

Technique in special examinations

Contents and category

- GI tracks
 - UGI
 - LGI
- Kidney
 - IVP
 - RP
 - AP/PN
 - PCN
- Breast
 - Mammography
- Female reproductive system
 - HSG



Health effects of ionizing radiation

- **Deterministic:**
 - visible, documented, confirmed within a relative short time
 - Skin erythema, hair loss, cataract, infertility, circulatory disease
- **Stochastic:**
 - estimated, years or decades to manifest
 - Cancer, genetic effects



Tissue reactions

- Have thresholds that are typically quite high
 - Skin erythema
 - Hair loss
 - Cataracts (even in low doses of radiation)
 - 5 Sv for protracted exposures
 - 2 Sv for acute exposures
- Epidemiological evidence suggesting thresholds (equivalent dose):
 - Lens of eye: 0.5 Gy
 - Circulatory system: 0.5 Gy

Table 2.2. Thresholds for tissue reactions (ICRP, 2007).

Tissue and effect	Threshold	
	Total dose in a single exposure (Gy)	Annual dose in the case of fractionated exposure (Gy/year)
Testes		
Temporal sterility	0.1	0.4
Permanent sterility	6.0	2.0
Ovaries		
Sterility	3.0	>0.2
Lens		
Cataract (visual impairment)	0.5	0.5 divided by years of duration
Bone marrow		
Depression of haematopoiesis	0.5	>0.4
Heart or brain		
Circulatory disease	0.5	0.5 (total dose for fractionated exposure)

Stochastic effects

- Detriment-adjusted nominal risk coefficient at low dose rate:
 - Cancer – 5.5 %/Sv
 - Genetic effects – 0.2 %/Sv (non-human species)
Tissue weighting factor of gonads: 0.2 → 0.08 (ICRP, 2007)
- Cancer risks are estimated on the basis of probability
 - Organ dose > 100 mGy → carcinogenic effects
 - 1 chest CT scan ~ 8 mSv → 20 mGy to breast
 - 5 ~ 15 CT scans → carcinogenic effects
- Stochastic risks have no threshold

For the average radiation exposure of survivors within 2,500 meters (about 0.2 Gy), the increase is about 10% above normal age-specific rates. For a dose of 1.0 Gy, the corresponding cancer excess is about 50% (relative risk = 1.5)

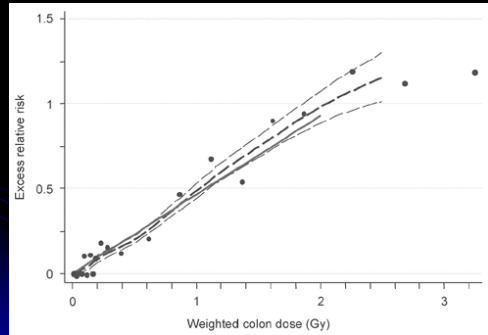
The excess number of solid cancers is estimated as 848 (10.7%)

Table: Excess risk of developing solid cancers in LSS, 1958-1998

Weighted colon dose (Gy)	LSS subjects	Cancers		Attributable risk
		Observed	Estimated excess	
0.005 - 0.1	27,789	4,406	81	1.8%
0.1 - 0.2	5,527	968	75	7.6%
0.2 - 0.5	5,935	1,144	179	15.7%
0.5 - 1.0	3,173	688	206	29.5%
1.0 - 2.0	1,647	460	196	44.2%
>2.0	564	185	111	61.0%
Total	44,635	7,851	848	10.7%

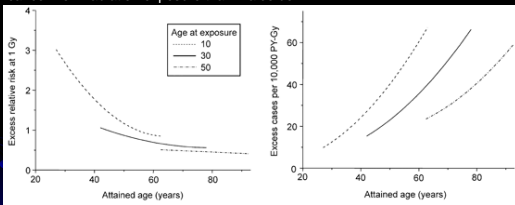
http://www.refr.jp/radefx/late_e/cancrisk

The dose-response relationship appears to be linear, without any apparent threshold below which effects may not occur



The probability that an A-bomb survivor will have a cancer caused by A-bomb radiation (excess lifetime risk) depends on the dose received, age at exposure, and sex.

Other analyses (not shown) indicate that females have somewhat higher risks of cancer from radiation exposure than males do.



Individual differences in radiosensitivity

- different tissues and organs have different radiosensitivities
- females are generally more radiosensitive than males to cancer induction
- young patients are more radiosensitive than older patients
- individual genetic differences in susceptibility to radiation-induced cancer
- These general aspects of radiosensitivity should be taken into account in the process of justification and optimization of radiological protection in fluoroscopically guided procedures

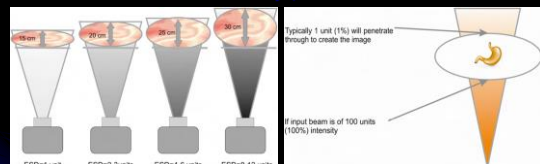


- Pre-existing auto-immune and connective tissue disorders predispose patients to the development of severe skin injuries in an unpredictable fashion.
- These disorders include scleroderma, systemic lupus erythematosus, and possibly rheumatoid arthritis, although there is controversy regarding whether systemic lupus erythematosus predisposes patients to these effects.
- Genetic disorders that affect DNA repair, such as the defect in the ATM gene responsible for ataxia telangiectasia, also predispose individuals to increased radiation sensitivity.
- Diabetes mellitus, a common medical condition, does not increase sensitivity to radiation, but does impair healing of radiation injuries

3.3 Common aspects of patient and occupational protection

3.3.1 Patient-specific factors

- Thickness of the body part in the beam



- Complexity of the procedure
 - Complexity represents the mental and physical effort required to perform a procedure.

• **Technique factors**

- Rotating the x-ray beam to avoid irradiation of the same area
- Fingers with overcouch geometry receive **100 times radiation dose** than undercouch geometry
- **Machine functionality** should be known



Overcouch geometry



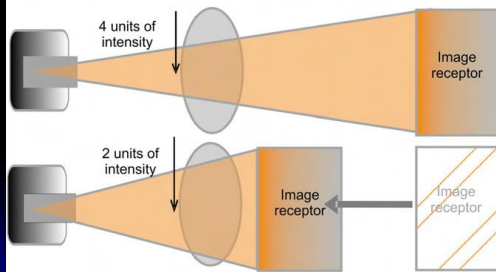
Undercouch geometry

• **Technique factors**

- Position of the x-ray tube and image receptor
- Avoid steep gantry angulations when possible
- Keep unnecessary body parts out of the x-ray beam
- Use pulsed fluoroscopy at a low pulse rate
- Use low fluoroscopy dose rate settings
- Collimation
- Only use magnification when it is essential
- Fluoroscopy vs image acquisition and minimization of the number of images
- Minimize fluoroscopy time
- Monitoring of patient dose

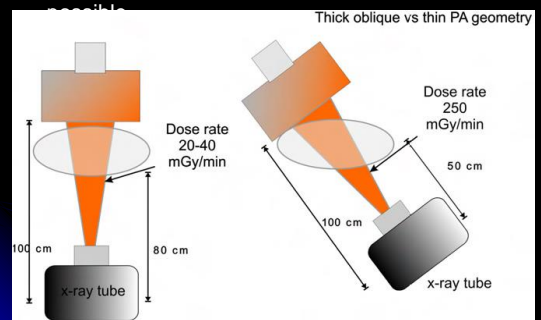
Position of the x-ray tube and image receptor

All other conditions remaining the same, moving image receptor toward patient lowers radiation output rate and lowers skin dose rate

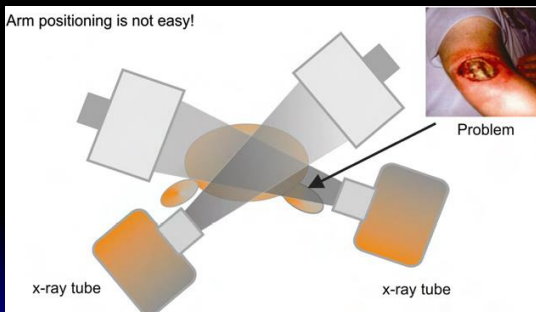


skin dose rate varies with the ratio (SID/SSD)²

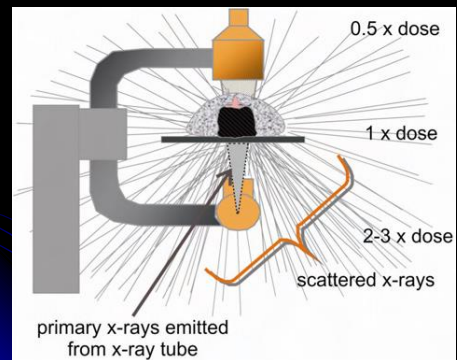
Avoid steep gantry angulations when possible




Arm positioning is not easy!



Specific aspects of occupational protection



- **Shielding**
 - Lead apron
 - Ceiling-suspended shield
 - Mounted shielding



(a) Penetration measured with lead aprons

0.50 mm lead

60 kVp; 100% → < 1 %


100 kVp; 100% → 3 - 7 %

(b) Penetration measured with lead aprons

0.25 mm lead


60 kVp; 100% → 2 - 3 %

100 kVp; 100% → 8 - 15 %



0.5-mm lead equivalence, reduce over 90% x-ray

- **Individual monitoring**
 - Individual monitoring of workers exposed to ionising radiation using **film**, **thermoluminescent dosimeters**, **optically stimulated luminescence badges**, or other appropriate devices is used to verify the effectiveness of radiation control practices in



Whole body dose limit for workers of **20 mSv/year** (averaged over a defined 5-year period; **100 mSv in 5 years**)


Typical TLD Card Configuration

Position/Element 1: Low Energy Photon Discrimination and Lens dose (H_{PC})
• ~300 mg/cm² filtration

Position/Element 2: Deep dose (H_T(10))
• 1000 mg/cm² filtration

Position/Element 3: Shallow dose (H_{sh}(0.07))
• ~17 mg/cm² filtration

Position/Element 4: Mid-Energy Photon Discrimination and Neutron dose
• Li-6 isotope
• Various filtration

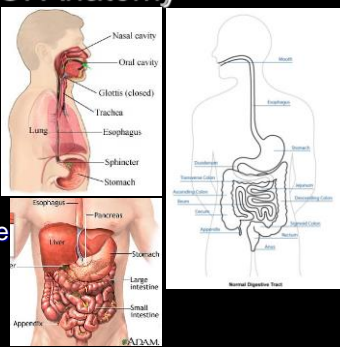


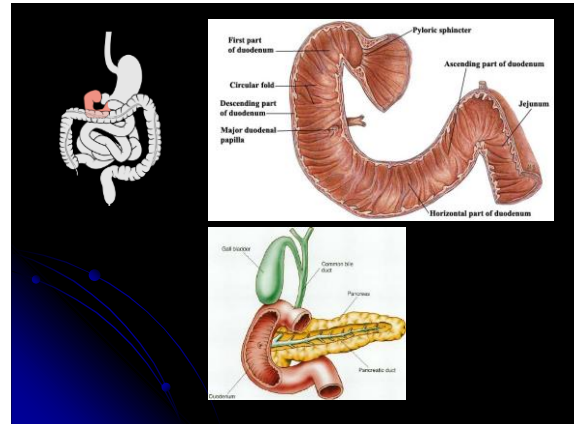
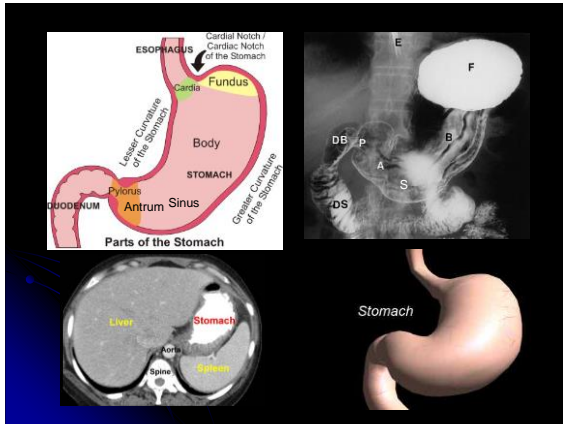
- 1 → **necessary**, inside the apron
- 2 → **optional**, outside the apron at the collar level closest to x-ray tube
- 3 → **optional**, on the skin surface

Upper GI Series

UGI Anatomy

- Oral cavity
- Throat
- **Esophagus**
- **Stomach**
- **Duodenum**
- Small intestine





UGI Applications

- Ulcers
- Acid reflux disease
- Uncontrollable vomiting
- Unexplained blood in stools
 - Fecal occult blood (FOB)
 - Hematochezia

Patient Preparation

- NPO
 - 6-8 hrs (solid food)
 - 3 hrs (anything)
- Auditing
 - Clothing
 - Procedures
 - Safety



Overview

- Contrast medium
 - Sodium Sulfate (硫酸鋇劑)
- Types of image
 - Full filled view (鋇劑充盈像)
 - Mucosal view (黏膜顯示像)
 - Double contrast view (雙重對比影像)
- Types of exam
 - Conventional or single contrast barium study
 - Double contrast exam of UGI tract



For dosing and other prescribing information see product insert.

Mixing Instructions: Fill measuring cup (Cat. No. 763) to top with water approximately 65 mL. Add water to E-Z-HD™ bottle and replace lid securely. Invert bottle and tap with fingers to mix contrast into the water. Shake vigorously for 30 seconds. Wait 5 minutes, then reshake thoroughly. To use with straw (Cat. No. 841), remove adhesive label on top of cap. Remove cap and use straw to push out cap liner. Replace cap.

Yield: 135 mL suspension, 85% w/w, 220% w/v.

NDC 32909-764-01
E-Z-HD™
BARIUM SULFATE FOR SUSPENSION (98% w/w)
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Net Contents: 340 g

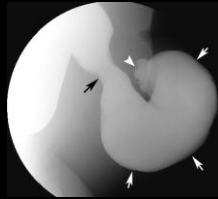
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Use immediately upon reconstitution. Discard any unused suspension.
Rx Only (USA)
DO NOT USE IF PRINTED TAMPER EVIDENT SEALS ARE BROKEN OR MISSING.

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Single Contrast

- **Sodium Sulfate** (硫酸鋇劑),
 - Semi-solid (250% W/V) for esophagus
 - 70~80% W/V for stomach and duodenum
- Image type: Profile view
- Techniques:
 - Rotation of body
 - Compression of part



Single Contrast

- 優點：
 - ① 一般而言，技術上比較簡單，對於顯影劑之品質要求較不必那麼嚴格。
 - ② 對上消化道不正常狹窄、充填缺損（如腔內大型腫塊）、外來性壓迫、痙管等病變易於顯示出來。對於食道靜脈曲張也比較容易診斷。
 - ③ 上消化道之生理狀況，如蠕動減少、張性 (tonicity) 消失、不正常攣縮等狀況，不易遺漏。
- 缺點：
 - ① 為使胃腔充分膨滿，大量硫酸鋇劑流入小腸造成重疊。
 - ② 胃底 (fundus) 無法壓迫到，cone compression無法做到。
 - ③ 過份依賴透視：檢查醫師非常依賴X光透視診斷，非透視醫師難發揮會診功能。
 - ④ 對細微病變，診斷率偏低。

Double Contrast

- Contrast medium
 - 140~250% W/V sodium sulfate
 - Air
- Image type: surface, profile



Double Contrast

- 優點：
 - ① 不必用大量硫酸鋇，注入空氣就可達到胃腔膨大之效果。
 - ② 例行檢查就可顯示每一部位之粘膜表層之細微構造，對於早期病變多半可以顯示，診斷率高。
 - ③ 無法做cone compression之處亦可顯示清楚。
 - ④ 透視主要用於定位和姿勢之調整，故可減少透視時間，病人和醫師的X光接受量較低。
 - ⑤ 不須太依賴透視診斷能力，放射線科專家可由獲得像片作較深入之分析或會診。透視時能認明病變尤佳。
 - ⑥ 照像條件kV & mA較低，醫師和病人所受X光照射量較少，對機器之要求亦較低。

Double Contrast

- 缺點：
 - ① 檢查技術困難。對於體質太弱或不合作病人，每一病人花費時間較長。
 - ② 診斷醫師更需經驗，人員訓練時間較長。
 - ③ 顯影劑的品質、濃度和發泡劑對照像品質影響極大。
 - ④ 使用空氣量不易控制，也不易決定。不足或過度膨脹都會使粘膜下層或粘膜層病灶隱藏。
 - ⑤ 非常依賴照片來診斷，所以，照像的條件影響診斷極大。
 - ⑥ 對胃前壁病灶容易遺漏或誤診，所以，檢查時必須包括胃體部和胃竇的cone-down compression film。

Esophagus Exam

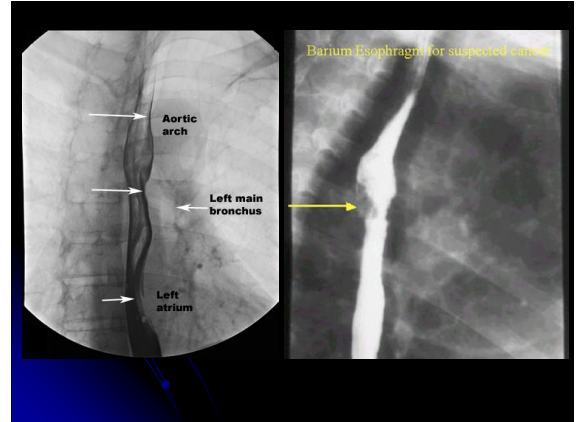
Procedures

- 檢查前5分鐘IM注射Buscopan 20mg。
- 檢查時令病人用5~10cc開水服下發泡劑，使胃部儘量充氣。
- 令病人站立，稍向左轉，含一大口硫酸鋇浮懸液，在X光透視監視下，嚥下硫酸鋇劑，當硫酸鋇劑通過Esophagogastric junction時，賁門舒張，胃部空氣立刻反流到食道內，並把食道充氣撐開，此時，立刻攝影取食道之雙重對比X光像。如此，重複吞嚥，攝影取照片。
- 攝影取頸部食道之正面和側面像。
- 將X光檢查台放置水平位置，令病人俯臥LPO，X光透視下，令病人再嚥硫酸鋇劑再照像。



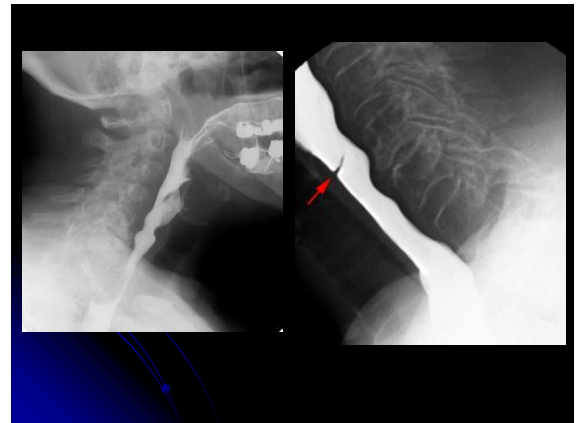
Notice

- 懷疑食道堵塞不通時，不作雙重對比鋇劑X光攝影。
- **Glucagon**對食道之低張性效果不理想。
- 選擇照像的時機比較困難，照像要快。
- 食道粘膜對**140% W/V**高密度硫酸鋇劑之親和力尚稱良好，但因重力關係，很快消退，另一方面，為避免小泡沫在食道內，可令病人多嚥幾口硫酸鋇劑，把小泡沫充分沖掉，並在每次吞嚥時選擇適當時機攝影取像片。
- 胃部要充飽空氣，才有足夠量之空氣反流到食道把食道張開。
- 使用低溫 (3~4°C) 之硫酸鋇懸浮液，可能減少食道之蠕動。
- 檢查過程，若硫酸鋇部分吸入氣管，則檢查應立刻中止。



咽部X光錄影

- 病人站立，分別吞嚥少量 (3~5cc) 硫酸鋇液，膏劑及含硫酸鋇餅乾
- 將吞嚥全程錄影，錄取正面、側面、斜位之影像。
- 檢查過程，若硫酸鋇劑部分吸入氣管，則檢查應立刻中止。

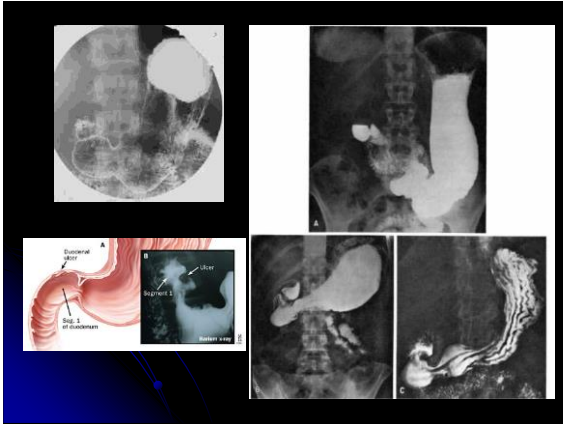


Stomach and Duodenum exam

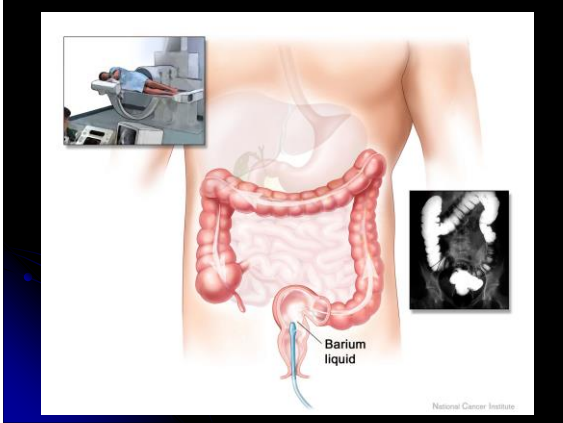
- **Contrast medium**
 - **硫酸鋇劑**：應採用高密度 (high density)、高黏質 (high viscosity) 且粘膜表面被覆性良好之硫酸鋇懸浮液，例如 140% W/V E-Z HD。
 - **空氣**：
 - ① 服用發泡劑 (effervescent agents)：在胃內產生 450cc 氣體 (如 E-Z gas)。
 - ② 消泡劑：消除小氣泡顆粒，如 gascon (Simethicone)。消泡劑可直接加入到硫酸鋇劑懸液內。
- **低張劑**
 - **Buscopan (Hyoscine-N-butylbromide)：(20mg/1ml/Amp.)**。
 - ① 為一種副交感神經解劑 (anticholinergic agent)，能有效地使食道、胃、十二指腸之緊張性減低，並使胃幽門鬆弛。
 - ② Buscopan 很少引起嚴重之副作用，但是患有前列腺肥大、腸胃道阻塞、toxic megacolon、重症肌無力、青光眼 (narrow angle glaucoma) 或心悸、高血壓者宜避免使用。
 - ③ 使用後將使小腸之 transit time 顯著延長，若病人要接著做小腸X光攝影時，不採用為宜。
 - **Glucagon**
 - ① IV 注射作用時間快，但作用時間短。
 - ② IM 注射後大約 15 分鐘才達所要之低張作用。
 - ③ 絕大多數沒有不良副作用，可是患有糖尿病之病人不宜使用。
 - ④ Glucagon 對食道低張作用不良，對胃幽門沒有鬆弛作用。藥效過後，小腸馬上恢復蠕動。

Procedures

- 檢查前 10~15 分鐘，IM 注射 glucagon 0.5mg 或檢查前 5~6 分鐘，IM 注射 glucagon 20mg。
- 用 5~10cc 水服下發泡劑，使胃部適當充氣。
- 病人站立稍向左轉，嚥下 1~2 口硫酸鋇懸液，在適當時機，快速照下食道雙對比 X 光像。
- X 光檢查台放平，頭稍低，令病人採俯臥姿，拍攝胃前壁 mucosal view。
- 站起來再嚥鋇劑，總共約 150~200cc 為原則，之後馬上將 X 光檢查台放平，令病人在 X 光檢查台上滾動一個，仰臥，透視看，覺得胃粘膜表面被覆 (coating) 良好，照下胃正面像。
- 令病人右側抬高 (RAO)，攝影取胃體、胃竇、十二指腸之雙對比 X 光像。
- 令病人左側抬高約 45° (必要時，控制 X 光機半立狀況，使病人頭高腳低)，取適當角度，攝影取胃底部 (fundus) 及 cardia 之雙對比 X 光像。
- 令病人 LPO 俯臥，攝影取胃和十二指腸全面像。
- 病人右側臥，攝影取胃和十二指腸側位像。
- 檢查台立起，病人面向前方站立，稍微 LPO，攝影取站立時胃及十二指腸全面像 (必要時再喝鋇劑把胃充滿)。
- 以機器之壓迫設備，壓迫胃體、胃竇、十二指腸，攝影取 (cone down views)。



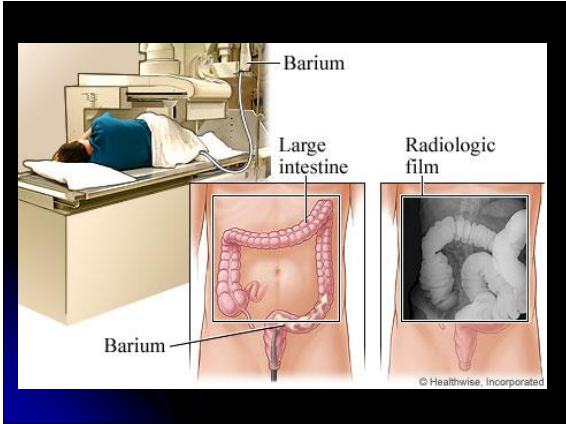
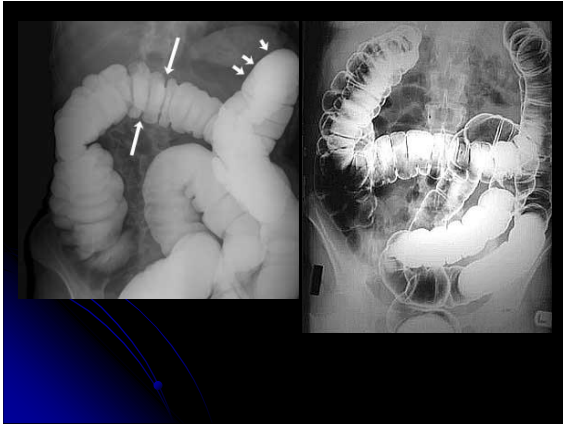
Lower GI Series (Barium Enema)



LGI Anatomy

- Ascending colon
- Transverse colon
- Descending colon
- Sigmoid colon
- Rectum

Colon Cancer and Polyp



Patient Preparation

- 成人
 - ①排定檢查時間前二天開始，儘可能食用低渣食物，少吃肉類和纖維多的蔬菜。並於睡前服用Ducolax一顆。
 - ②檢查前一天每小時喝水200cc直到睡眠為止。早、午、晚餐一律食用低渣或流質食物，晚餐後於晚上九點鐘服用30cc蓖麻油後喝二杯開水。服完蓖麻油後，除了茶、水之外，禁吃一切食物。
 - ③檢查當天禁用早餐，於排定時間前半小時左右，到影像診療部登記，換好檢查服裝，等候醫師檢查，做完檢查後才能進食。
- 小兒：
 - 5歲以下小兒，在檢查前3天開始餵食牛奶、果汁等流質食物，檢查當天延早餐，送影像診療科檢查即可。
 - 8至14歲小孩，輕瀉劑量約成人1/3-1/2量。

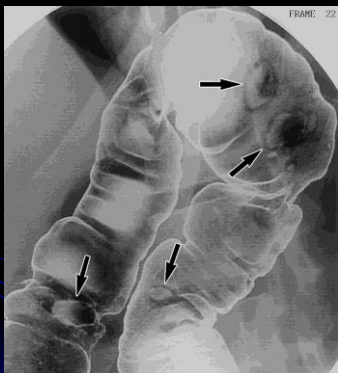
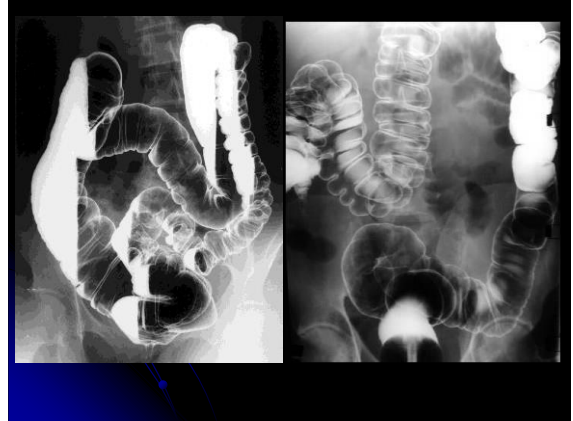
Overview

- Contrast medium
 - Barium Sulfate (硫酸鋇劑)：以每120mg硫酸鋇加700cc水的配法，配成70~80% W/V barium suspension，(Barytgen和E-Z paque各半量混合)。每一病人每次檢查大約需要200~250cc之硫酸鋇浮懸液。
- 低張劑
 - Buscopan
 - Glucagon



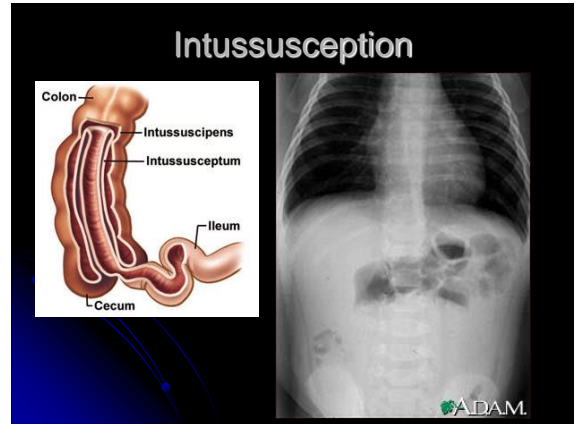
Procedures

- 病人檢查前5分鐘視病情可以IM注射20mg Buscopan。(若病人患有青光眼、高血壓或前列腺肥大時，改用glucagon 0.5mg IV注射)。
- 檢查時病人側躺在X光檢查台，護理人員幫忙放入連接顯影劑之肛管，然後令病人稍臥，檢查台頭部稍低。
- 在X光透視監視下，徐徐灌入硫酸鋇劑，通常在銀劑逆流到脾彎(splenic flexure)時停止，先解開導管接頭，排掉直腸處之硫酸鋇，再換上打氣之導管。
- 讓病人翻身俯臥頭部放低，身體右側稍微抬高；在X光透視監視下由導管注入適當量空氣，當硫酸鋇劑流到橫結腸中央部位時，令病人身體左側抬高，繼續再灌入空氣。
- 當硫酸鋇劑流到結腸肝彎(hepatic flexure)時，將病人頭端之X光檢查台適度抬高，再以空氣把硫酸鋇劑推送到升結腸(每一病人總共約需700~1000cc空氣)。
- 在透視下，適當調整病人角度，並攝影取直腸AP、PA、Lat及S狀結腸RAO之X光像。此時，把X光檢查台豎立起來，讓硫酸鋇劑流到迴盲部及S狀結腸處，攝影取肝彎和脾彎之像片，最後拍攝影迴盲部AP、PA像片。
- 病灶部位加照適當角度之X光像。
- 最後再以X光透視自直腸至迴盲部全部再察看一次，以免遺漏。
- 以over tube用14x17吋底片攝影取結腸之AP、PA、及水平X射線bilateral oecubitus之全面像及直腸(sigmoid-rectum)之側位像。
- 必要時可加照排便後的大腸X光像(post-evacuation films)。



Notice

- 病人若因便秘而做鋇劑X光檢查者，檢查完畢，由醫師處酌發給輕瀉劑(如MgO、Solven、Ducolax等)讓病人服用，以利排清鋇劑。
- 檢查時，原則上灌到脾彎為度。倘若S狀結腸長而扭曲時，則應酌減量，否則鋇劑勢必過多。
- 檢查時，醫師若發現結腸內有較多殘留糞便時，宜以硫酸鋇劑灌注到盲腸處；隨即讓病人在檢查室廁所排解顯影劑，此時殘留糞便能一併解出(相當於一次清潔灌腸)；之後，馬上在檢查台上，把空氣灌入結腸，即成雙重顯影劑效果(時間要快)。
- 臨床上懷疑阻塞或檢查當中發現結腸堵塞者，不可採用結腸雙重對比X光檢查技術，應改為單對比鋇劑灌注檢查法。鋇劑容器高度不超過X光檢查台面3英尺為宜。
- 務必在X光透視監視下注入空氣。



診治小兒腸套疊

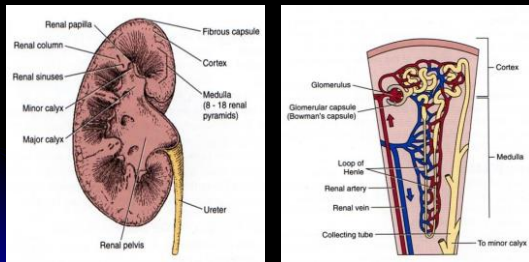
- 小兒在檢查時採掙扎不能合作時，應事先給予鎮靜劑充分sedation，不可勉強，且不可隨意翻轉病人。
- 只能使用single contrast technique。灌筒不可高於X光檢查台3英尺。切忌施行雙重對比鋇劑X光攝影技術。
- 發病超過48小時，或有明顯（嚴重）bloody mucoid stool或有發燒、心悸、白血球顯然增多甚至有腹膜炎徵象出現時，不得嘗試鋇劑灌腸分解法治療套疊。

IVP Series (Intravenous Pyelography)

Urinary Anatomy

- Urinary system
- Kidney
 - 左腎高度在T11~12肋間隙，右腎底部通常位於L3上段，左高右低相差約1cm
- Ureter
 - 從膀胱後外側進入
- Urinary bladder
- Urethra

Urinary Anatomy



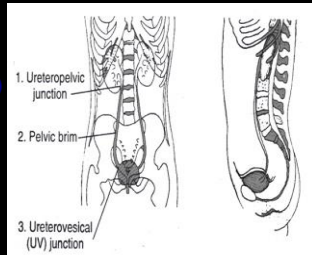
Urinary Anatomy

- A. Minor calyces
- B. Major calyces
- C. Renal pelvis
- D. Ureteropelvic junction (UPJ)
- E. Proximal ureter
- F. Distal ureter
- G. Urinary bladder



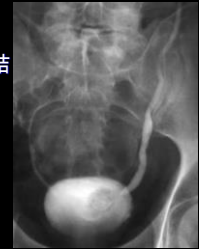
Urinary Anatomy

- Ureteropelvic junction : (UP Junction)
- Pelvic brim
- Ureterovesical junction : (UV Junction)



Indications

1. 腹部腫塊或骨盆腫塊(abdominal mass、pelvis mass)
2. 腎結石(kidney stones)、輸尿管結石(ureteral calculi)、膀胱結石(cystolith)
3. 腎臟外傷(kidney trauma)
4. 腰痛(flank pain)
5. 血尿(hematuria)
6. 高血壓(hypertension)
7. 腎衰竭(renal failure)
8. 泌尿道感染(urinary tract infection ,UTI)



Contraindications

1. 對含碘造影劑過敏(hypersensitivity to iodinated contrast media)
2. 無尿或沒有排出尿液(anuria)
3. 多發性骨髓瘤(multiple myeloma)
4. 糖尿病(diabetes)
5. 嚴重的肝病或腎病(hepatic disease)
6. 嗜鉻細胞瘤(pheochromocytoma)
7. 鐮狀血球貧血(sickle cell anemia)

Patient Preparation

- 病人需NPO(最少8小時)
- 詢問過敏病史(碘、海產)
- 前一天晚上口服輕瀉劑，清晨塞劑灌腸
- 更換檢查衣
- 排空膀胱
- Check 血壓 & 脈搏

IVP Series

- Routine
 - Plain film (KUB)
 - 5 min
 - 10 min
 - AP
 - RPO
 - LPO
 - 30 min
 - +30 min
 - Post-voiding
- Additional imaging
 - PA
 - RAO/LAO
 - Lateral Projection of bladder
 - PV standing

Imaging Techniques

- Plain film



- 5 min



- 10 min



- 10 min LPO(30°~45°)

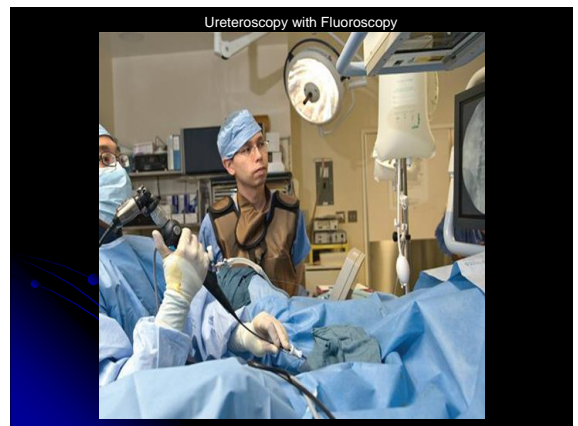
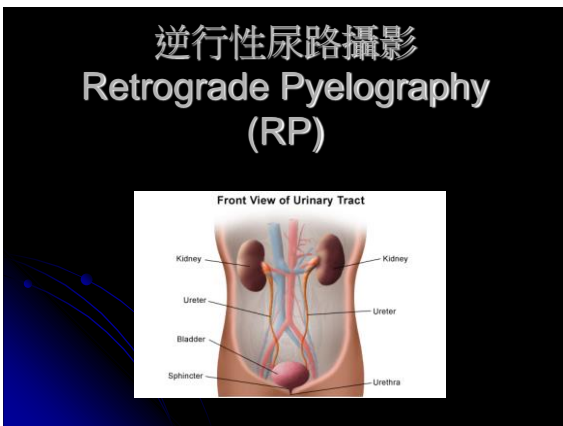
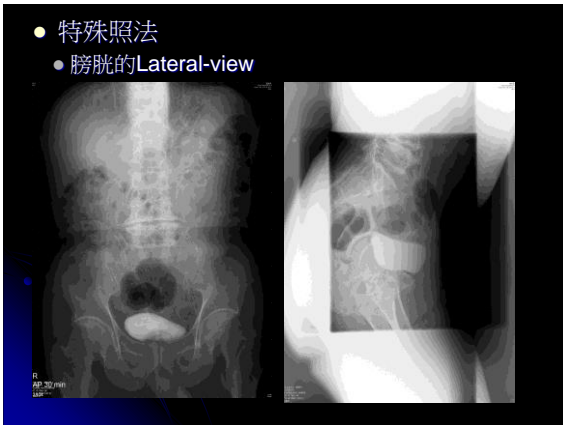
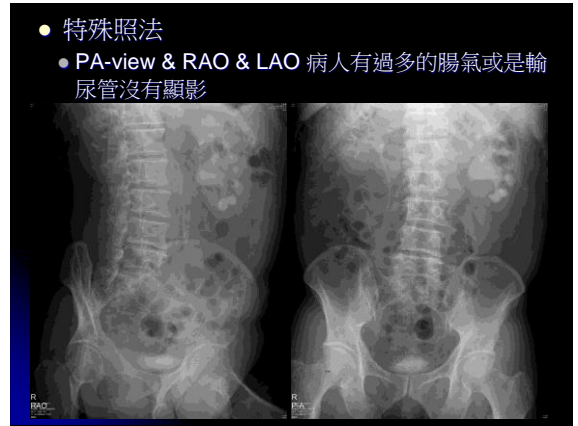
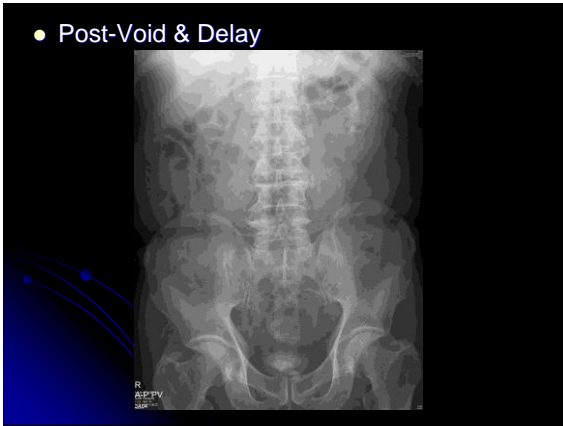
- RPO(30°~45°)

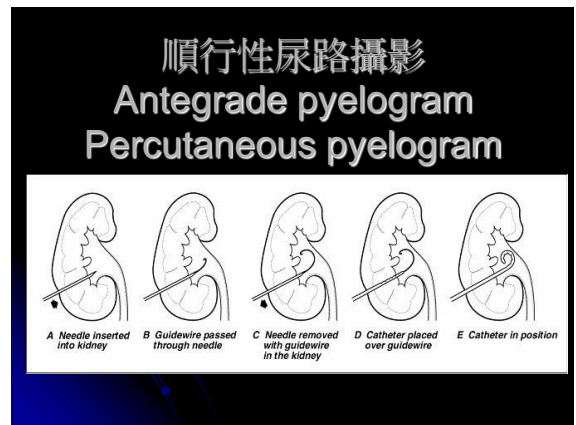
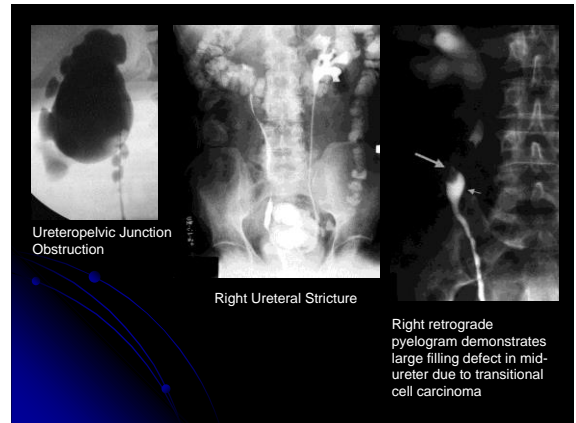
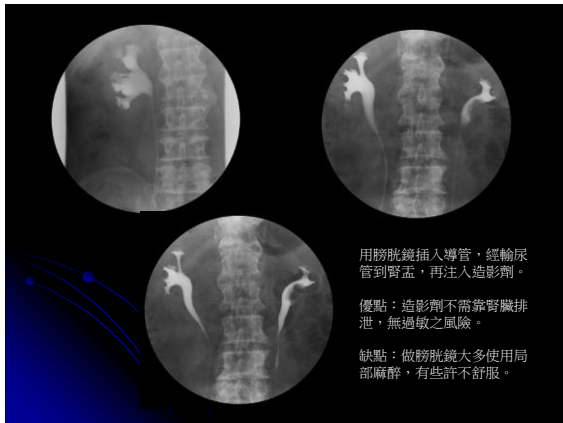
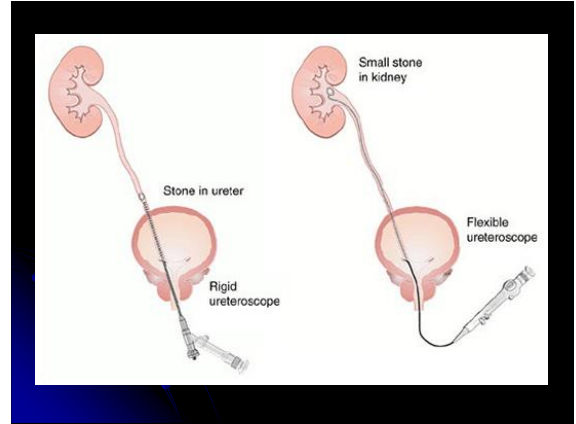
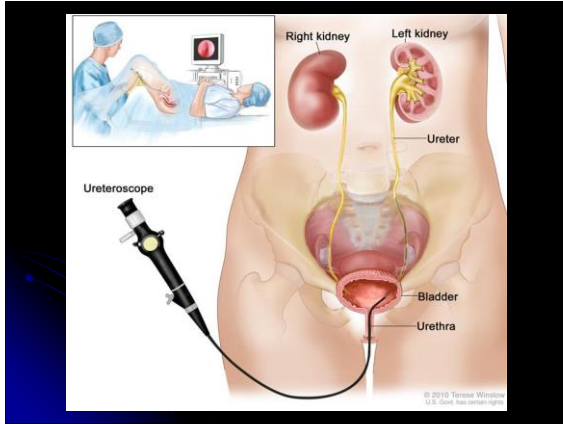


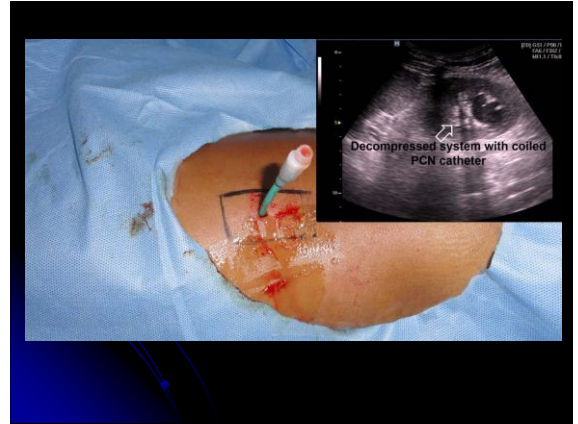
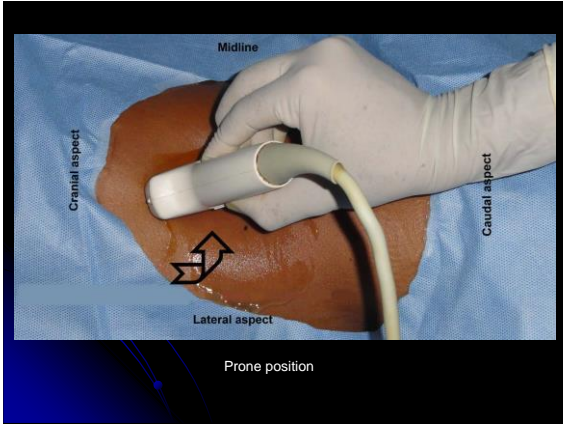
被觀察的該側輸尿管不能與脊椎重疊
 喝5杯水，使膀胱脹大以便更明確觀察膀胱周圍是否有腫瘤或腫塊

- 30 min



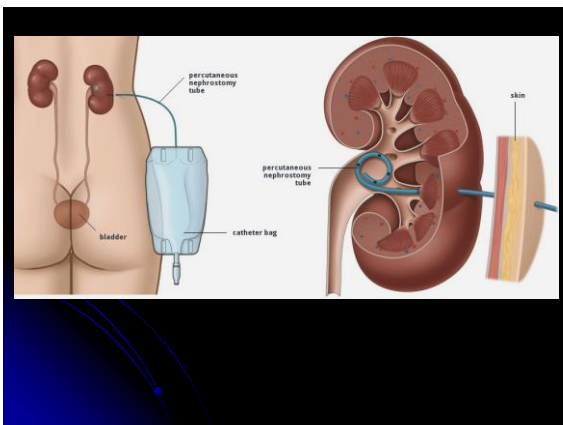


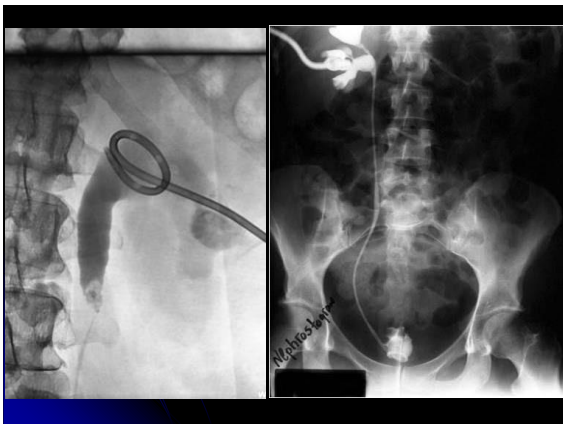
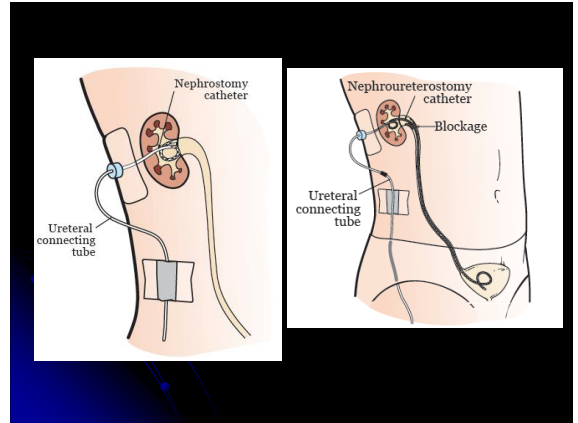
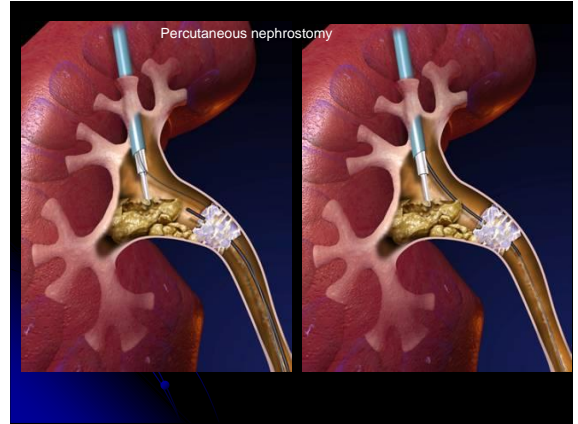
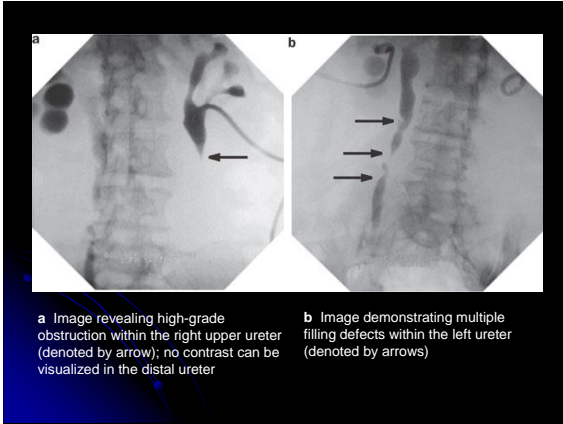




經皮腎造瘻術 Percutaneous Nephrostomy (PCN)

Diagram illustrating the anatomy of the kidney and ureter, and the placement of a nephrostomy tube. Labels include: Kidney, Ureter, Bladder, Backed up urine, and Urine is drained through nephrostomy tube.





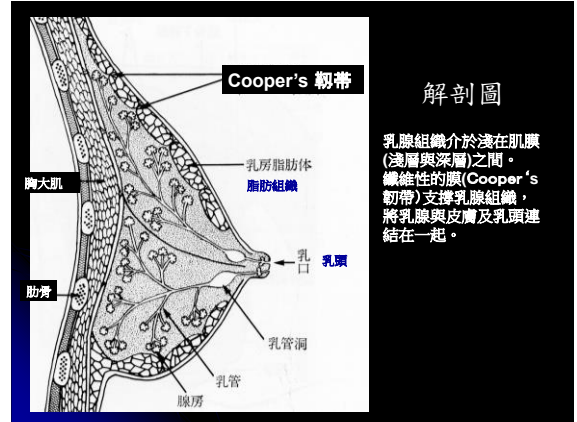
Mammography
-- Basics and Techniques --

Background

民國99年，女性及男性乳房惡性腫瘤發生個案數分別占全部惡性腫瘤發生個案數的10.65%及0.04%，女性及男性乳房惡性腫瘤死亡人數占全部惡性腫瘤死亡人數的4.16%及0.03%。發生率的排名於女性為第1位、男性為第34位；死亡率的排名於女性為第4位、男性為第35位。民國99年初次診斷為女性及男性乳房惡性腫瘤者分別為9,655人及39人；當年死因為女性及男性乳房惡性腫瘤者分別為1,706人及12人。

項目	發生個案		項目	死亡個案	
	男性	女性		男性	女性
個案數(人)	39	9,655	個案數(人)	12	1,706
年齡中位數	66	52	年齡中位數	77	57
粗率(每10萬人口)	0.34	83.76	粗率(每10萬人口)	0.10	14.80
年齡標準化率 ¹ (每10萬人口)	0.21	58.63	年齡標準化率 ¹ (每10萬人口)	0.06	9.98
年齡標準化率 ² (每10萬人口)	0.24	63.16	年齡標準化率 ² (每10萬人口)	0.07	10.86
性別比(年齡標準化率)	1	263.17	性別比(年齡標準化率)	1	155.14

註：1. 自 96 年癌症登記開始起，惡性腫瘤位各部位獨立出來計算發生率，並納入排名。
2. 3. 年齡標準化率¹係使用 1976 年世界標準人口為標準人口，年齡標準化率²係使用 2000 年世界標準人口為標準人口。



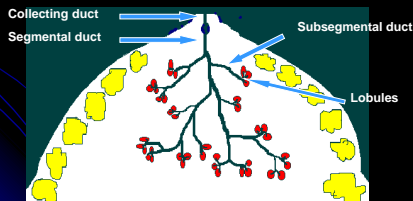
解剖圖

乳腺組織介於淺在肌膜(淺層與深層)之間。纖維性的膜(Cooper's 韌帶)支撐乳腺組織，將乳腺與皮膚及乳頭連結在一起。

乳房的解剖

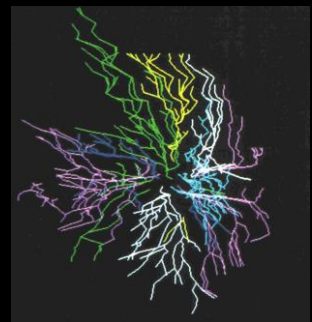
- 乳葉 (區域) 的概念 -

- 乳腺由15—20個乳葉所組成。
- 乳葉由1根乳管聯繫，分歧的乳管分為collecting ducts、segmental ducts、subsegmental ducts，末端連結乳小葉 lobules。



乳管系統

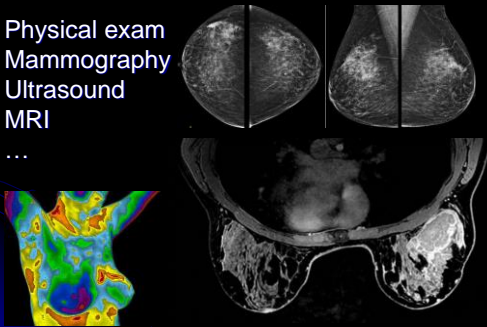
- 各乳管系統呈不規則狀分歧，互相交織，整體呈扇狀分布。
- 有一些乳管系統會互相重疊，由上往下看易誤以為在同一部位。



T. Ohtake et al. Cancer 2001;91:2263-72

Exam Methods

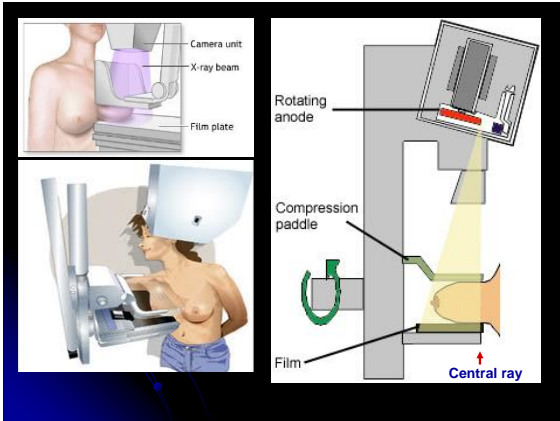
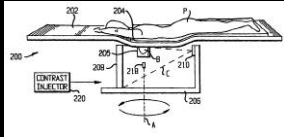
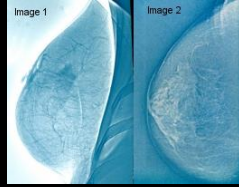
- Physical exam
- Mammography
- Ultrasound
- MRI
- ...



		密度 (g/cm ³)	線性吸收係數 (cm ⁻¹)
乳房組織	乳腺組織	1.035	0.80
	脂肪組織	0.93	0.45
	皮膚	1.090	0.80
平均 乳房組織	50%乳腺	0.98	0.62
	50%脂肪		
病灶	腫瘤	1.045	0.85
	鈣化	2.20	12.5

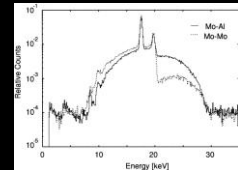
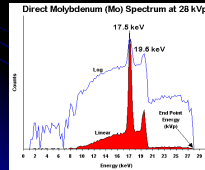
Types of Mammography

- Xeroradiography
- Screen-film
- Digital Mammography
 - DR
 - CR
 - Tomosynthesis
 - Flat-panel CT



Background Physics

- Target / Filter
 - Mo/Mo, Mo/Rh, Rh/Rh, W/Rh, W/Al, W/Ag
- Tube voltage (kVp)
 - 20 ~ 32 (Target: Mo, Rh)
 - 24 ~ 40 (Target: W)



Background Physics

- Source-to-imager distance (SID)
 - 60 ~ 66 cm
- Field-of-view (FOV)
 - 8" x 10", 10" x 12"
- Image Resolution

	DR		CR		
	GE DS/2000D	Hologic Selenia	Fujifilm FCRm	Kodak DirectView	Konica Regius 190
Pixel Size (µm)	100	70	50	47.5	43.75
Area Ratio*	4.43	2.17	1.11	1	0.85

Background Anatomy

乳房的解剖

成人女性的乳腺分布在胸廓、胸肌上，呈斜三角形。「tail of Spence」往靠腋窩方向延伸。

末梢部分的邊界並不清楚。

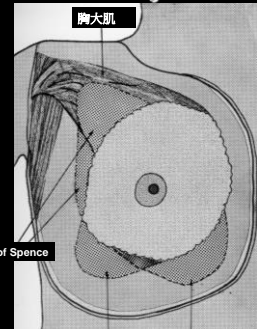
深部：胸肌肌膜

淺部：

側面：覆蓋在前鋸肌上

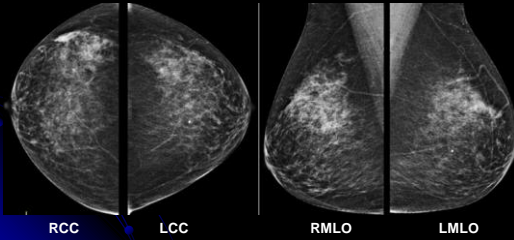
足部方向：覆蓋在外斜肌、上直肌肌腱上

正中側面：胸骨



Routine Series

- (1) CC (Craniocaudal) View
- (2) MLO (Mediolateral oblique) View



Compression

- 由於散亂X光射線的減少，使得對比度及分辨率提高。
- 乳腺的濃度的均一化。
- 分離乳腺構造的重疊，使得組織間對比度加大。
- 乳腺組織吸收放射量減少。
- 由於被攝影對象-底片間距離的縮小，減少幾何學上的模糊。
- 對乳房的固定防止了模糊的發生。

正確的壓迫基準

1. 至少要把乳房壓迫到組織編緊的狀態。
2. 受檢者「能夠忍受的最大限度下的壓迫」即不感到很大痛苦程度的壓迫。

Breast Positioning – CC view

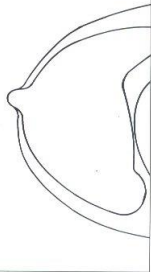
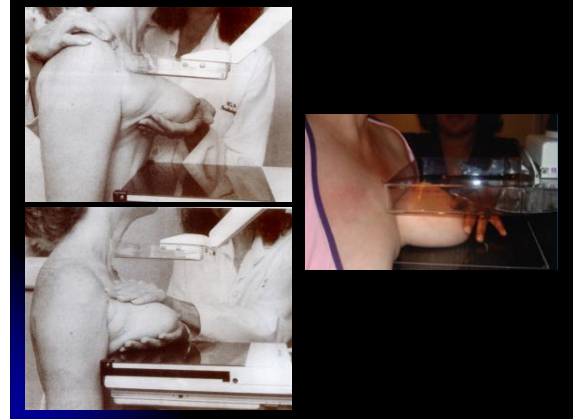
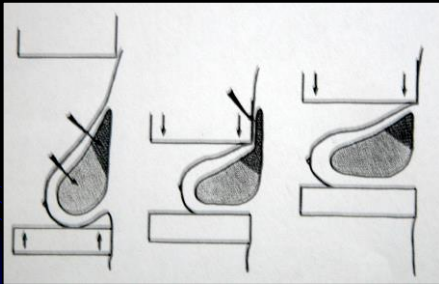
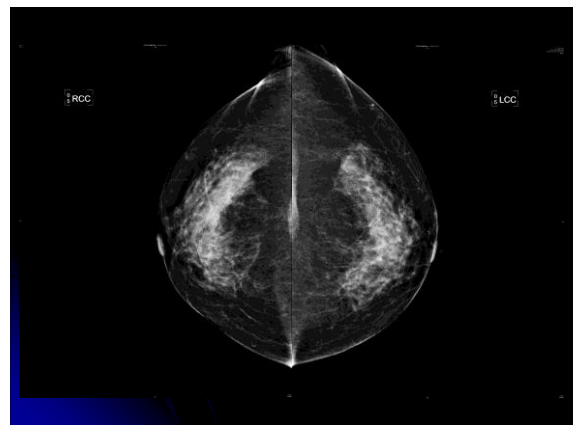


DIAGRAM OF CRANIOCAUDAL FILM



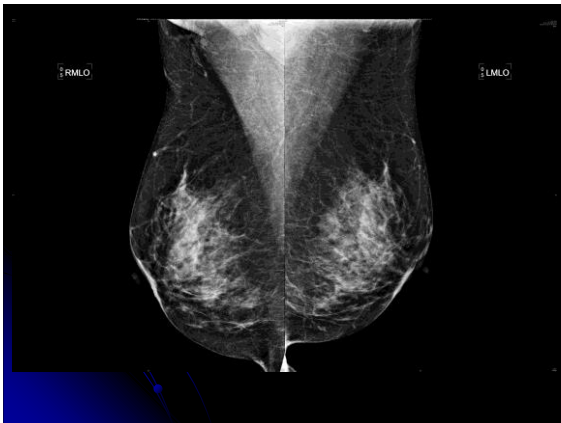
POSITION FOR CRANIOCAUDAL FILM



CC擺位評比標準：

1. 包括所有內側組織都應被看到
2. 乳頭位於Image中線位置
3. 其乳頭後連線的長度不能短於在MLO攝影中的乳頭後連線長度1公分，或以要能看到胸肌為準
4. 乳房沒有皺紋。

Breast Positioning – MLO view

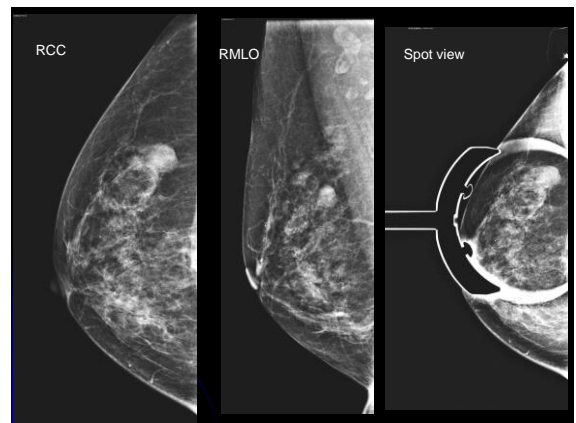


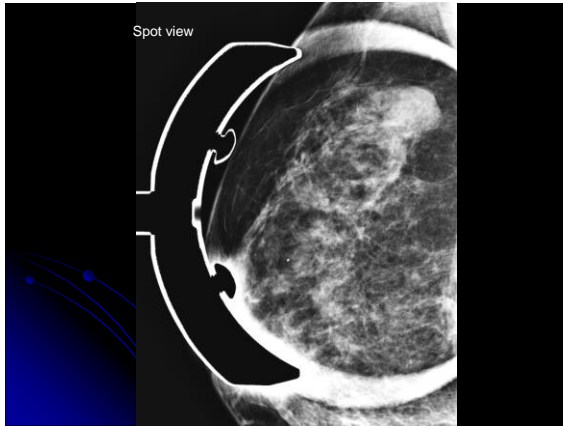
MLO擺位評比標準：

1. 左右對稱。
2. 乳房輪廓呈現。
3. 胸大肌要照到乳房的基準線。
4. 乳腺後方的脂肪要被描繪出來。
5. 乳房下部組織也要照出來，Inframammary fold伸長。
6. 乳房沒有皺紋。

其他特殊擺位法

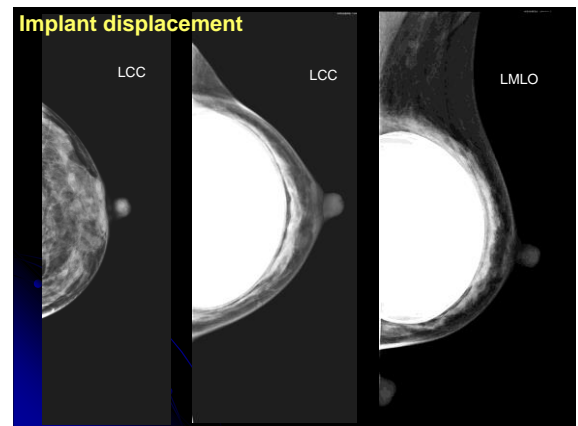
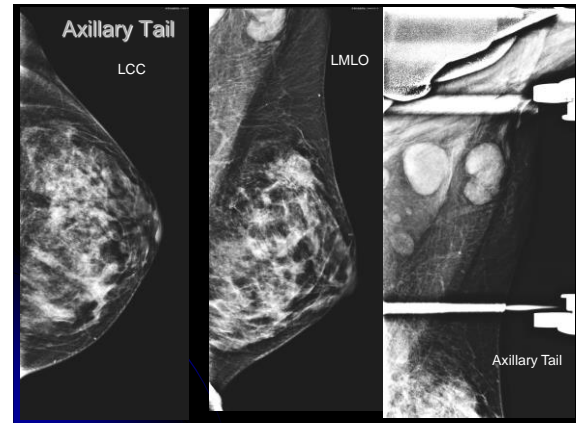
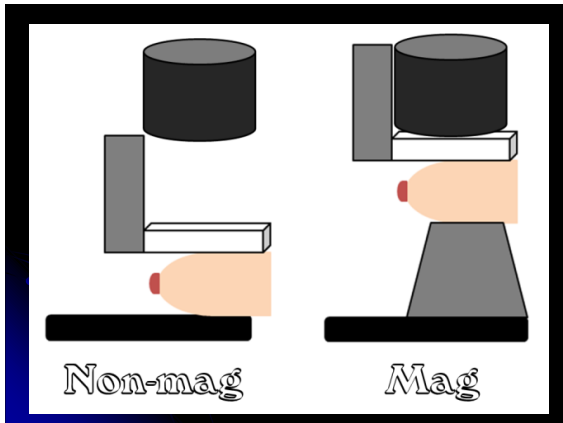
- 較常做的有90° lateral view
- Spot compression 焦點式壓迫
 - 對於組織密度高的地方壓迫，可以提升乳房組織分離程度

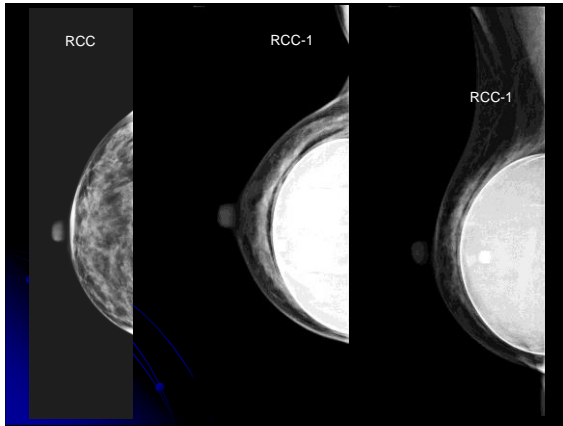




其他特殊擺位法

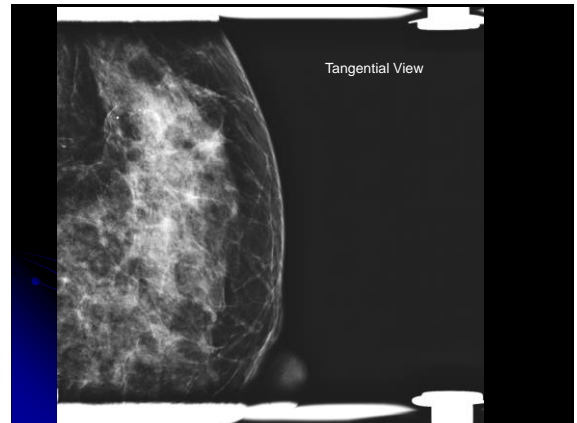
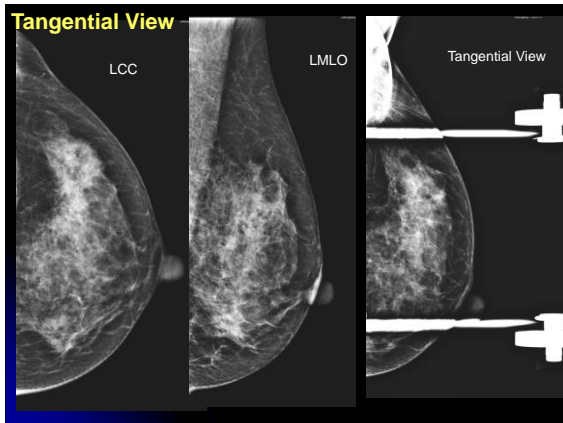
- **Magnification 放大攝影**
 - 對於腫塊的邊緣結構性特點、辨別病灶良/惡性有很大的幫助，而放大更容易看出鈣化的數目與型態(放大1.5~2倍)
- **Axillary Tail**
 - 照乳房腋下的淋巴結，其需與乳房支撐平台平行，擺位時將之從胸壁外拉
- **Implant displacement 義乳攝影**
 - 植入物推開攝影，填充物往內或上推，上胸壁方向，輕輕拉乳房組織再壓迫





其他特殊擺位法

- **Tangential**
 - 切面攝影法，對於鈣化是否在皮膚表層內，而相對於週圍纖維組織密度高者，不清楚時所特別使用攝影方法

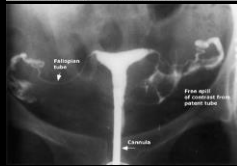
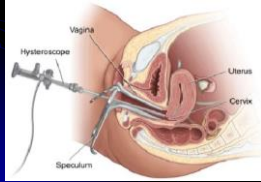
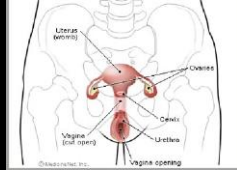


The temporal changes of mammograms obtained from the same woman over seven years. The top row illustrates the **raw images** processed to show density and the bottom row illustrates the **"For Presentation"** images generated by the manufacturers (including Hologic, Siemens and GE).

子宮輸卵管攝影 Hysterosalpingography HSG

Introduction

- 將對比劑注入子宮及輸卵管顯像來評估子宮及輸卵管通暢情形，並診斷子宮及輸卵管有無異常。



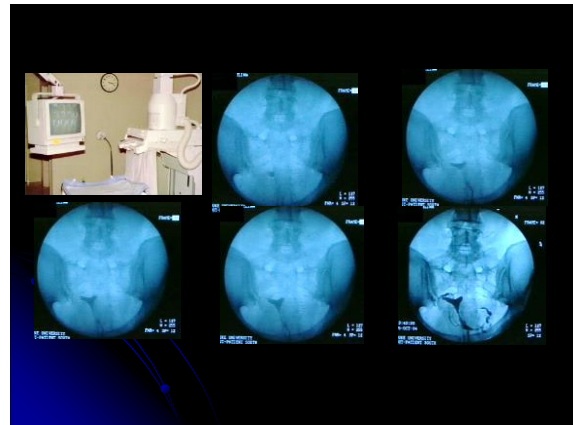
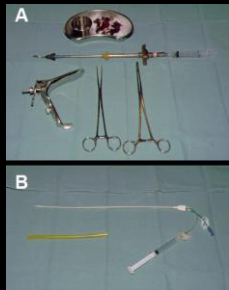
Preparations

- 在月經過後7天左右做檢查
- 檢查前先排空膀胱內尿液
- 換上檢查服
- 受檢者躺在檢查台，姿勢與婦科內診相同



HSG Exam Procedures

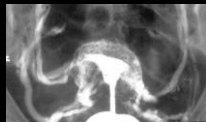
- 醫師以陰道窺管張開陰道
- 以子宮探針測子宮方向、大小
- 置入注射針管
- 拔出陰道窺管
- X光透視下以適當的速率注射對比劑，同時照相
- 等待30分鐘後再照一張



Complications

- 疼痛
- 骨盆腔感染
- 出血
- 子宮破裂
- 過敏反應
- 血管或淋巴管內注入顯影劑造成肺栓塞
- 骨盆腔沾粘發生腸阻塞
- 子宮內膜異位
- 膿性輸卵管破裂

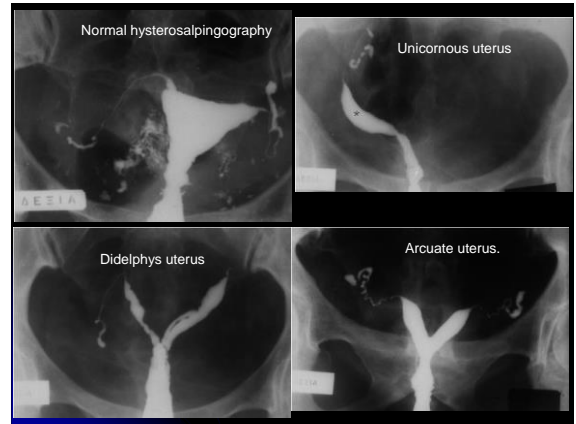
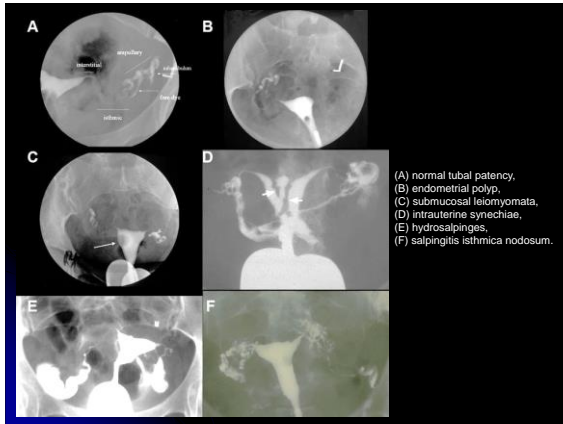
使用含碘顯影劑時可能感覺噁心、暈眩、嘔吐、打噴涕；
具過敏體質患者可能引起全身性蕁麻疹、寒顫；
極少數特異體質患者會發生喉頭水腫、血壓降低、心肺衰竭、休克。



Informed Consent

- Risk of infection
- Contrast reaction
- Hemorrhage
- Uterine perforation
- Radiation exposure
- Theoretical risk of harm to an undiagnosed pregnancy
- Oil embolism after extravasation

Exam	Dose (mGy)
HSG	0.4 ~ 5.5
Tubal cannulation	8.5
Barium enema	6.5
Pelvic CT	1 ~ 19



After Examination

- 檢查結束時醫師會放一塊紗布在陰道內，於當天洗澡時取出
- 部分醫師會給予藥物，抗生素、止痛藥之類，檢查結束後服用

Contraindication

- 月經剛結束或將來時
- 月經過期尚未確定懷孕者
- 子宮外孕
- 骨盆腔發炎或骨盆腔內有腫瘤
- 對顯影劑過敏者