

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



RADIOTHERAPY IN MOROCCO: 1929-2017

First Coordination Meeting and Workshop on Multidisciplinary Management of Cervical Cancer

IAEA/ INO

N. BENJAAFAR

07-11 May 2018, Rabat, Morocco



INTRODUCTION

- * **Radiotherapy: Main therapeutic facility in cancer care of more than 50%
cures more than 40 % of cancer patients**
- * **Objectives:**
 - Improve overall survival and increase loco regional control
 - Decrease loco regional recurrence rate
 - Increase conservative treatment rate
 - Palliate symptoms: Relieve Pain, compression, hemorrhage
- * **In Morocco**
 - Radiotherapy is used since 1929 with low energy KV machines in one centre in Casablanca

Plan

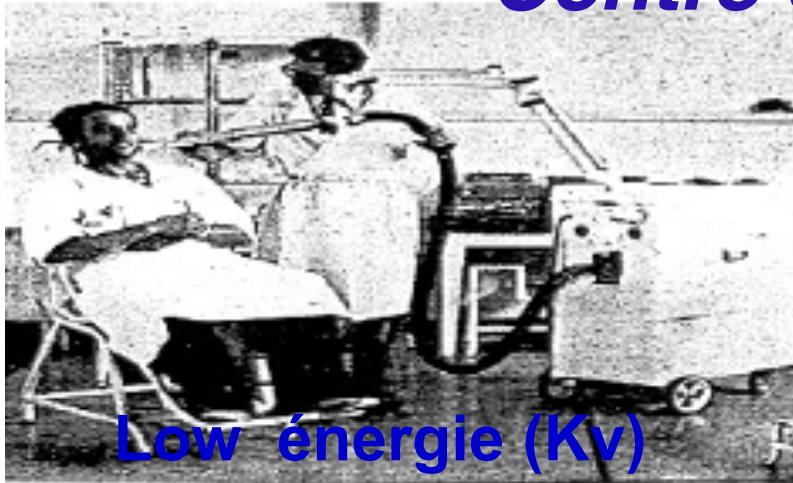
- **Infrastructure**
 - Radiotherapy centres
 - Equipment
- **Human Resources**
 - Radiation oncologists
 - Medical Physicists
 - RTTs, mould technicians, Maintenance engineers
- **Radiotherapy Techniques used**

2D, 3D, IMRT, Stereotaxy



History

1929: centre de Bergonié-Casablanca Centre d'oncologie Ibn Rochd



Cobalt 60: 1982



Césium equipment: 1972



Source of Radium 1933

INFRASTRUCTURE

Centres: 25

LINACs: 41; 17 Elekta; 24 Varian

Brachytherapy units: 14, 4 Co60

Gamma Knife: 1

CT simulators: 18

PET CT: 8

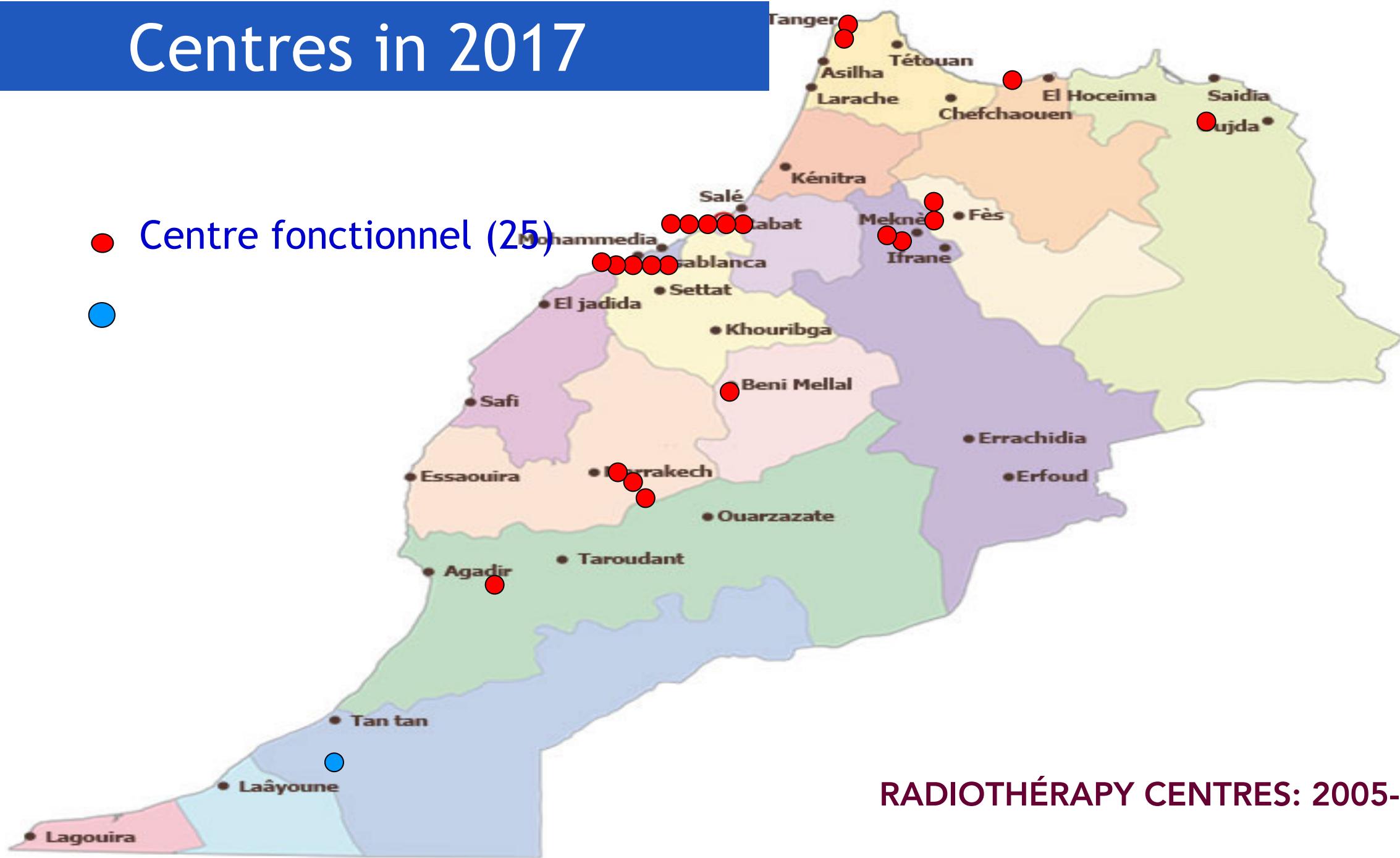


Centres before 2005

- Radiotherapy Centres
(7)

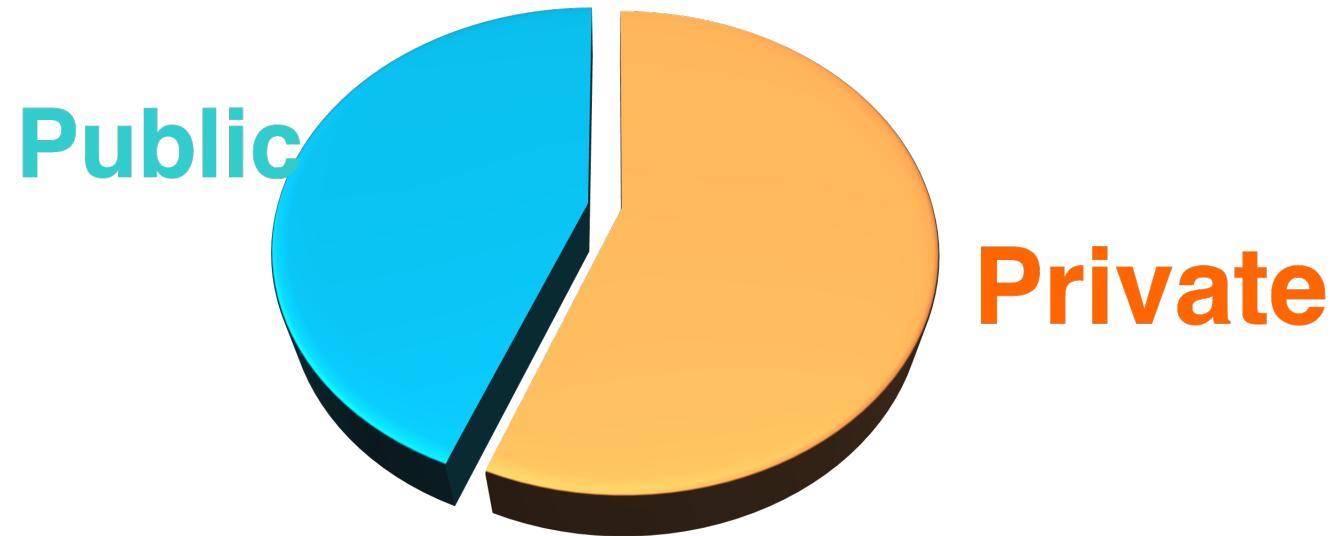


Centres in 2017

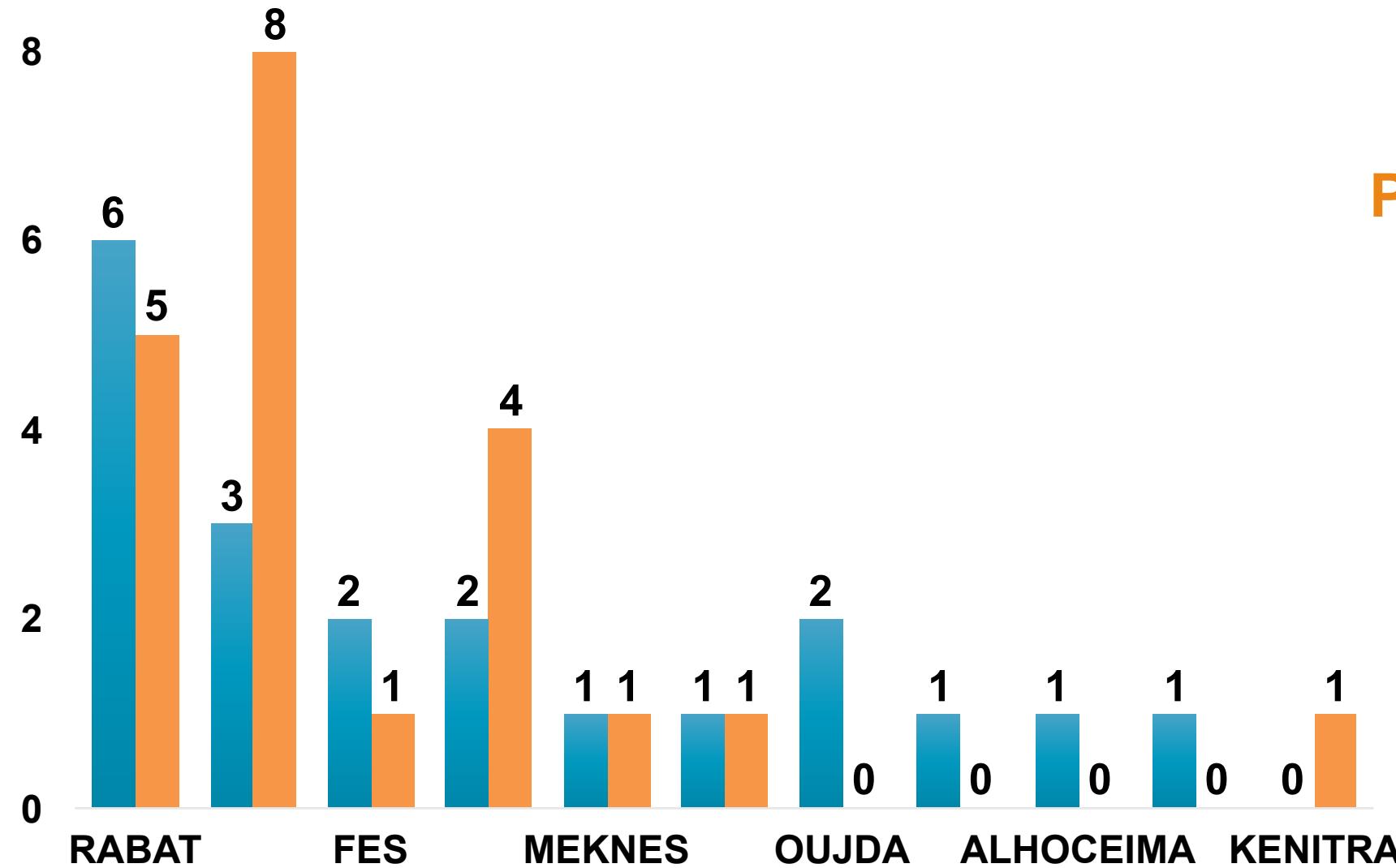


RADIOThÉRAPHY CENTRES: 2005-2017

Radiotherapy centres by Sector: 25

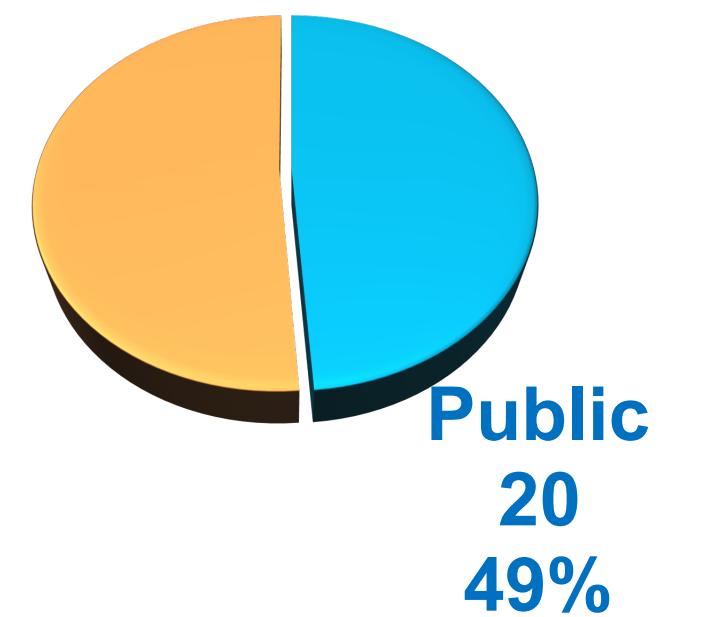


Distribution of LINAC in Morocco

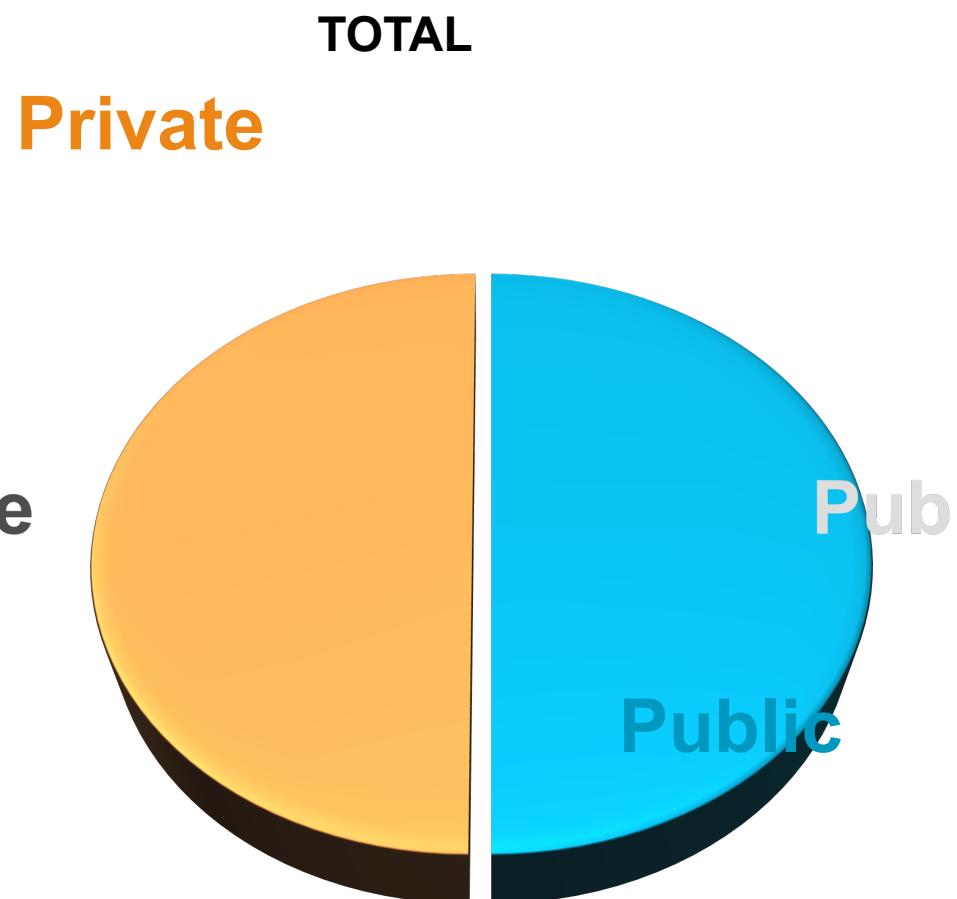
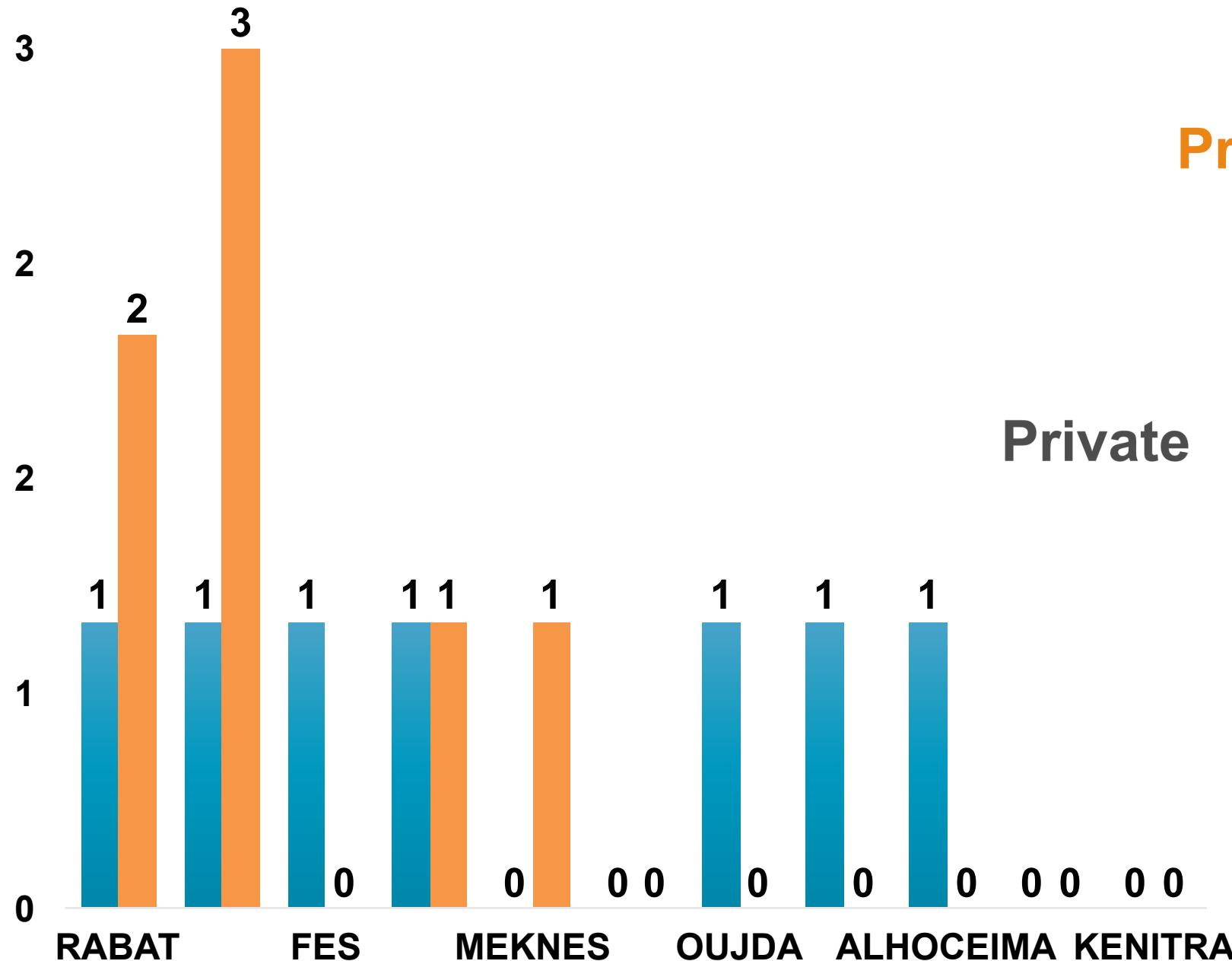


TOTAL: 41

Private
21
51%



Distribution of HDR in Morocco



Human resources

Radiation Oncologists: ROs

- 5 university
Centres: 4 years
training, Oujda, Fes,
Rabat , Casablanca &
Marrakech

Medical Physicists: MPs

- Masters in medical
physics: 2 years
academic and clinic
- Rabat, Casablanca
- 60 physicists trained
- 20 ongoing master
Settat

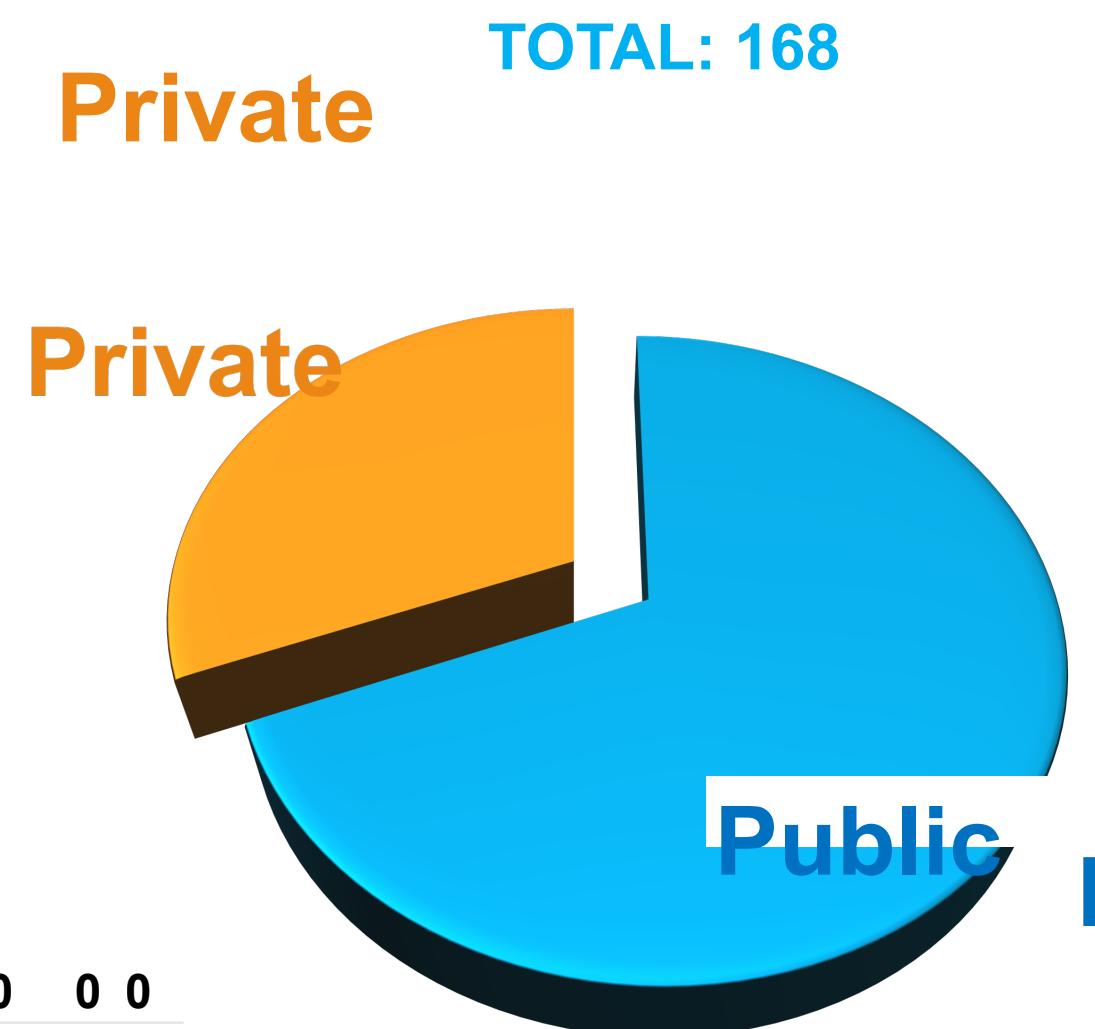
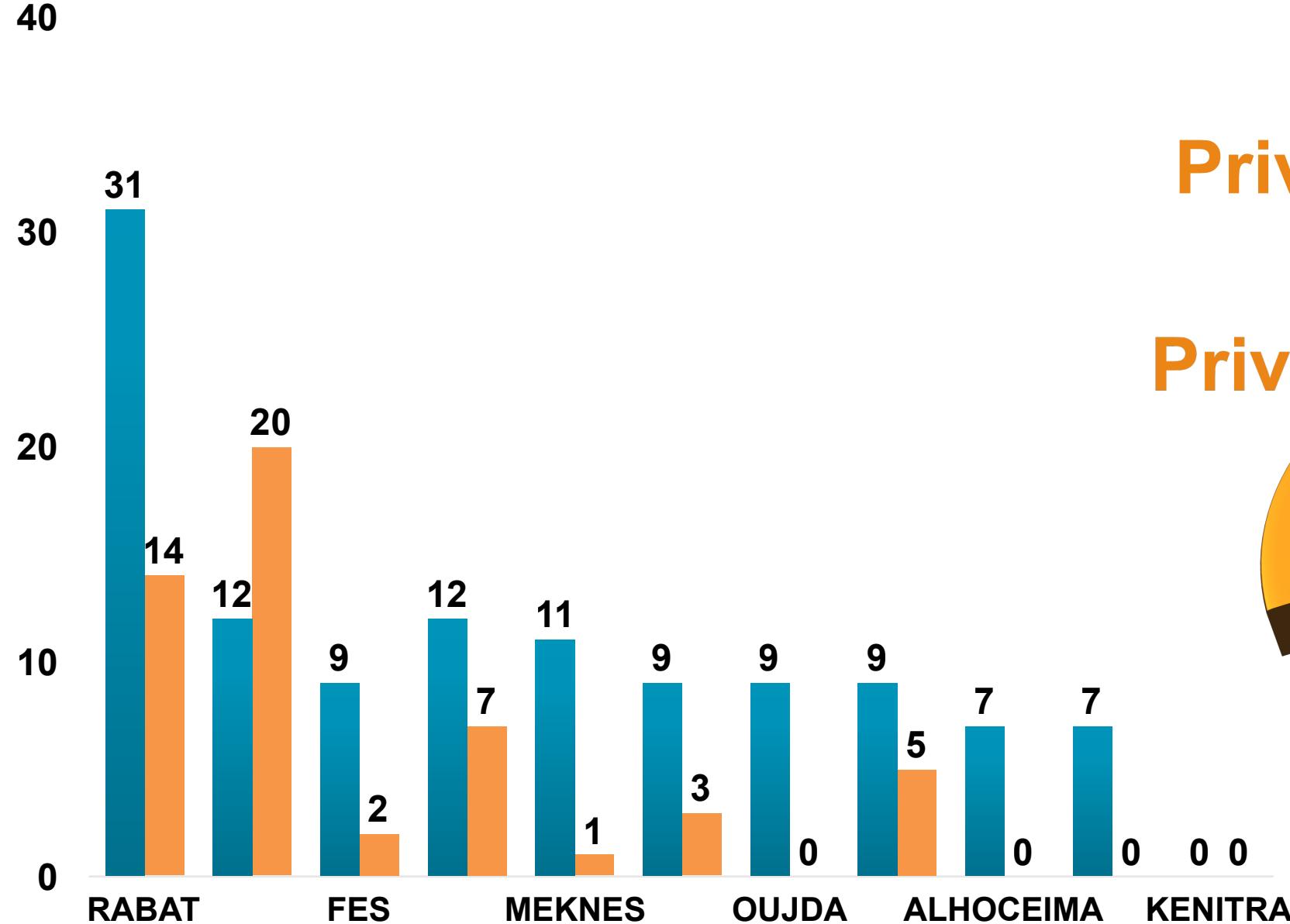
Radiotherapy Technicians RTTs

Training Centres
ISPITS
Instituts Supérieur Des
Professions Infirmiers Et Des
Techniques De Santé: 3 years
training :
Imaging ,radiotherapy and NM

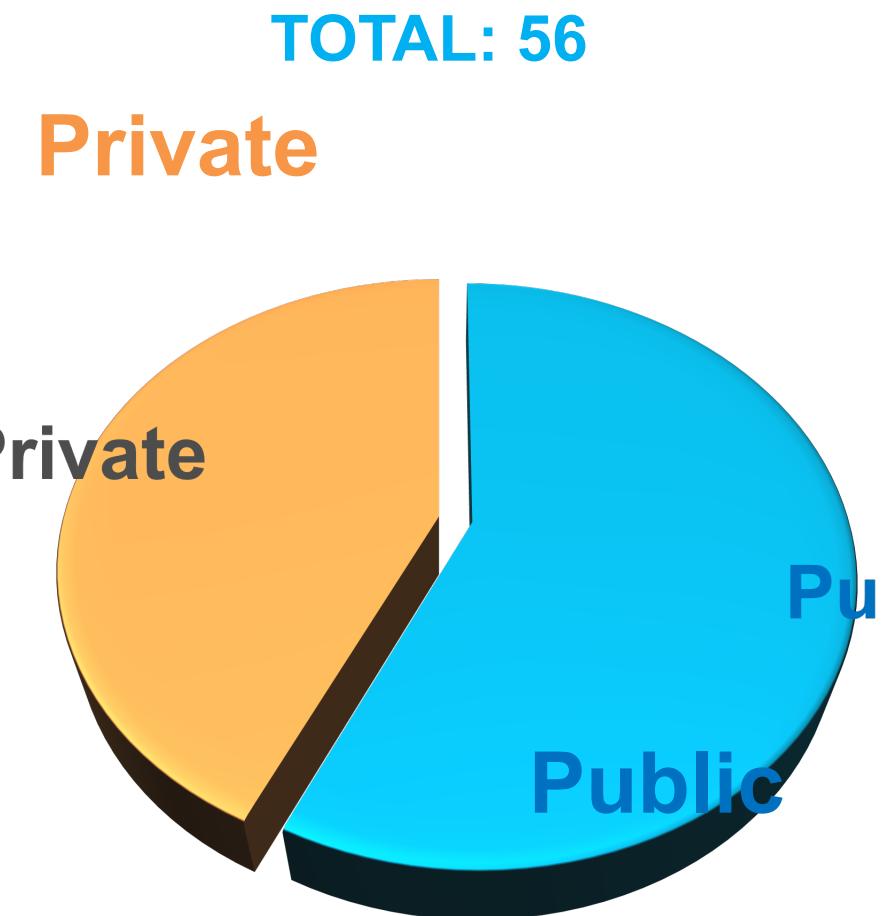
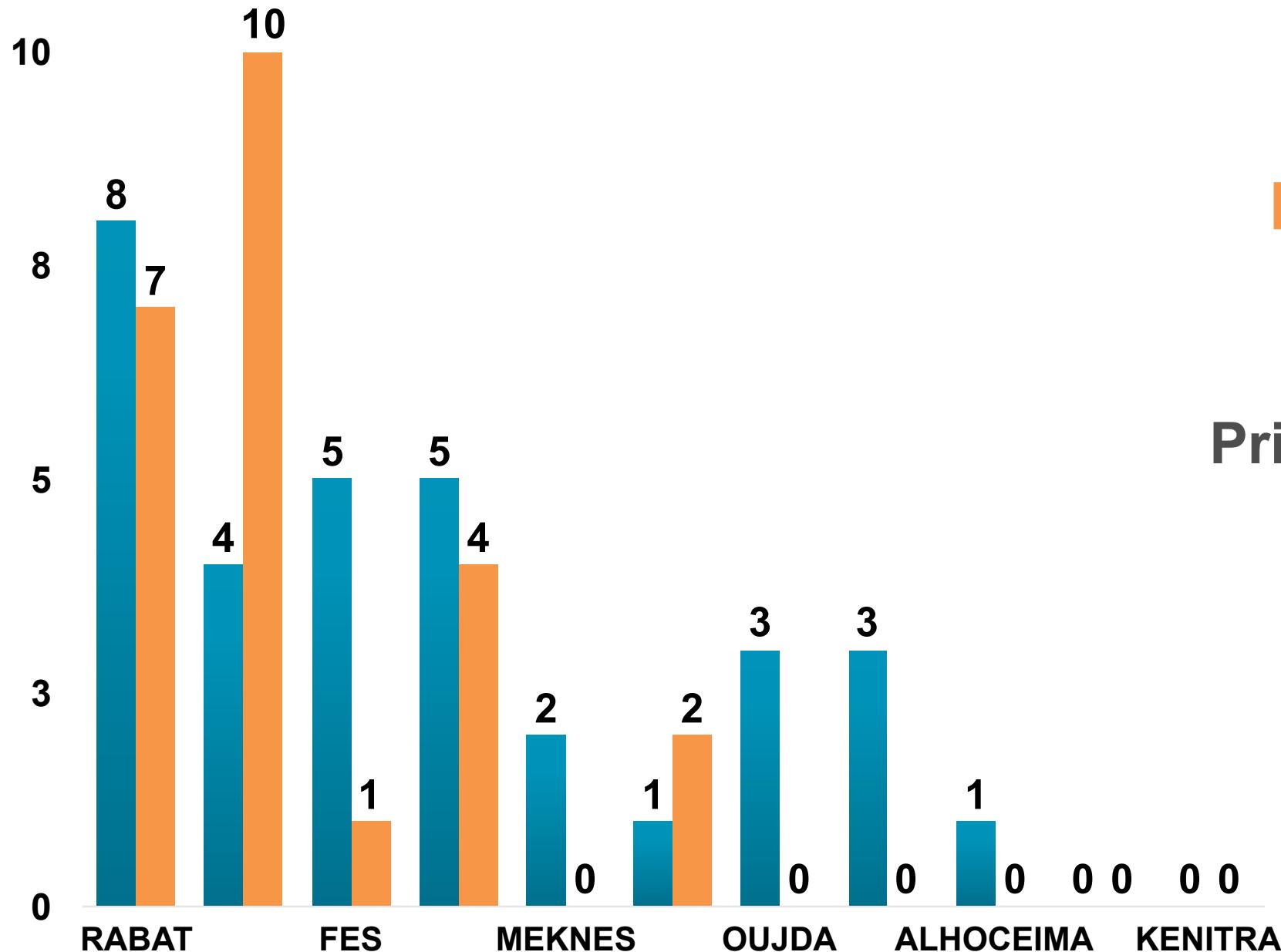
Dosimétrists

Faculty of
sciences in
Rabat: 1 year
training

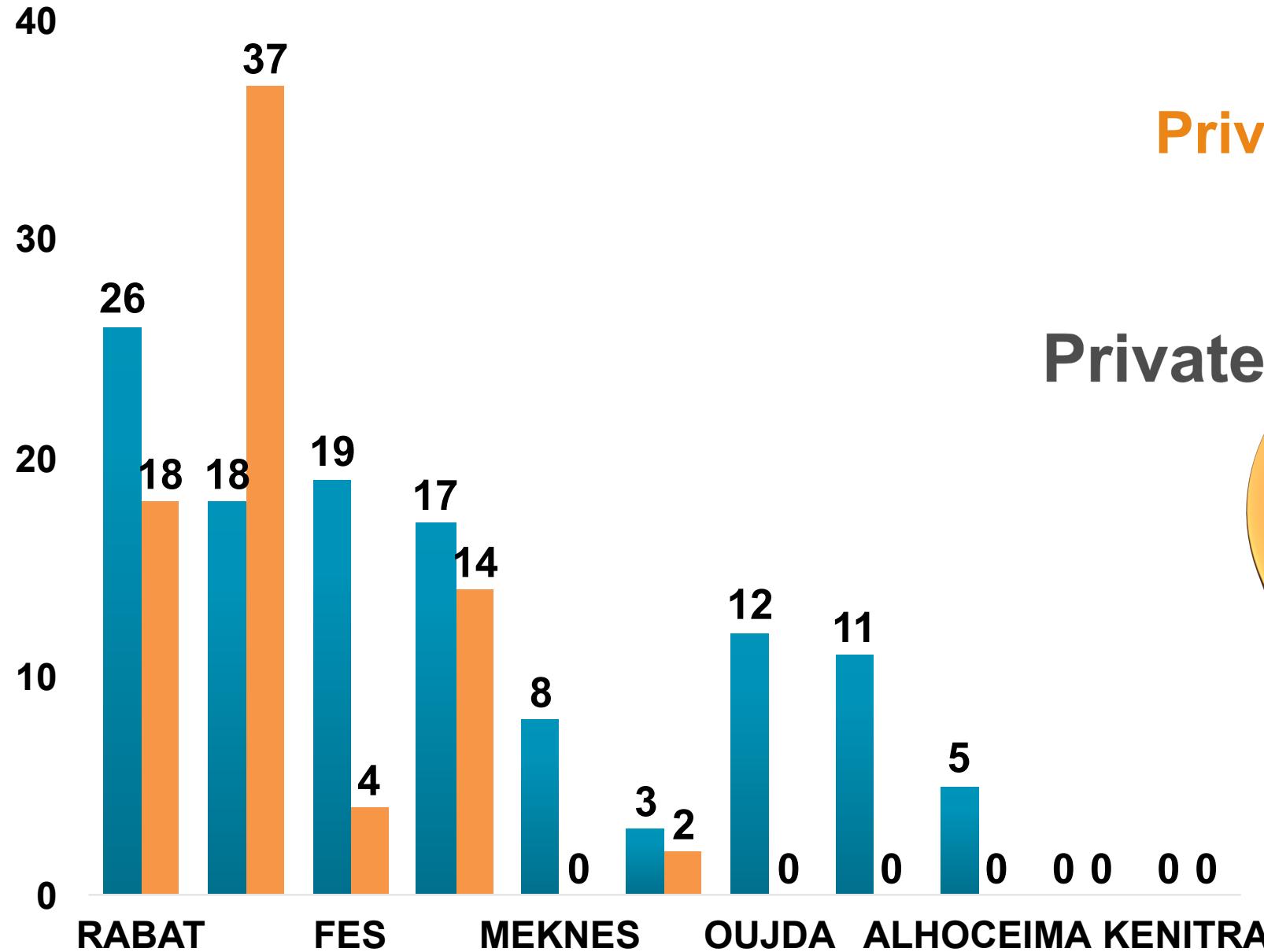
Distribution of ROS in Morocco



Distribution of MPs in Morocco



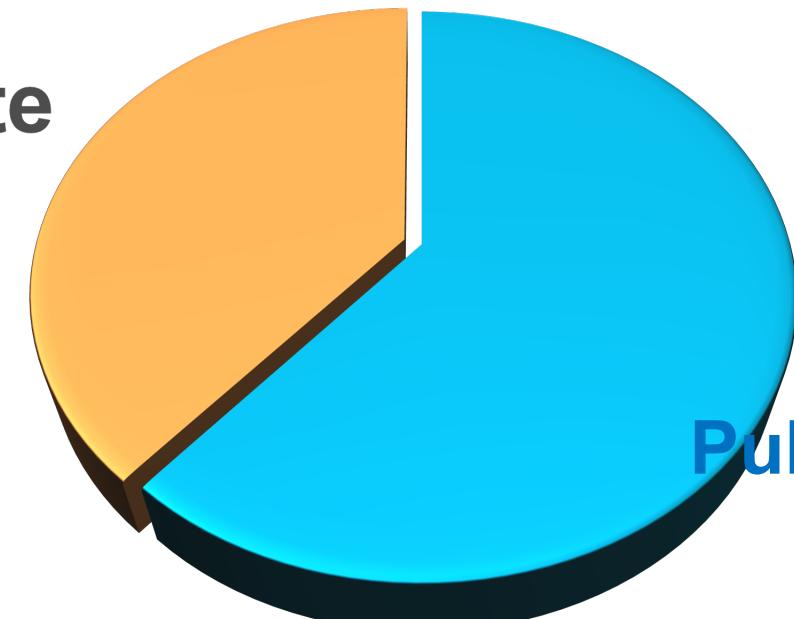
Distribution of RTTs in Morocco



Private

TOTAL: 194

Private



Infrastructures en RT :Standards ESTRO-QUARTS

Infrastructure and personnel	No. of units or personnel/no. of patients (or range)*	No. of units or personnel/no. of patients used in this analysis	Present status (n=84 countries)		Required by 2020 (n=84 countries)	
			Existing/required	% of present deficit [†]	Total needed	% of additional required [‡]
Teletherapy units	1/450 patients	1/450 patients	4138/10,735	61.4%	13,307	+221.6%
Radiation oncologists	1/250-300 patients	1/250 patients	11,803/19,323	38.9%	23,952	+102.9%
Medical physicists	1/450-500 patients (3)	1/450 patients	3392/10,735	68.4%	13,307	+292.3%
	1/300-400 patients (17)					
Radiotherapy technologists	1/100-150 patients	1/150 patients	10,780/32,204	66.5%	39,920	+270.3%

RADIOTHERAPY DEPARTMENT AT INO

Regional designated center by the IAEA.

Since 2004

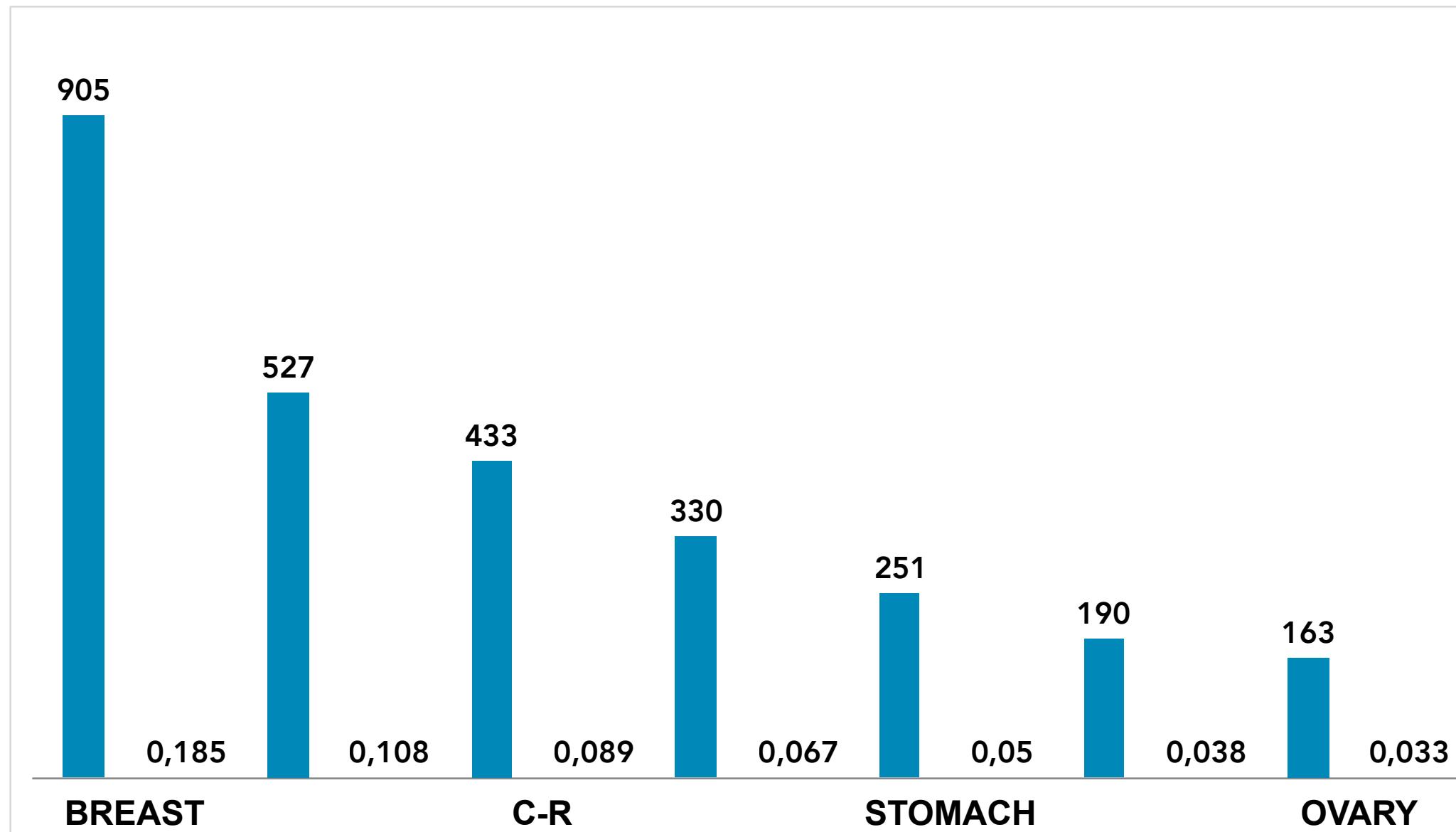


Radiotherapy department: AFRA RDC

INO



Recruitment of patients INO 2016



Equipment at INO

INO National Institute of oncology in Rabat 1985 :

2 cobalt machines

1 conventional simulator

BT unit 11 LDR projectors Curietrons

- **1990:** LINAC saturne 43 6 & 25MV + Electrons

TPS : 2D Multidata

: Nucletron Ir192 HDR

- **1998 :** 3D TPS Multidata

- **2004 :** Elekta Precise Linac with MLC + Precise plan TPS + R&V Mosaiq network

CT Simulator Siemens

- **2010:** 2 Elekta Synergy platform LINACS with MLC + 3D XIO TPS + R&V Mosaiq

Replacing 2 Cobalt 60

- **2015:** 3rd Elekta synergy platform
HDR Flexitron from Elekta + Oncentra TPS
Access to MRI 3 Tesla in treatment position
- **2017:** 4 th Elekta Versa HD IMRT, VMAT & stereotaxy
SBRS and SBRT
5 Monaco Sim & 3 Monaco TPS Montecarlo
QC equipment Patient and machines IBA & Aquilab

STAFF

- 22 Radiation Oncologists
- 6 Medical Physicists
- 20 Residents, 9 from Africa
- 18 RTTs
- 1 mould room technician
- 1 Maintenance engineer

COMMON CANCERS

Radiotherapy INO

Breast cancer

Uterine Cervix cancer

Lung cancer

Nasopharyngeal carcinoma

Rectum



TRAINING

- Radiotherapy department at INO is a university center that trains radiation oncologists to get diploma, and (RTTs) from Morocco and from many African countries(North, west and central Africa)
- Clinical training for MPs
- Daily technical meeting to validate Treatment planning
- Dedicated day for training, courses, workshops on thursdays
- Courses for young residents on Tuesdays

Radiotherapy techniques

EBRT

2 subspecialty teams:

- Gyne- breast; Lymphoma, sarcoma
- H&N; Digestive; urology; lung;
- All patients have CT simulation, Target delineation; OAR delineation
- 3D Treatment planning
- 3D EBRT, IMRT, VMAT IGRT



Radiotherapy techniques

BRACHYTHERAPY

HDR Ir192 source: Intracavitory and interstitial Uterus, Vagina; skin

Operating room, insertion UA, CT scan simulation(MRI in treatment position) with fusion

3 D planning(Oncentra TPS)

