP1-GFP rather than the fully O-glycosylated 150-kD-200-kD form (Fig. S2) (14).

We then characterized different members of the APFH family with distinct expression patterns, particularly those expressed in a tissue-specific manner in roots such as APH4H2 and APH4H5, which are expressed mainly in the root meristematic zone (Fig. S3 and table S1) (12, 19), as well as APH4H3, which is also expressed in roots (Fig. 1A). Cell-type expression analysis showed that GFP-tagged PH4H2 and PH4H5 are present only in trichoblast cells, whereas APH4H3 is expressed in both trichoblast and arabisoloblast cells (Fig. 1A). Subcellular localization of all three PH4Hs was confined to the apical zone of emerging root hairs but was distributed throughout the cell in elongated root hairs (Fig. 1B).

At the subcellular level, all three PH4Hs colocalized with an ER marker. PH4H2 and PH4H5 partially colocalized with a Golgi marker (Fig. S4). To clarify the role of these PH4Hs in developing root hairs, we used plants with transferred DNA (TDNA) insertions (broccoli lines) in each of these O-glycosylating genes (Fig. S5). We observed that the PH4H-deficient lines displayed shorter-than-normal root hair length (Fig. 1B, Fig. S5, and table S2), which mimicked the phenological inhibition of PH4Hs that was previously reported (16). In addition, the *ph4h2* mutant showed reduced root hair density. All three mutants lacked normal APFH transcripts, with the exception of *ph4h2* (Fig. S5) and showed reduced Hyp content in root cell walls in roots (Fig. 1C). Similar results were obtained by silencing normal APFH gene expression with complementary microRNA (Fig. 1C and Fig. S5). Therefore, we concluded that the normal elongation of root hair cells requires Pro hydroxylation, performed by APFH enzymes, and the subsequent O-glycosylation of HRGPs, which is a consequence of Pro hydroxylation (20).

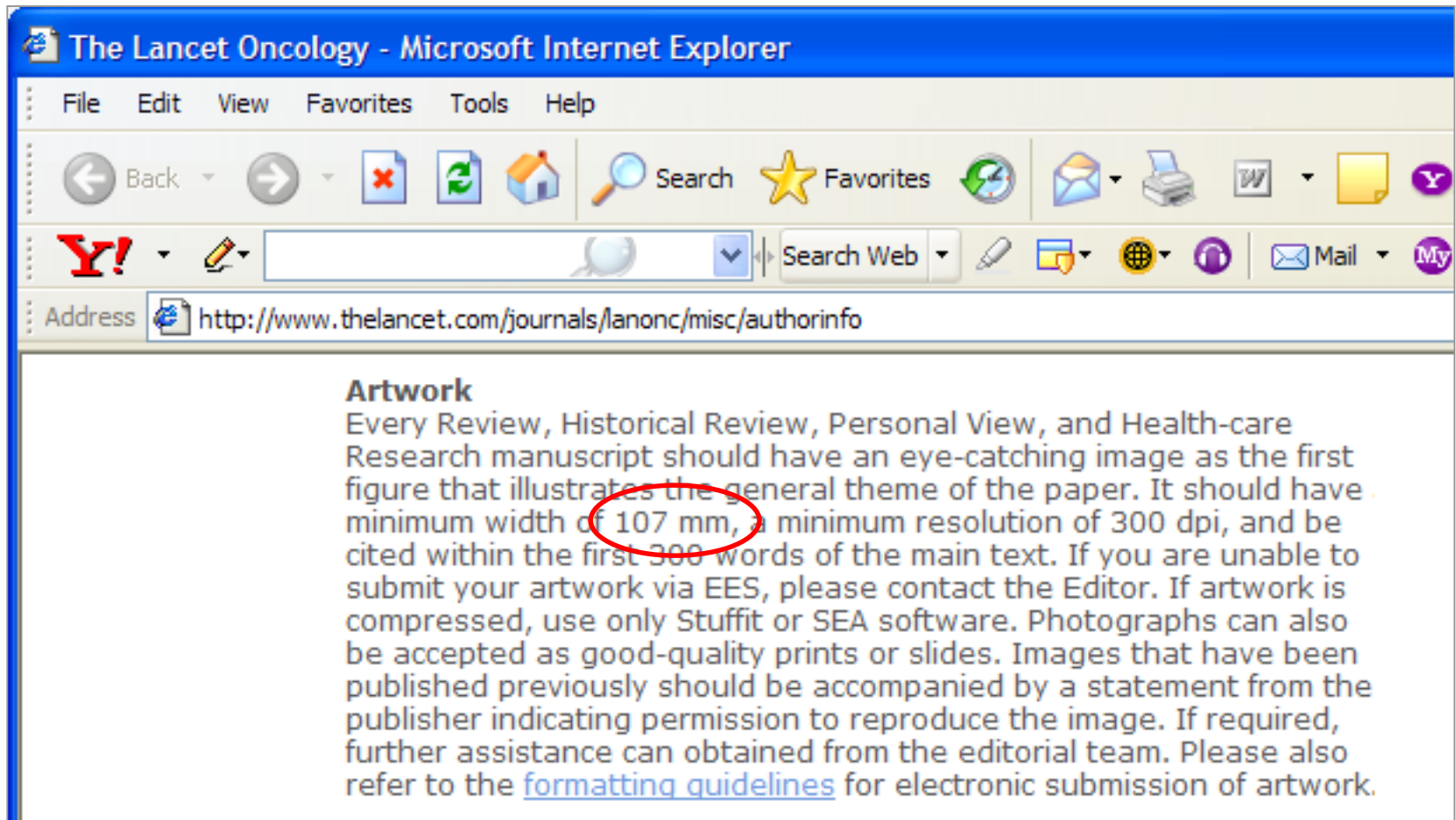
In support of the conclusions derived from *ph4* mutants, GFP-tagged PH4Hs driven by either their own promoter (Fig. 1C and Fig. S5) or the strong 35S::MUV constitutive promoter (Fig. 1C and table S2) restored root hair length, morphological phenotypes, and cell wall Hyp content to wild-type (WT) levels. Overexpression of PH4Hs in a WT genetic background (Fig. S6) doubled root hair length (Fig. 1D and Fig. S6) and increased root hair density (Fig. S7).

Given the overlapping substrate specificity of PH4Hs (6), we explored the potential genetic interactions among PH4Hs by observing the root hair phenotype that was displayed by double mutants (Fig. S7). The *ph4h2*/*ph4h3* double mutant phenotype was similar to that of the single mutant *ph4h3*, suggesting a functional overlap between PH4H2 and PH4H3. In contrast, the double mutant *ph4h2*/*ph4h1* line had shorter root hairs and exhibited a lower Hyp content in the cell walls than that of the respective single *ph4* mutant (Fig. S7), suggesting subtle differences in substrate specificity for each of these PH4Hs. To address the target specificity of PH4Hs, we performed a yeast two-hybrid screen using PH4H5 as bait and identified LEXY, a root-specific leucine-rich repeat extensin (At4g13340) and proteins containing prolyline 1 repeats (25) as targets of PH4H5 (table S3). We calculated the interaction of each PH4H (PH4H2, PH4H3, and PH4H5) with the (SP)<sub>2</sub> and PAPA/PSF<sub>2</sub> peptides that are present in AGPs or a prolyline repeat that is usually present in EXTs and PRPs (Fig. S8, table S4, and supporting online material (SOM) text S1). The modeling showed that these PH4Hs have a high affinity of PH4Hs for polyproline-like (EXT-PRP-type) substrates (Fig. 8). Other biochemical studies have also demonstrated a greater hydroxylation activity of consecutive Pro residues compared with that on nonacidic residues (6).

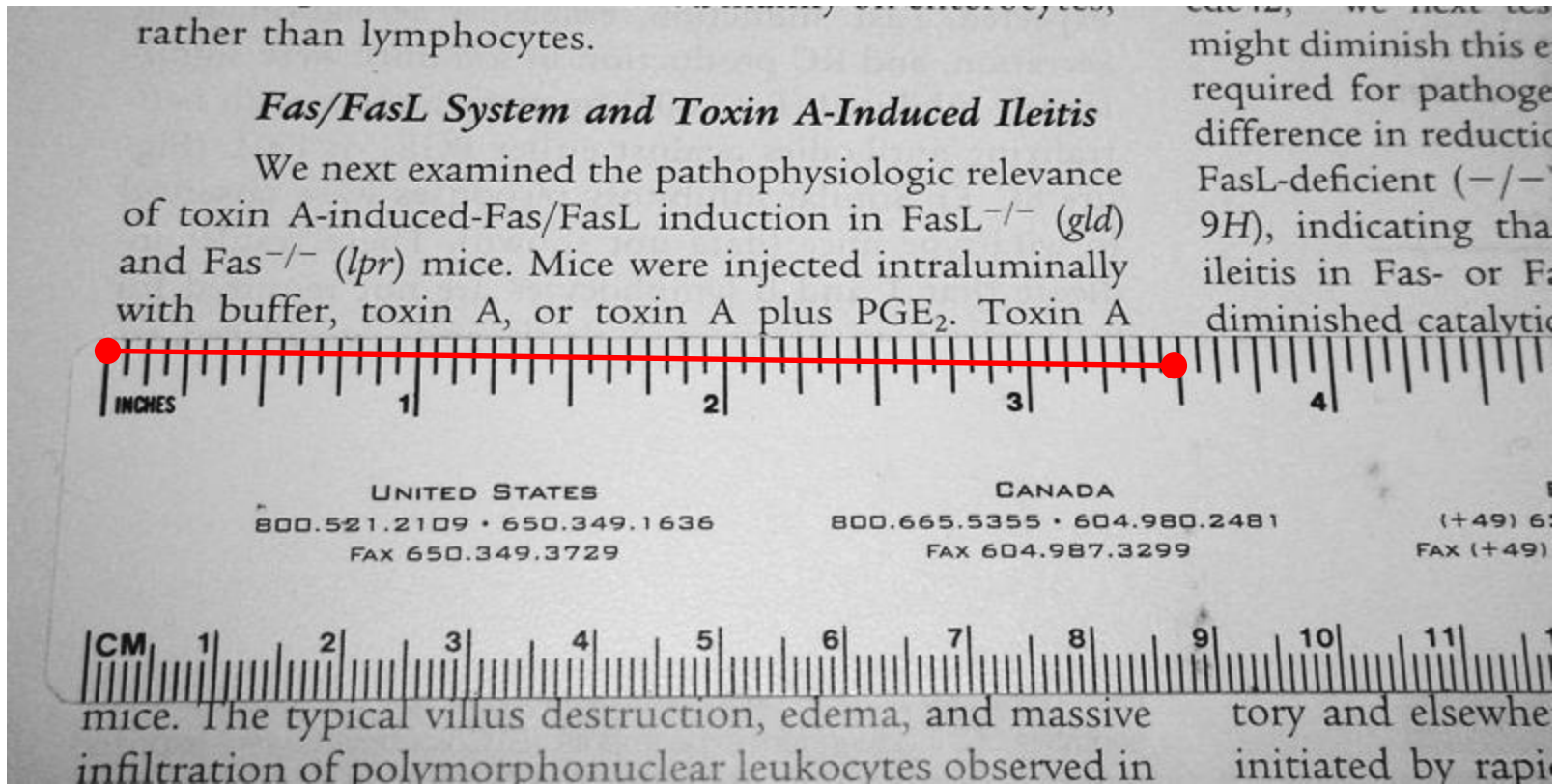
**O-linked glycans in proteins.** Having established the importance of PH4Hs in posttranslational modifications of the EXT peptide backbone and considering that O-glycosylation is relevant in protein function either directly or indirectly through changes in polypeptide conformation, we explored O-glycosylation, mainly O-arabinosylation, in the context of EXT structure. Using genome-wide expression analysis, we determined that glycosyltransferase (GT) RRA3 reduced root hair number, 3, A11 (9360) and XLE13 (At4g35610) (Fig. S9), both members of the GT family 77 (GT 77) of the Carbohydrate Active Site (CAS) database (CAZY, www.cazy.org), were coexpressed with PH4H2 and PH4H5. RRA3 was 70 and 82% identical to the putative membrane-bound type-II arabinosyltransferases RRA1 and RRA2, respectively, which are implicated in EXT glycosylation (Fig. S9) (6, 9). The impaired root hairs that were exhibited by *rri1-rri3* mutants were similar to those of *ph4h2*, *ph4h5*, and *ph4h1* mutants (Fig. 3A). In addition, *rri1-rri3* mutants had reduced EXT epitope content in their root cell walls (Fig. S10). As another GT family member, XLE13 (At4g35610), which is a putative arabinosyltransferase, has also been reported to glycosylate *in vivo* (The CAZY 13.2

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# 매우 친절한 *Lancet*



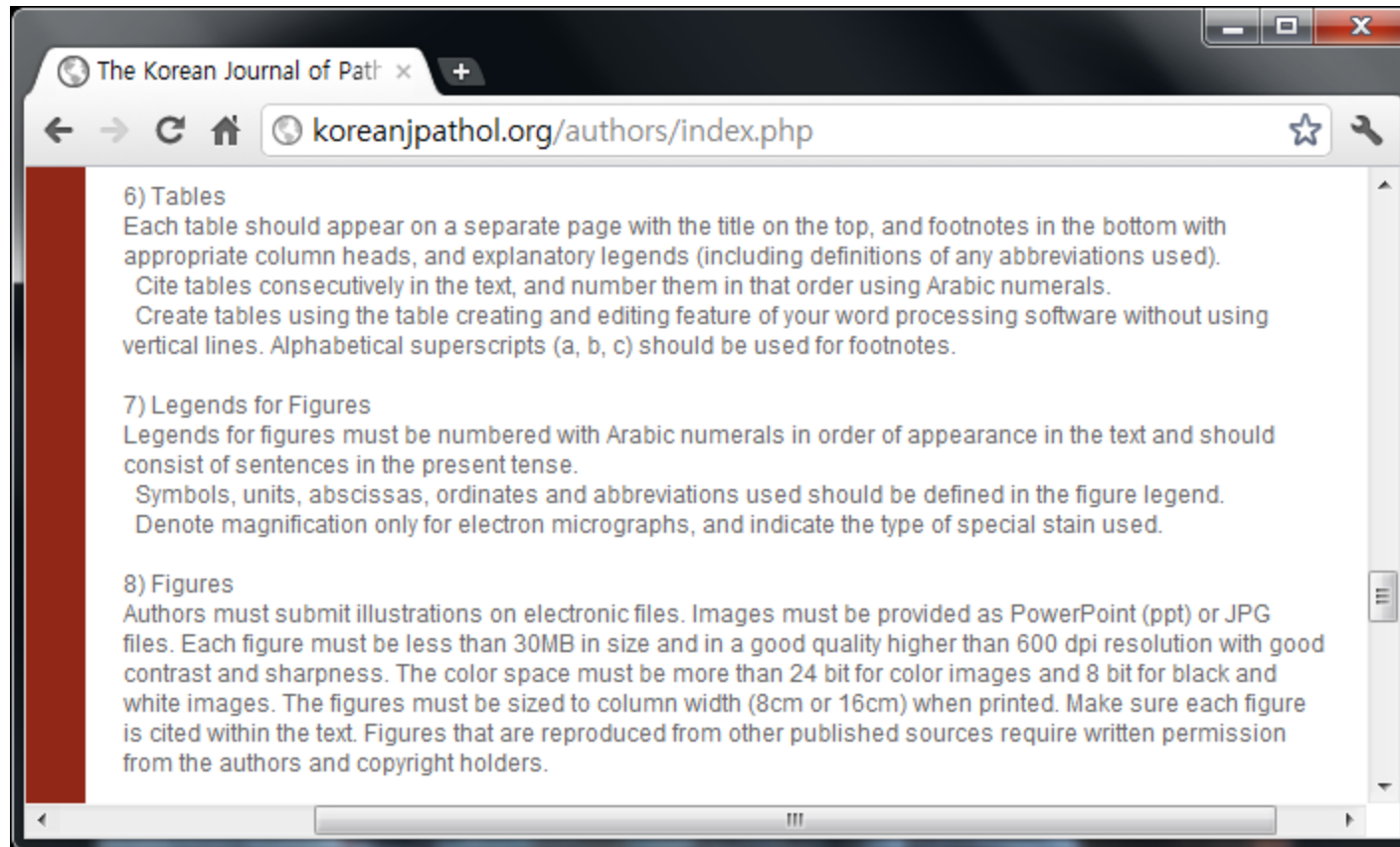
# One column is usually 3.5 inch or less



**4 inch, 900 dpi로 작업을 하면 대부분의 경우에 문제가 없다**

# 대한 병리학회지 투고규정

- 2011/7 & 2014/7





- Authors must submit illustrations on electronic files. Images must be provided as **PowerPoint (ppt) or JPG** files.
- Each figure must be less than **30MB in size** and in a good quality higher than **600 dpi** resolution with good contrast and sharpness.
- The **color space** must be more than 24 bit for color images and 8 bit for black and white images.
- The figures must be sized to column **width (8cm or 16cm)** when printed.

- Authors must submit illustrations on electronic files. Images must be provided as **TIFF files**. **JPEG is also acceptable when the original format is JPEG.**
- Each figure must be ~~less than 30MB in size and~~ ~~in a~~ good quality higher than **300 dpi** resolution with good contrast and sharpness.
- ~~The **color space** must be more than 24 bit for~~ ~~color images and 8 bit for black and white~~ ~~images.~~
- The figures must be sized to **4 inches**.
- **If possible, submit the original file without any modification.**

# 변화는 쉽게 오지 않는다.

## 7) Figures

Authors must submit illustrations as electronic files.

Images should be provided as TIFF files, but JPEG is also acceptable when the original format is JPEG. When authors need to arrange figures in certain ways, **they can submit figures in prearranged ppt/pptx files.** Each figure needs to be prepared in a resolution **higher than 300 dpi** with good contrast and sharpness..



# 요약: 논문 제출을 위한 이미지

- 논문에 제출할 그림은 대표적인 line art이다.
- 가능하면 vector형식의 image program을 사용하여 그림을 만드는 것이 좋다.

예) 그림은 Adobe Illustrator, Graph는 Prism

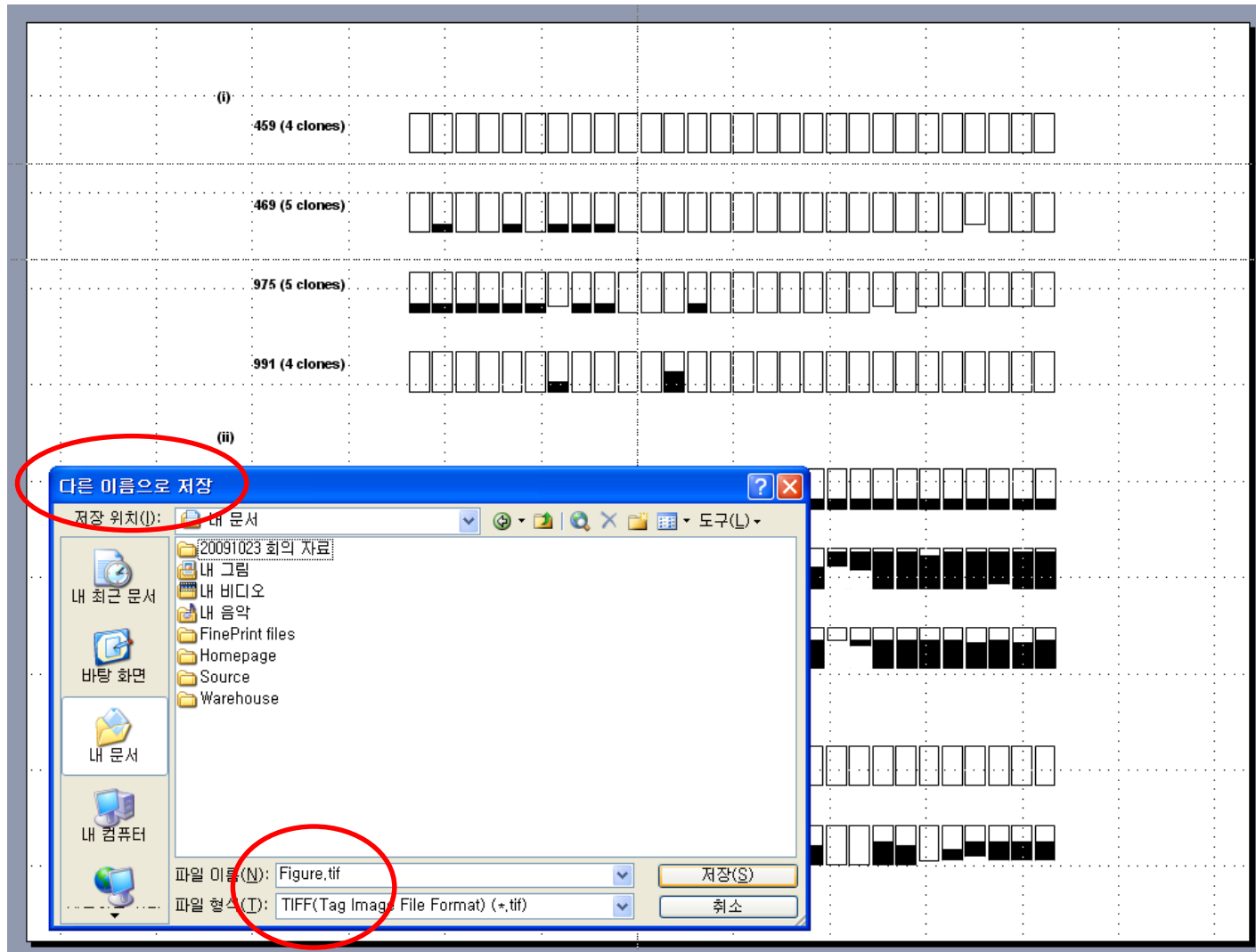
- 마지막 단계에서 "TIFF 형식, size 4 inch, resolution 900 dpi, 색상 흑백" 선택

**Tip 1**

# PowerPoint를 TIFF로 바꾸기

성균관대학교 의과대학 삼성서울병원 내과 이준행

# PowerPoint에서 손쉽게 TIFF로 만들기



(i)

459 (4 clones)



469 (5 clones)



975 (5 clones)



991 (4 clones)



(ii)

455 (4 clones)



128T (11 clones)



231T (13 clones)



(iii)

128N (12 clones)



231N (10 clones)





### 이미지 크기

픽셀 치수: 1.90M

폭(W): 960 픽셀  
높이(H): 720 픽셀

문서 크기:

폭(D): 10 인치  
높이(G): 7.5 인치  
해상도(R): 96 픽셀/인치

스타일 비율 조정(Y)  
 비율 제한(C)  
 이미지 리샘플링(I):  
쌍입방(매끄러운 그라디언트에 적합)

확인  
취소  
자동(A)...

128T (11 clones)



231T (13 clones)

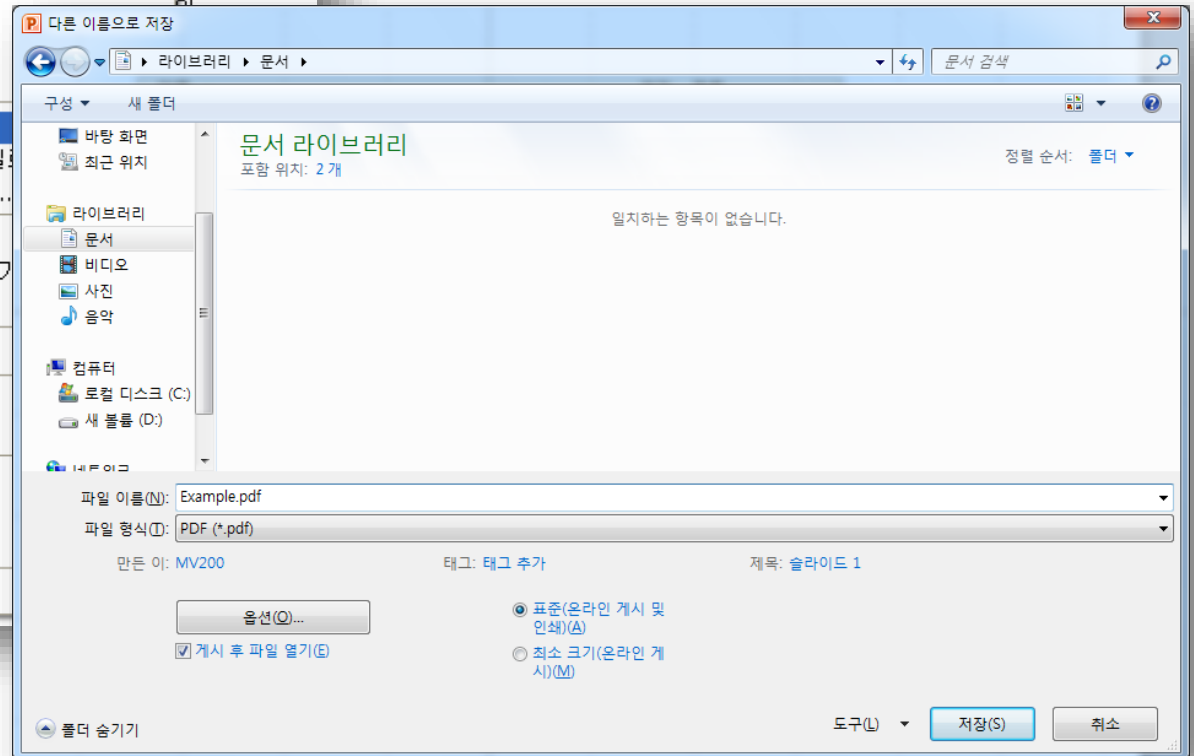
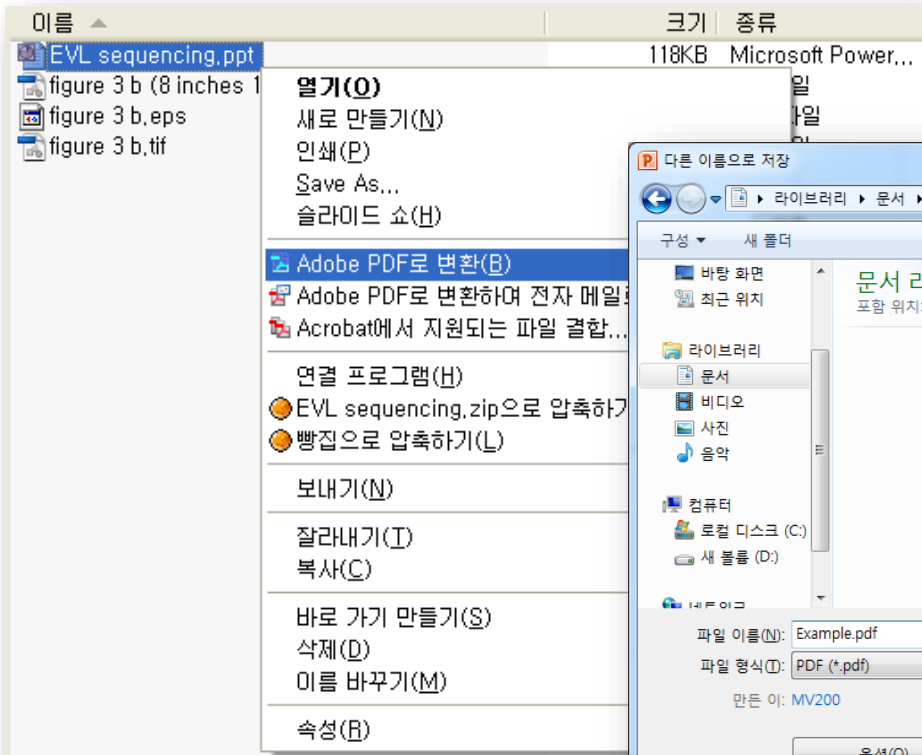




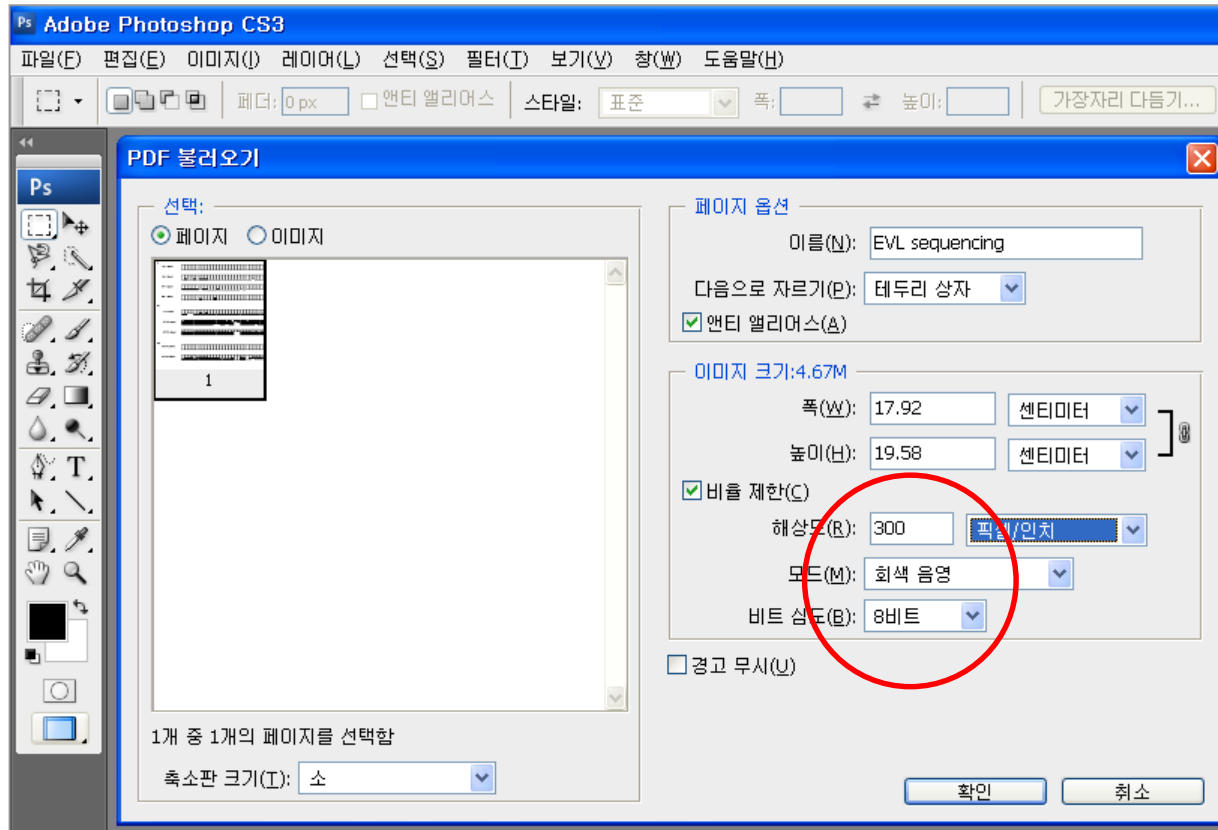
# PowerPoint 이미지를 고해상도 TIFF 파일로 바꾸는 방법

- Adobe Illustrator를 사용하는 방법
- Adobe Acrobat (혹은 Photoshop)를 사용하는 방법

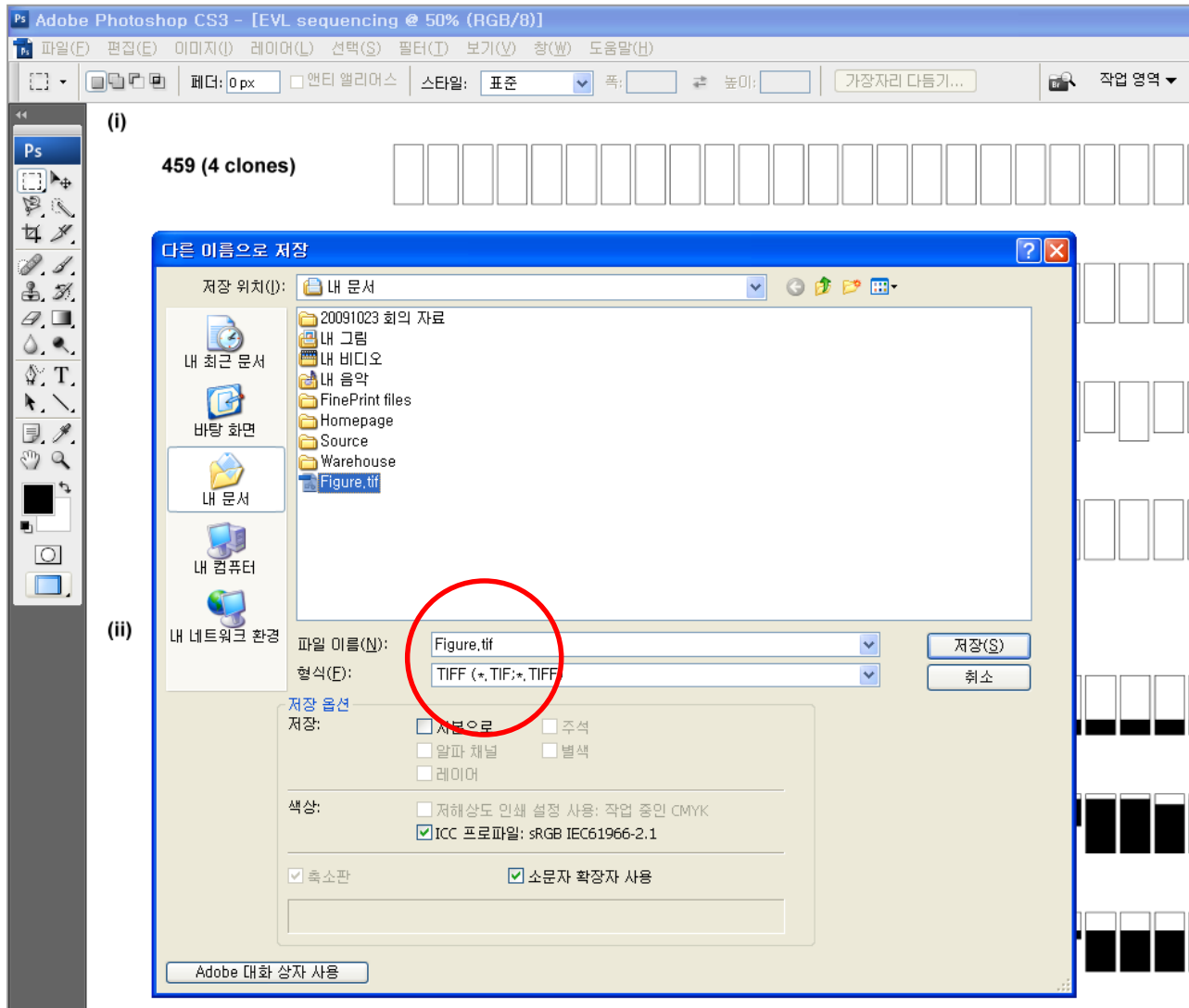
# Acrobat 혹은 Powerpoint를 이용하여 PDF 파일로 변환

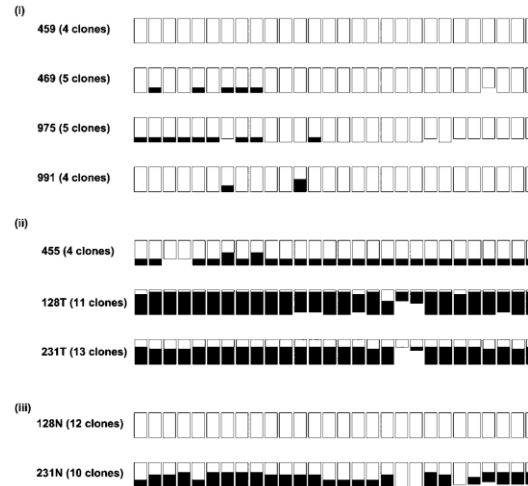


# PDF 파일을 Photoshop으로 불러온다



# Photoshop에서 TIFF 파일로 저장한다





**Figure 3** *EVL/hsa-miR-342* locus CpG methylation in colorectal carcinogenesis: evidence for a 'field defect' of *EVL/hsa-miR-342* locus CpG methylation in colorectal cancer. Bisulfite genomic sequencing results are shown for the *EVL/hsa-miR-342* CpG island from (i) normal colorectal mucosa from four individuals without cancer, (ii) colorectal cancer tissue from three individuals and (iii) normal appearing colorectal mucosa from two patients with concurrent colorectal cancer. The numbers in the left column represent patient identifiers. The number of clones sequenced from each patient sample is indicated in parentheses. Matched tumor (T) and normal (N) colorectal mucosa were analysed from patients no. 128 and no. 231 with results shown in (ii) and (iii). Each bar represents one CpG dinucleotide and the proportion of methylated CpGs is indicated by black shading. The height of the bar is representative of the number of informative clones at a given CpG site.

identify genes that are (a) overexpressed in colorectal cancer based on results from three relevant gene expression profiling studies (Alon *et al.*, 1999; Notterman *et al.*, 2001; Zou *et al.*, 2002) and (b) PicTar-predicted targets of *hsa-miR-342*. Eleven genes satisfied these criteria and are presented in Supplementary Table S3.

### Discussion

In this study, we confirmed that silencing of *hsa-miR-342* is a common event in colorectal cancer and provided evidence for coordinate epigenetic silencing of an intronic microRNA and its host gene in human cancer. Given that roughly half of microRNA genes are located in introns (Rodríguez *et al.*, 2004; Kim and Kim, 2007; Saini *et al.*, 2007), we suggest that this mode of coordinate silencing may represent a more general mechanism of microRNA suppression in human cancer.

Our data also suggest that methylation of the *EVL/hsa-miR-342* locus is an early event in colorectal carcinogenesis, given that it is detectable in 67% of adenomas, as well as in 56% of histologically normal colorectal mucosal specimens from patients with concurrent colorectal cancer. Based on these observations,

we propose that the methylated DNA corresponding to the *EVL/hsa-miR-342* locus may merit further investigation as a biomarker for non-invasive disease detection or risk prediction for colorectal cancer, especially in light of its apparent specificity for colorectal cancer.

With respect to carcinogenesis, the data suggest a model in which the aberrant methylation of *EVL/hsa-miR-342* precedes histologically apparent neoplastic alterations in the colon and leads to an early expansion of precancerous progenitor cells carrying methylated CpG islands at the *EVL/hsa-miR-342* locus. The presence of methylation of *EVL/hsa-miR-342* in normal appearing colorectal mucosa may reflect an acquired, early epigenetic change in the pathogenesis of colorectal cancer. Alternatively, it could also be the consequence of clonal expansion of rare, normal colorectal epithelial cells that carry a methylated *EVL/hsa-miR-342* locus as a part of their normal physiological state (Ohm and Baylin, 2007; Widschwendter *et al.*, 2007).

Given that *EVL* and *hsa-miR-342* are coordinately silenced, we cannot determine *a priori* whether suppression of *EVL*, *hsa-miR-342* or both is the relevant event in colorectal carcinogenesis. *EVL* is a member of the Ena/VASP protein family, which are actin-associated proteins involved in a variety of processes related to

# PowerPoint 파일 → 고해상도 TIFF 요약

- PowerPoint file (vector image)를 직접 TIFF로 변환하면 960x720 px의 저해상도 TIFF로 바뀐다.
- PDF 파일(vector image)로 변환한다.
- Photoshop을 이용하여 PDF 파일을 고해상도 raster 이미지로 불러온다.
- TIFF 형식으로 저장한다.

**Tip 2**

# 사례 검토. 흠집 찾기

성균관대학교 의과대학 삼성서울병원 내과 이준행

# 실제 출판된 어느 논문의 일부입니다.

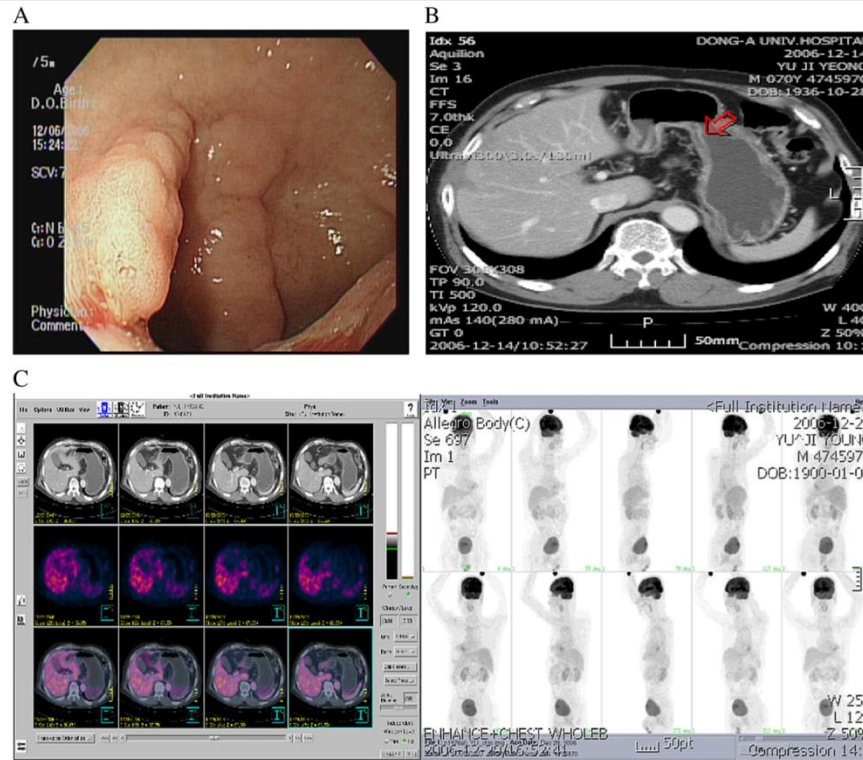
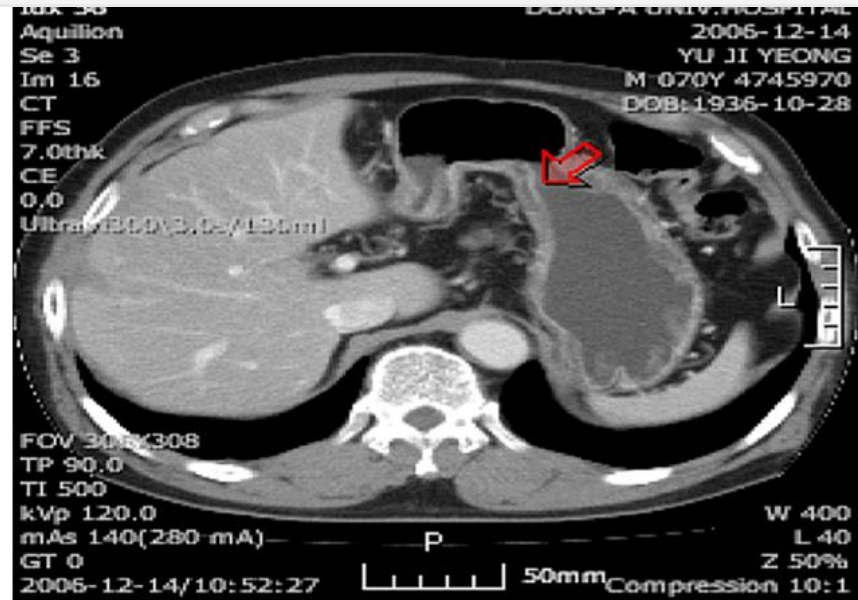
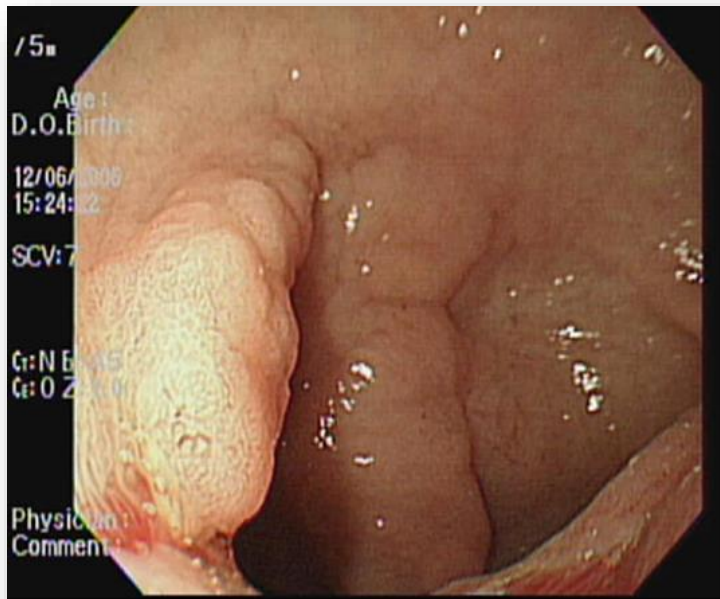


Figure 1. A. Endoscopic finding. Well-demarcated, elevated nodular lesion can be seen at anterior wall of antrum. B. Conventional CT finding. Focal irregular wall thickness can be seen at anterior wall of antrum, but shows no lymph node or distant metastasis. C. Representative FDG-PET image of a patient with early gastric cancer without lymph node metastasis or distant metastasis. Transversal slices of respectively PET-CT fusion and FDG-PET show no highlighting pathological FDG-PET uptake in the gastric wall. No lymph node or distant metastases can be observed. Coronal slice of total body FDG-PET examination with physiological FDG-PET shows no uptake in the gastric wall. Again, no lymph node or distant metastasis is observed.



# 잘못된 부분은?

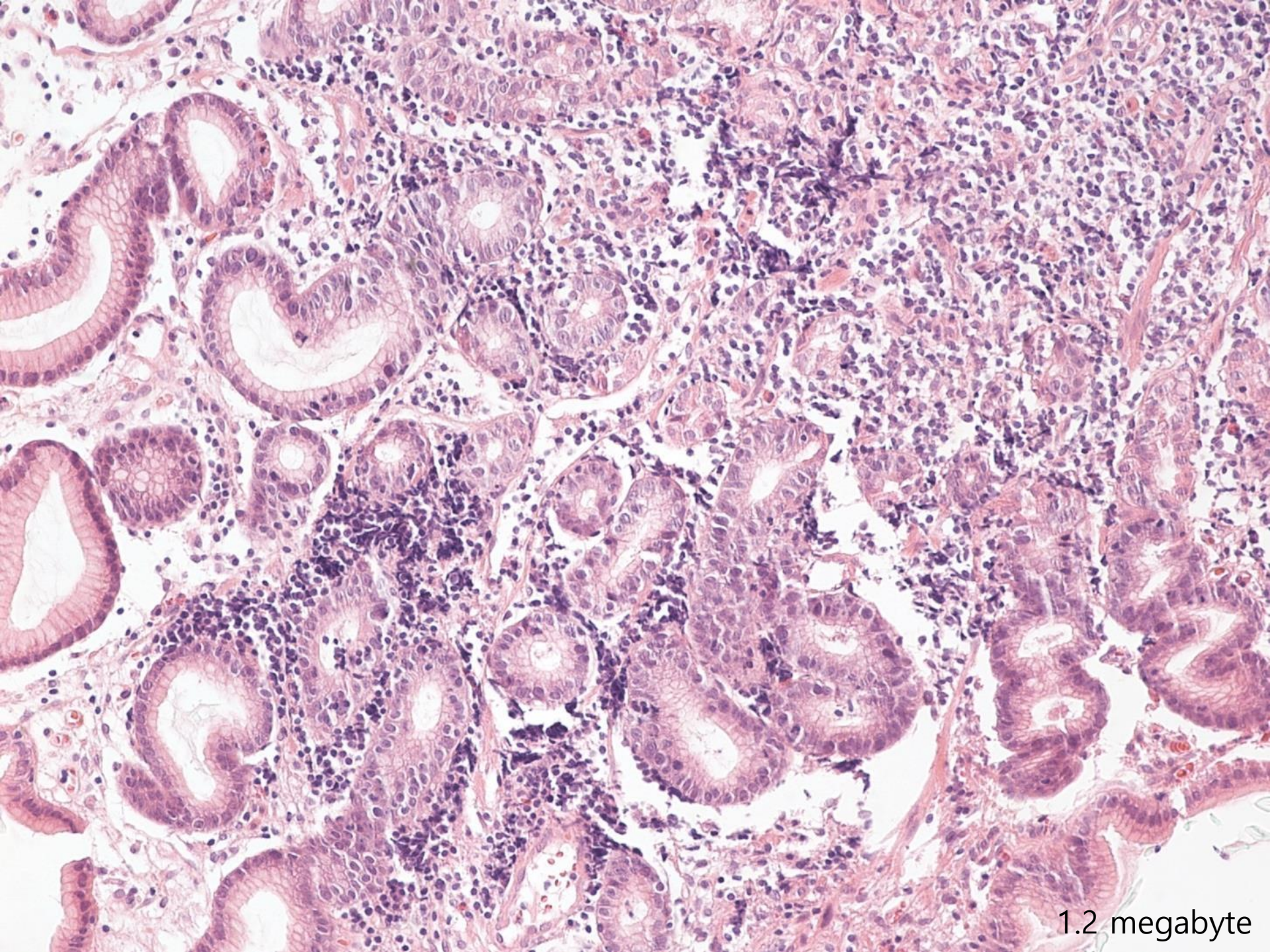


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- 이미지를 변경시킬 경우 원본 파일을 확실하게 back up 해 두어야 한다.
- 가능하면 그래프는 vector 형식을 이용하는 것이 좋다.
- 출판용 이미지는 고해상도가 필요하지만 PowerPoint 발표에서는 적절한 저해상도가 좋다.



경청해 주셔서 감사합니다.



1.2 megabyte