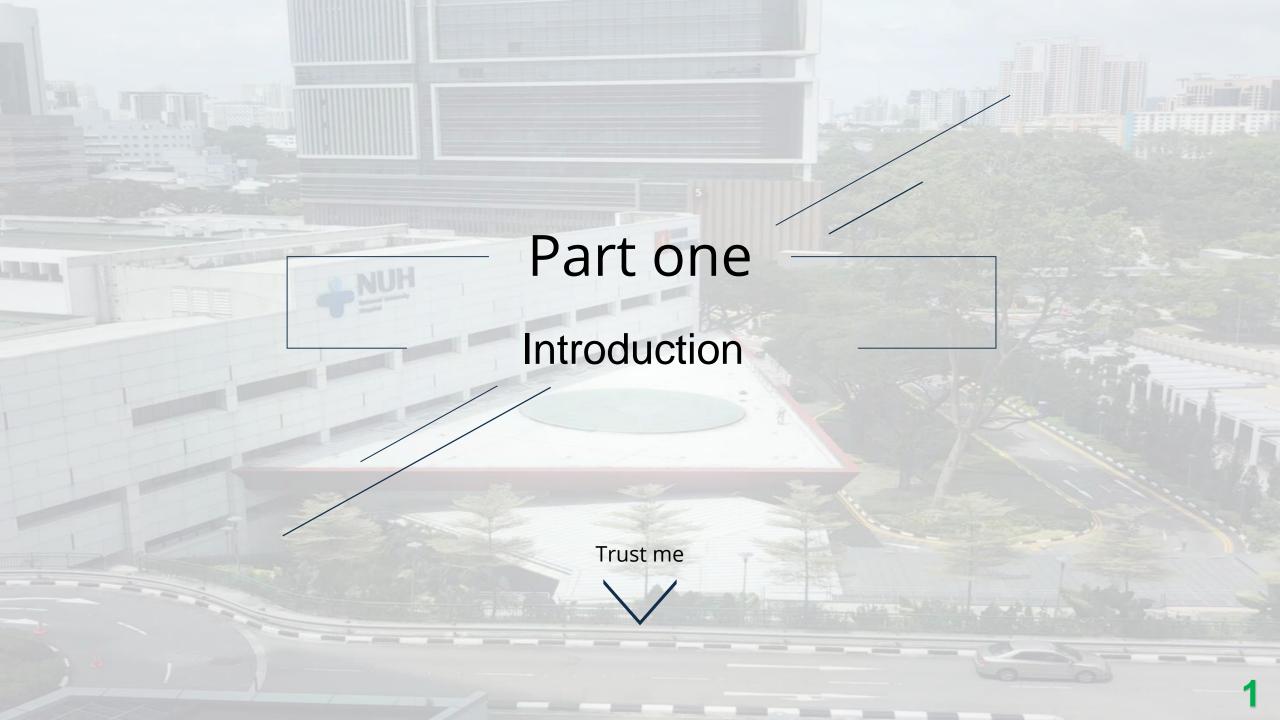


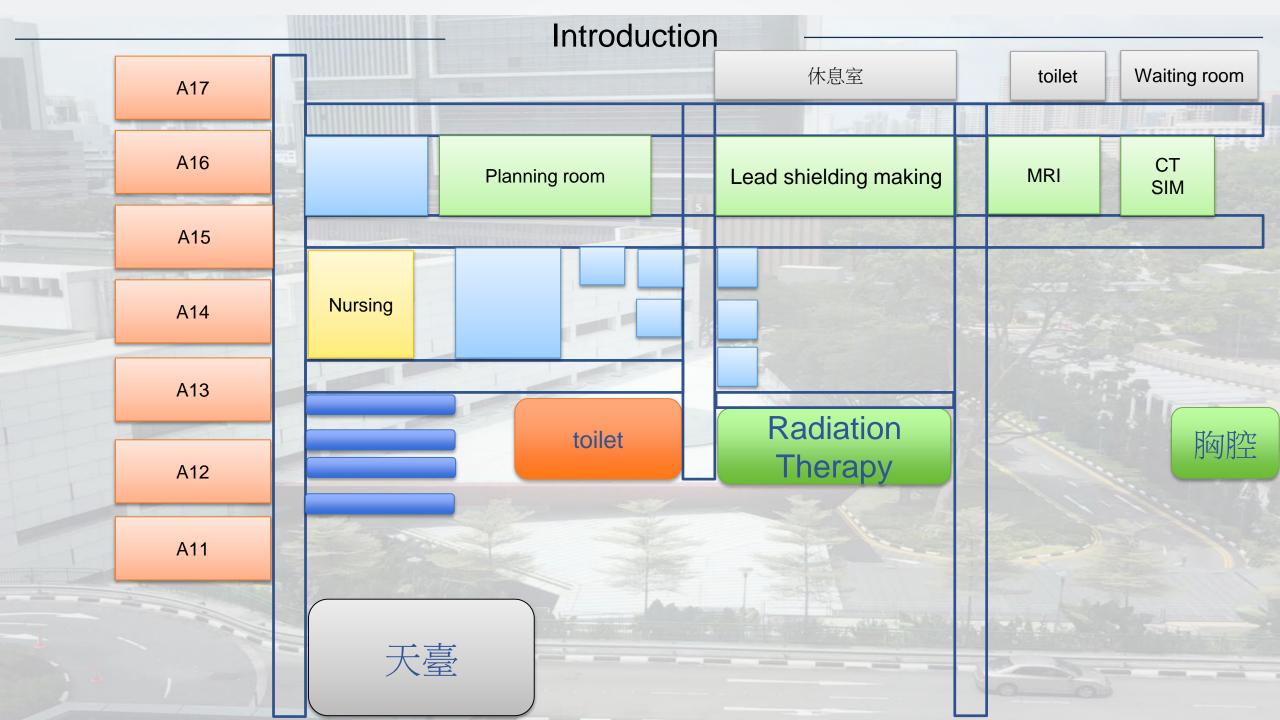
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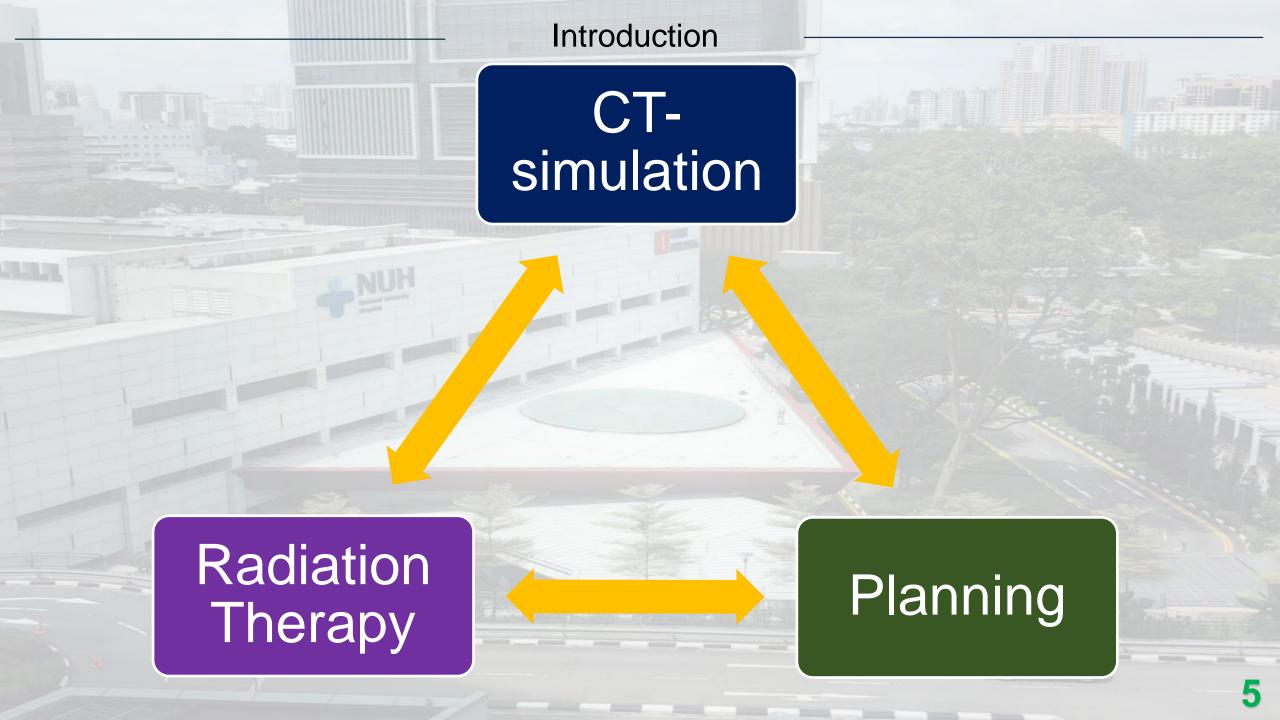
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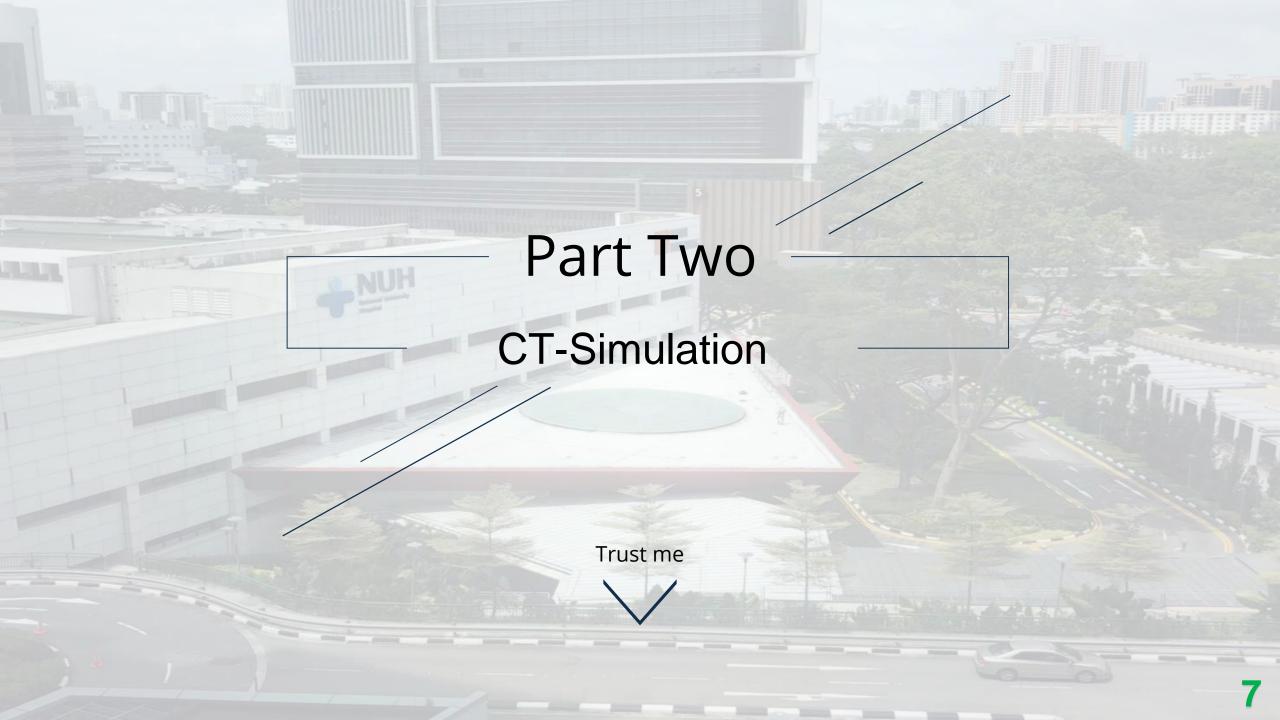






Introduction





- How to read a new patient's information EX: IC number, location
- How to use the contrast media:
- ➤ IMRT(Intensity Modulation Radiation Therapy強度調控放射治療)

Immobilization

Mask Head or Head & Neck

Vaclok Thorax / abdomen /

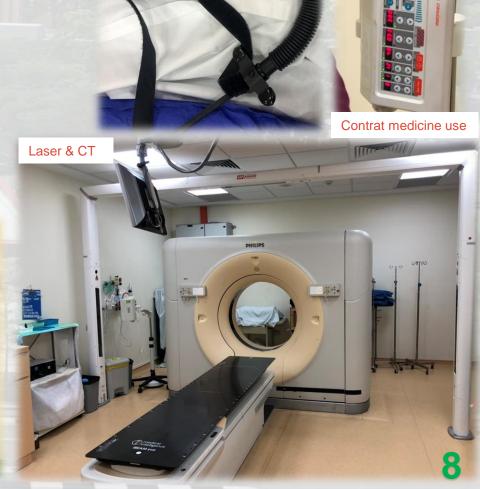
Pelvis/Extremities

- ➤ Brachytherapy近接治療:APBI
- Lead shielding making
- CT Markers and tattoo
- > 4D CT

Site	Vol (ml)	Delay Time &	Flow rate (ml/sec)			
Head	40-50	40	1.2			
Thorax	60	45				
bdo/Pelvis	70-80	60-70				
H&N	70	30-35				
PAEDS	Vol=Weight x 2 (1-2ml/kg)					
	≤45ml	Coop Gond	1			
Paeds Non-head)	3431111	Scan @end of injection	1.0			







Below

Immobilization: Mask & Vaclok

Mask:

- 1.是種熱塑性塑膠-Mask is a thermoplastic
- 2.根據治療的方式不同去選擇(浸泡的溫度、時間根據不同的面具而不同)
 - -According to different treatment to choosing.(Different mask have different soak temperature and time)
- 3.從熱水中取出並稍微擦乾放置病人上。務必說明會有濕濕熱熱感避免病人驚嚇。
 Get it out from the hot water and let it dry before putting on the patient.

 Note:must to notify the patient it will be a little wet and warm to prevent patient from

being scared.

4.在面具上做好雷射標記-Making the laser marker on the mask.

> Valock:

- 1.Can be reused.
- 2.After fixed onto the patient, suck air out from the vaclok by the machine it will become hard.









65800			Ensur	e 5 - 8 cm	water (mi	n > 2.5 cm	n) in water bath				
CORP.	Conventional				IMRT			SRT/SRS	Bolus		
Site		Head		Head 8	& Neck	Head	ead Head & Neck		Head/Nose	Orfit Pellet	
Shell Type	Klarity (Bright Green)	Orfit (Yellow)	Uniframe Civco (White)	Orfit (Yellow)	Klarity (Bright Green)	Klarity (Bright Green)	Civco (White)	Klarity (Bright Green)	Fraxion	Orfit (White)	
Water Temp °C	70 - 75	65	75	65 -70	70 - 75	70 - 75	75	70 - 75	65	≥ 65	
Heating (min)	1-2	3 - 30	5	3	1-2	5	7-9	5	4 - 30		
Working (min)	5	1 - 1.5	5	1-2	5	5	5	5	1 - 1.5	N.A	
Cooling (min)	5	5	5	10	5	10	20 (cold towels)	5	7	40	



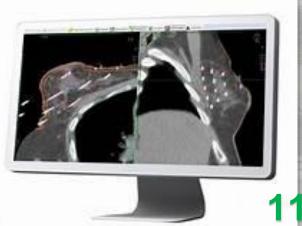
APBI (Accelerated partial breast irradiation 部分性乳房加速放射線治療)

- Age> 45 year old
- ➤ Breast tumor larger than 2.5 cm
- No meta, shape is
- Source: 192 Ir
- Every tube have there own number should check is same before treatment.









4D IMRT

➤ 相較於傳統IMRT較有精確的PTV位置

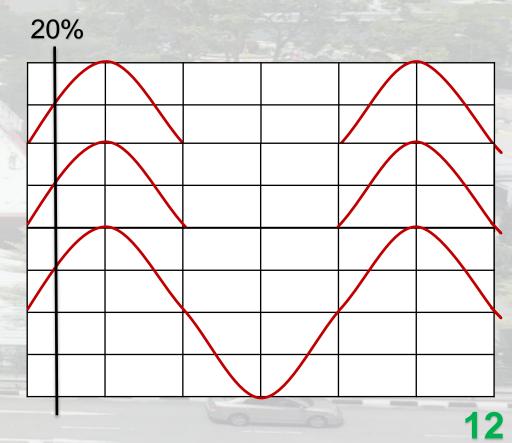
The PTV can more close to the tumor than conventional IMRT

EX: Conventional

4D IMRT



➤ CT電腦將同時間呼吸所造成影像進行重疊而知移動範圍
 CT computer scan the breathing at the same time and overlapping the images that can know the moving range



Lead shielding making 鉛屏蔽製作

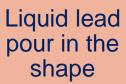
According the tumor picture from planning and cut the same size of the styrofoam



Choosing the size



Before use the liquid lead must to take out the surface layer because that is impurity





Wait it cold sown

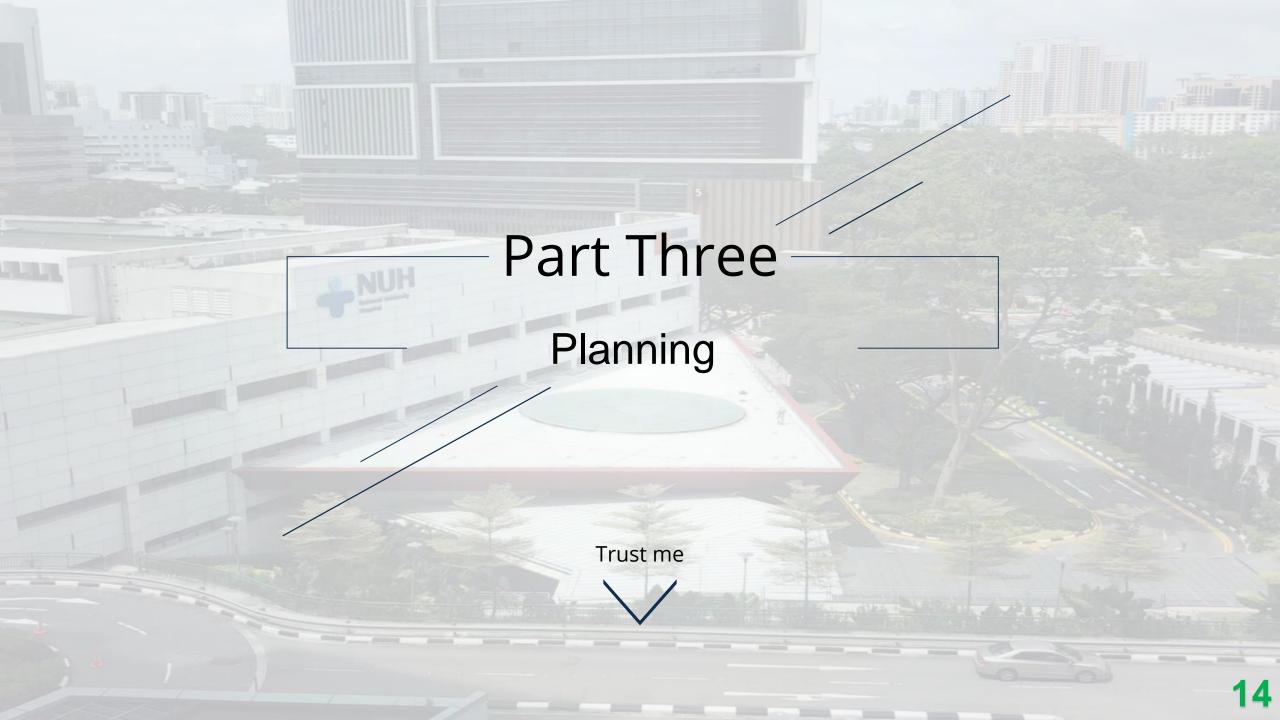








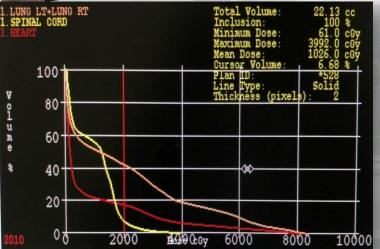




Planning

Planning





➤ Planning process 計畫過程:

image from CT/MRI → doctor outline PTV → Therapist start plan

- → Medical physicist check dose → doctor check plan → sent to treatment unit
- Forward planning 順行計畫
 - → preset(MLC、field、wedge) → calculate 計算 → evaluate 評估 e.g.: 3D-CRT
- ► Inverse planning 逆行計畫
 - →Doctor outline the PTV(isodose line) and give the limit to machine, machine will calculate and generate a plan for us e.g.: IMRT(including SRS \ SRT \ SBRT \ DMLC)
- ► DVH(Dose Volume Histagram 劑量體積直方圖)---OAR dose
 - →Using to check the organ dose(different organ have different D_{max})
- Wedge: Let the dose distribution more even
- Bolus(Artificial tissue filler): Using to the tumor is close skin surface or uneven skin. (long time ago used pig skin)



Planning XiO[®] Listening Confidence Collaboration Confidence Listening Innovatio







A15

- ➤ Machine Elekta
- MLC 0.5cm (thinner than normal which can make the treatment more precisely)
- This machine most treat the head or head & neck patient
- ➤ IMRT(Intensity Modulation Radiation Therapy 強度調控放射治療)

VMAT(Volumetric Modulated Arc Therapy 弧形調控放射治療)

SBRT(Stereotactic Body Radiation Therapy 立體定位軀體放射治療)

(also known as SABR in some journals)

SRS(Stereotactic Radiosurgey 立體定位放射手術)

SRT(Stereotactic Radiation Therapy 立體定位放射治療)

- ➤ 3D-CRT (3D-comformal Radiation Therapy 三度空間順形治療)
- > 4D IMRT
- Cooperate with dietitian

(Sometime the patient will lose weight during treatment, the mask of the patient will no fit the patient and can't produce an accurate setup)



| 3D-CRT(3D-comformal Radiation Therapy 三度空間順形治療)

- ▶ 每個照野內的光子數是均勻分布的。
 - The photon count inside the field is distributed.(Intensity of radiation beam is distributed)
- ➤ 藉由CT scan,重組成3維模擬影像,使醫師畫的PTV範圍能更貼近腫瘤 By the CT scan, reconstruct the 3D simulation image can let PTV more close to tumor which is outline by doctors .
- ➤ 高劑量區能順著腫瘤的形狀,腫瘤可獲得高劑量,鄰近的正常組織得到良好的保護,併發症與不適均有效的降低。較2D好。
 - High dose area can forward the tumor shape, tumor can receive the HD, normal tissue get good protected, complications and discomfort would also have decrease as compared to 2D.

IMRT(Intensity Modulation Radiation Therapy 強度調控放射治療)

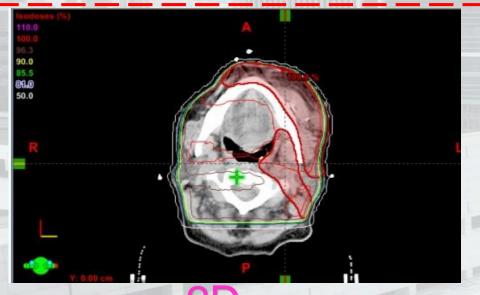
- ➤ 每個照野中光子分布是不均勻的

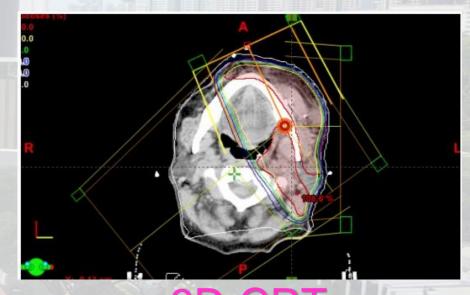
 The photon count inside the field is modulated.

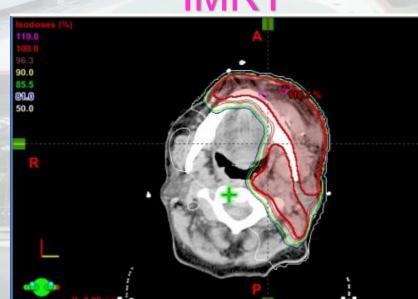
 (Intensity of radiation beam is modulated)
- ➤ 利用7~9個射束讓高劑量區符合腫瘤形狀
 Using 7 to 9 beams let the HD area match the tumor shape.
- ➤ 腫瘤獲得高劑量,鄰近的正常組織得到良好的保護,併發症與不適均有效的降低都優於3D-CRT

Tumor can receive the HD, normal tissue get good protect, complications and discomfort have decrease all will better than 3D-CRT.

Dose Distribution Comparison 劑量分布比較





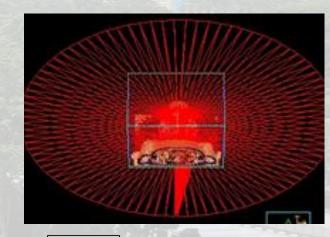


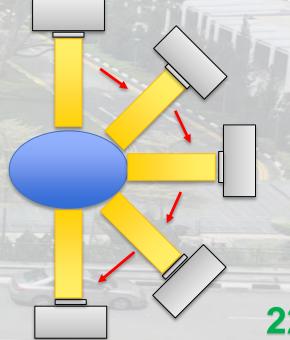
VMAT(Volumetric Modulated Arc Therapy 弧形調控放射治療)

- ➤ 動態移動多葉式準直儀和機頭 Dynamic MLC and Gantry.
- ➤ 治療時間比傳統IMRT來的短

 Treatment time shorter than conventional IMRT.
- ➤ 放射治療射束以弧形動態連續給予,在給予射束的同時並持續變化照射角度和MLC,使得在不同角度有不同的射束強度。

Radiation therapy beam is given continuously in arc dynamic, when it change the gantry angle and MLC will have different beam intensity.





SBRT(Stereotactic Body Radiation Therapy 立體定位軀體放射治療)

➤ 除了頭部以外的治療,在NUH常見肺臟和肝臟的治療。
The treatment location except head and neck, in NUH it usually use to treat the lung and liver.

➤ 壓板可以減少呼吸所造成的腫瘤移動
Compressor can restrict breathing thus decrease the tumor motion.

▶ 使用 vaclok 固定病人身體Using the vaclok to fixed patient's body.



SRS(Stereotactic Radiosurgey 立體定位放射手術)

|SRT(Stereotactic Radiation Therapy 立體定位放射治療)

➤ SRS和SRT兩者皆是用來治療腦部腫瘤

SRS and SRT both of are ues to treat the tumor of brain.



Method	SRS	SRT
Dose	單次高劑量治療 Singal high dose treatment	多次劑量治療 Multiple dose treatment
Time	Short	Long
Tumor size	<4cm	>4cm

A13.14

- Machine: Elekta
- MLC: 1 cm
- ➤ IMRT(Intensity Modulation Radiation Therapy 強度調控放射治療)
- ➤ 3D-CRT (3D-comformal Radiation Therapy 三度空間順形治療)
- ➤ VMAT(Volumetric Modulated Arc Therapy 弧形調控放射治療)
- ➤ ABC(Active Breathing Coordinator 主動呼吸控制系統)
- ► Electron 電子射束



ABC(ACTIVE BREATHING COORDINATOR 主動呼吸控制系統)



- 用於左方胸部腫瘤,閉住氣時可以防止腫瘤移動 Using with the left breast tumor, when the patient breathing in and hold, can decrease the tumor motion.
- > 吸氣時會使胸部和心臟之間有肺的填充去分隔促使減少心臟的劑量 When the patient breath in, the lung will separate breast and heart therefore can decrease the dose on heart.
- ▶ 管內有球體可協助患者閉氣 There have a balloon inside can help the patient hold breathing by blocking the passage.
- ➤ 無法配合呼吸者則用另一種方式(Breastboard) The patient who can't cooperate with breathing will using another method. *Breastboard make the patient body have a angle with the table, it can make heart away from the tumor to decrease the dose on heart.



Electron 電子射束

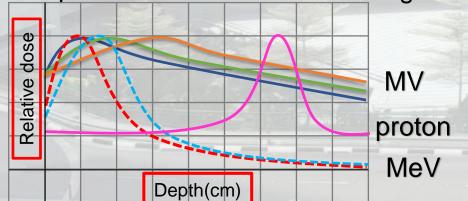
➤ 使用MeV的射束,不同於其他使用MV

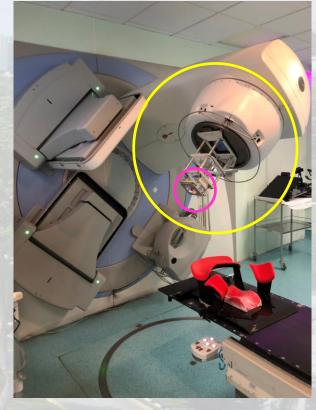
Different to others treatment is that it use the MeV beam not the MV.

▶ 因為電子在體內釋放最大能量的深度較淺,所以用以治療靠近體表的 腫瘤

Because the electron released the maximum energy depth is shallow so use to treat the tumor which surface of body.

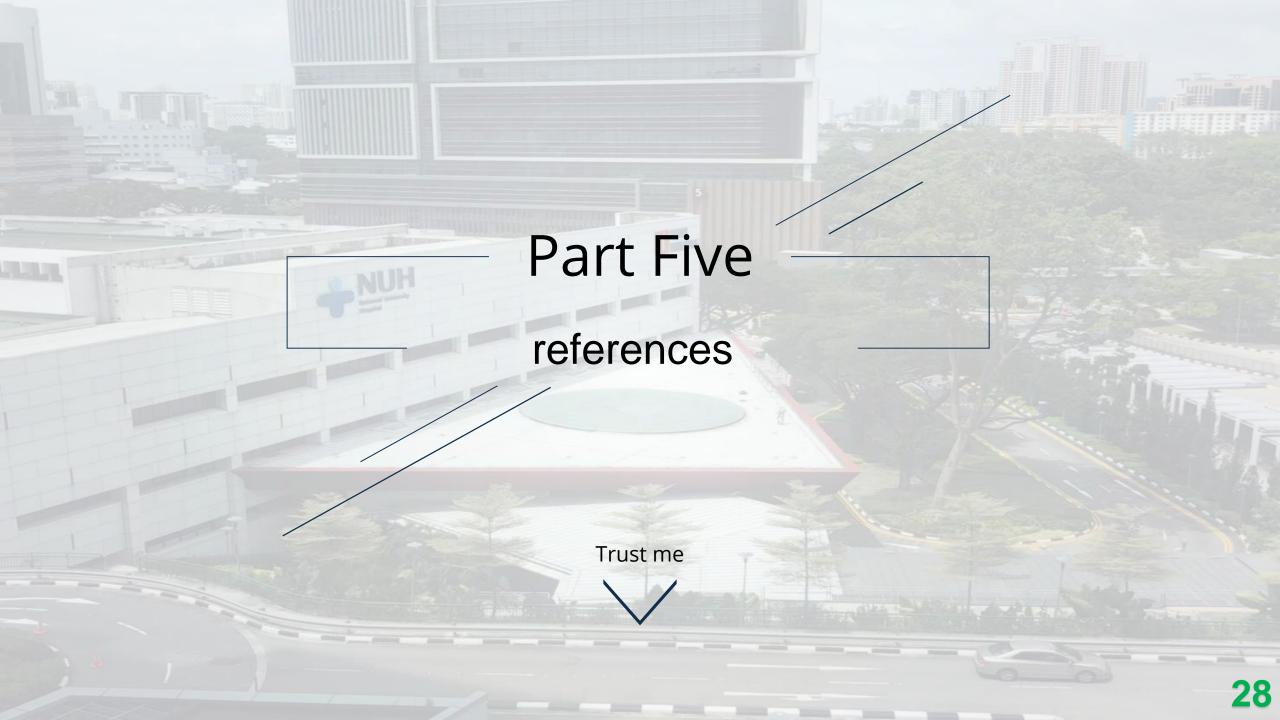
➤ 裝上電子錐筒,下方會根據腫瘤形狀去放置不同形狀的鉛擋塊 Setting on the electron cone and according to the patient tumor shape to put the different lead shielding.











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