

# RECIST 1.1 (Response Evaluation Criteria in Solid Tumors)



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## Introduction

- RECIST widely used in oncology clinical trials to evaluate response to treatment
- Endpoints of RECIST have been used as primary or supportive data for regulatory approvals
- Provides standardized set of rules based on imaging modalities
- Measurable vs. Non-measurable (evaluable) disease dilemma at baseline

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## When to use RECIST 1.1

- All solid tumors
- Exceptions:
  - Lymphoma
  - GIST during Glivec therapy
  - HCC
  - Malignant brain tumors

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## Basics of RECIST 1.1- Method of Assessment

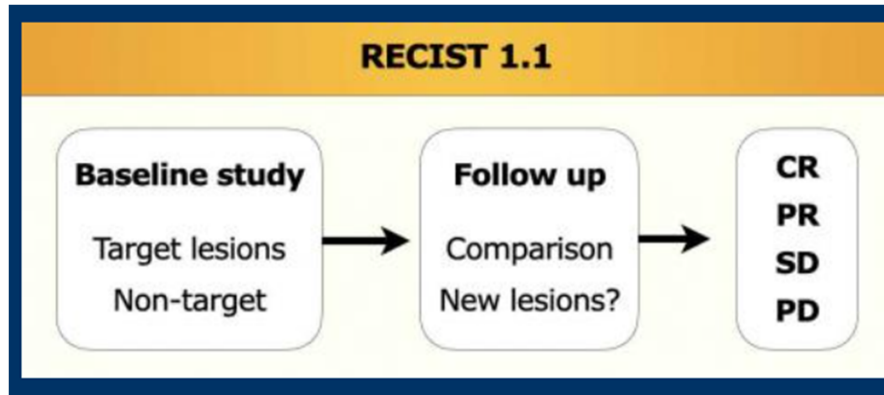
- ✓ Computerized Tomography (with IV contrast, 5 mm or thinner slices)
- ✓ Magnetic Resonance Imaging
- ✓ Chest X-ray ?

X Ultrasound

- Endoscopy and Laparoscopy
- PET/CT

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## Basics of RECIST 1.1- Tumor Measurements



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## Basics of RECIST 1.1- Baseline

- Choose “target lesions”

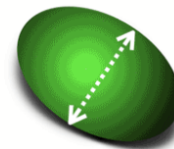
### **Tumours**

CT scan: long axis  $\geq$  10mm  
Chest X-ray: long axis  $\geq$  20mm



### **Malignant lymph nodes**

Short axis diameter  $\geq$  15mm



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## Basics of RECIST 1.1- Baseline

### **Selection of lesions**

Choose 1 to 5 target lesions, equally distributed over affected organs (with a maximum of 2 per organ)

Preferably choose largest lesions

Preferably choose well-described lesions that are easy to measure

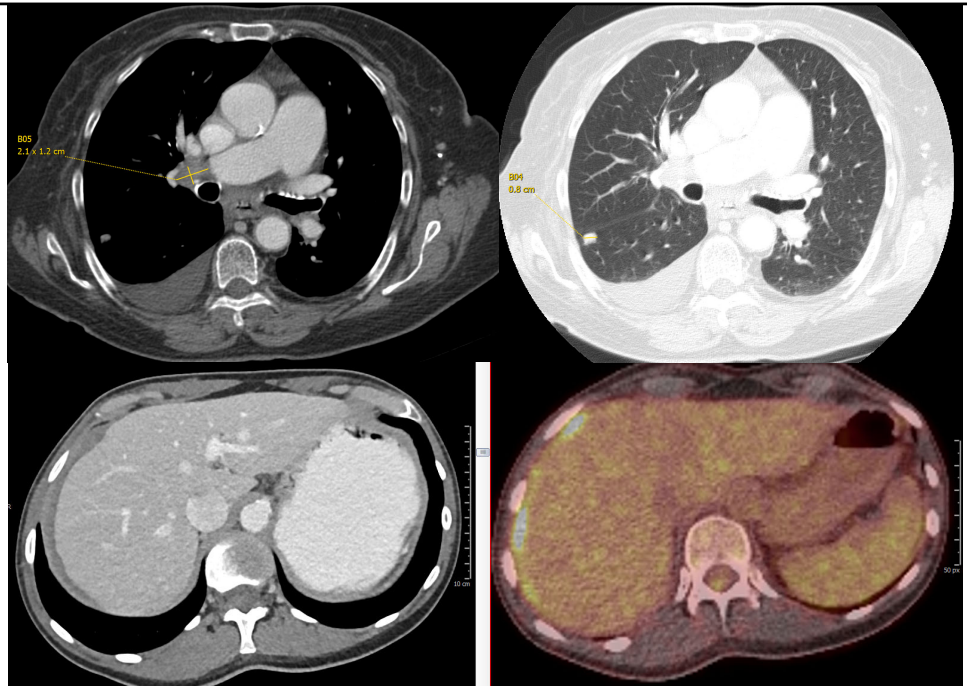
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## Basics of RECIST 1.1- Baseline

- Identify “non-target lesions”
  - All small lesions (not matching criteria for target lesion)
  - Non measurable lesions: pleural effusion, ascites, leptomeningeal disease, lymphangitic involvement of lung
  - Lesions with radiotherapy
  - Bone lesions without soft tissue component

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## Examples of Non-Target Lesions



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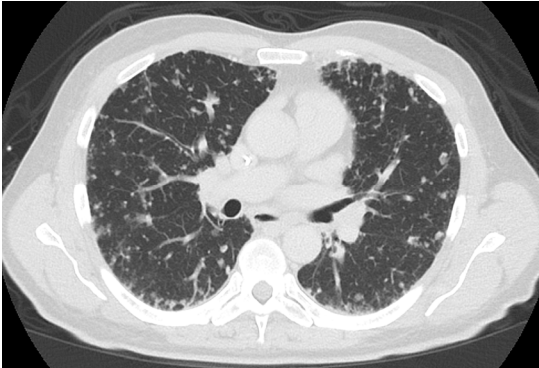
## Basics of RECIST 1.1- Baseline

- Calculate “sum of the diameters”

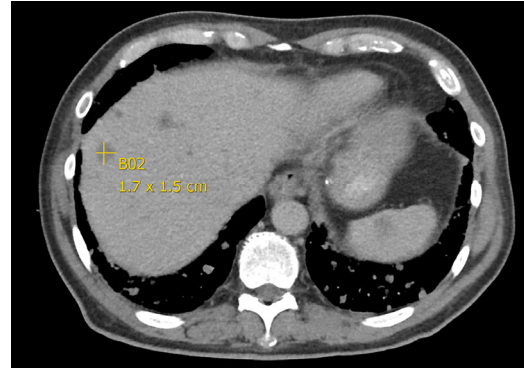
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## Example Case: Head and Neck Cancer, Outside Scan

**Miliary Lung Lesions (non-measurable)**



**Liver Lesion (Target 1)**

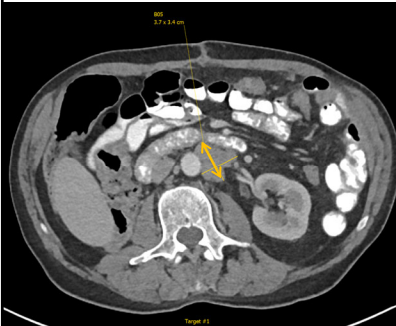


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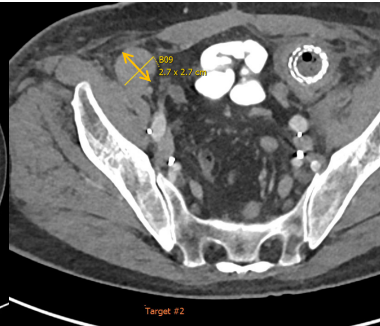
77 yo male. Bladder cancer, cystoprostatectomy

Pick-up Target lesions: 3 Target lesions

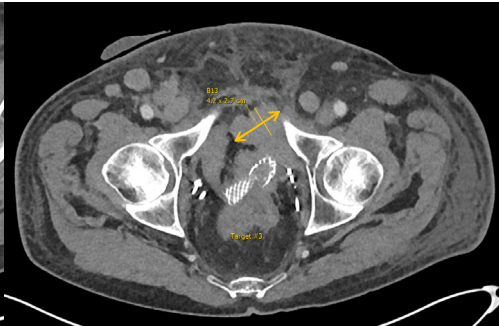
**Target lesion #1,  
Left Periaortic LAP,  
SAD**



**Target lesion #2,  
Right External Iliac LAP,  
SAD**



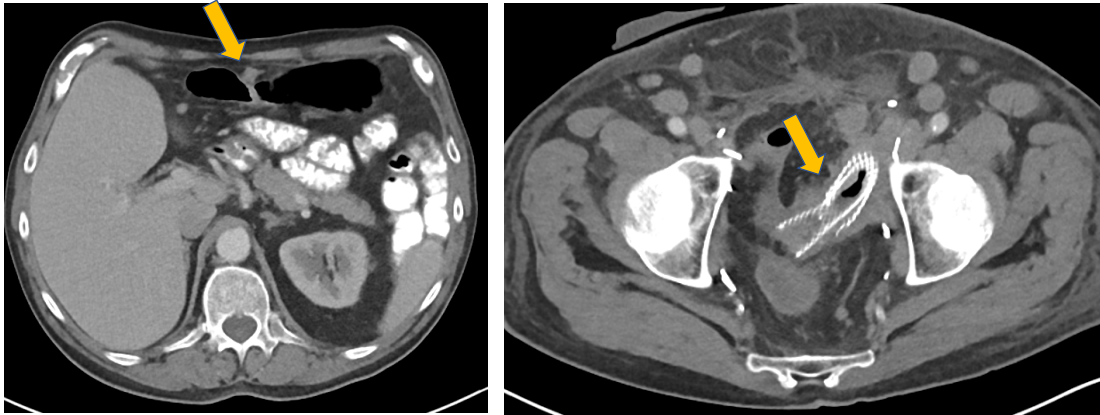
**Target lesion #3,  
Left Pelvic Lesion, LAD**



**Sum of the Diameters:  $3.4+2.7+4.2= 10.3$  cm**

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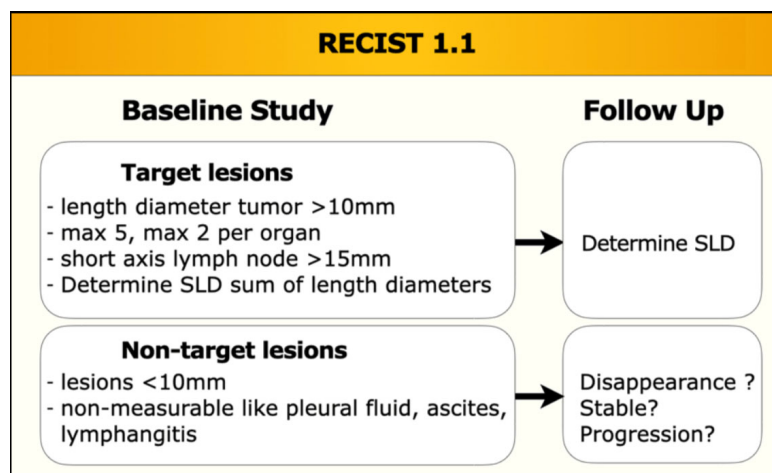
## Non Target lesions



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## Basics of RECIST 1.1- Follow- up

- Identify the same target lesions, measure the same lesions and calculate SLD
- Assess “non-target lesions”



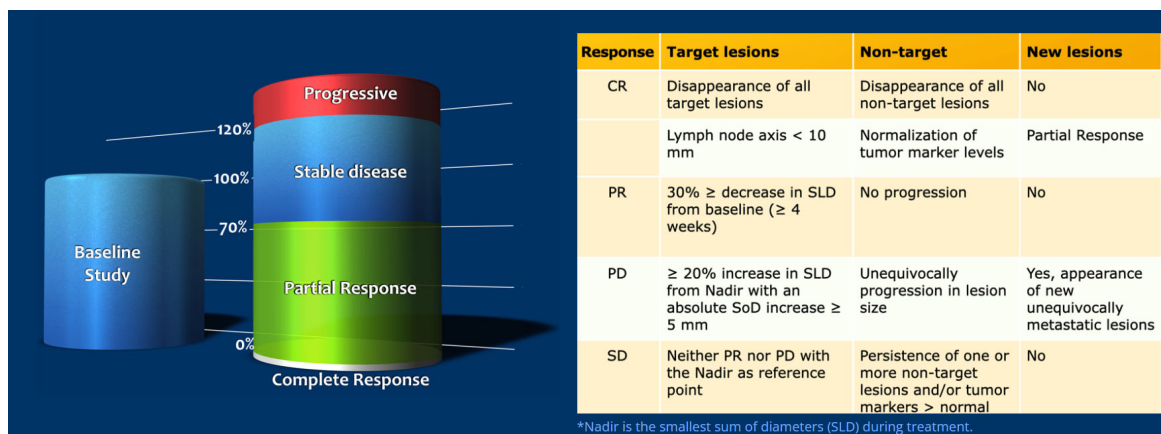
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## Basics of RECIST 1.1- Follow- up

- Don't's
  - Don't change target or non-target lesions
  - Don't measure lesions after local therapy (RF ablation, radiotherapy etc.). Label them as non-evaluable
  - Don't classify "new" sclerotic bone lesions as progressive disease
- Check for "new" lesions

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## Response Categories



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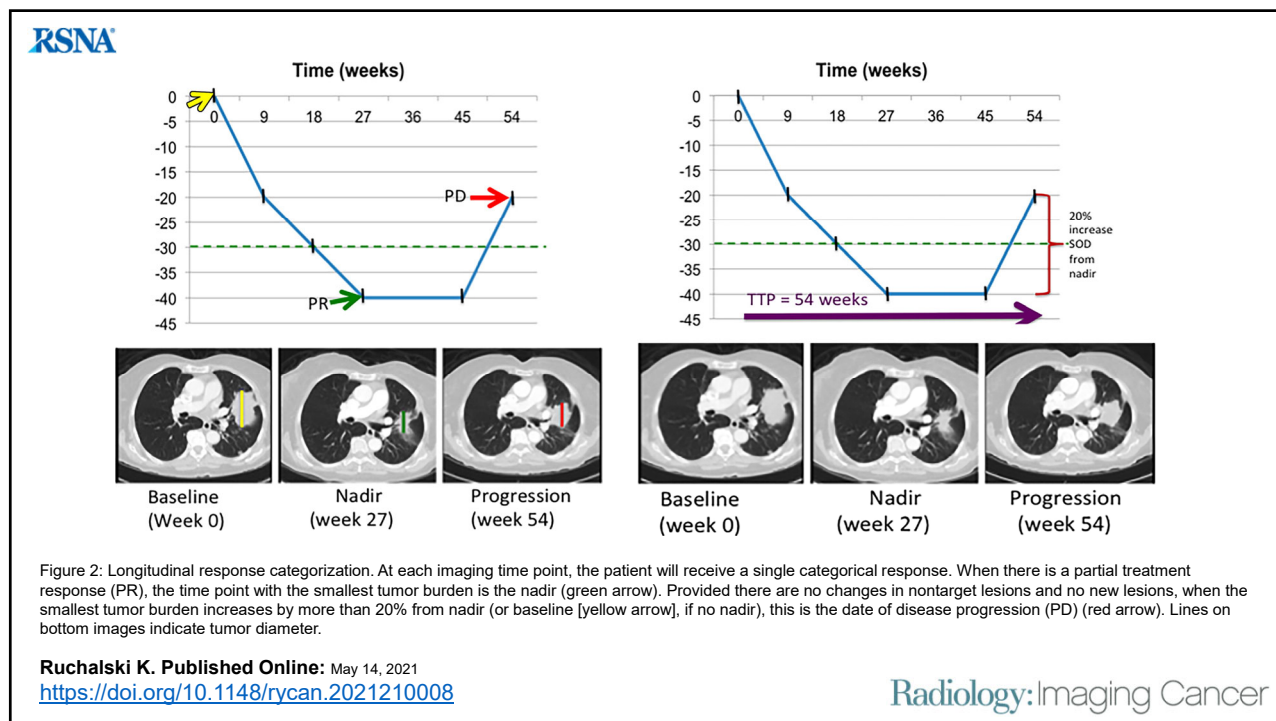


## Time point response

Target lesions	Non-target lesions	New lesions	Overall response
CR	CR	No	Complete Response
CR	Non-CR / non-PD	No	Partial Response
CR	NE	No	Partial Response
PR	Non-PD or NE	No	Partial Response
SD	Non-PD or NE	No	Stable Disease
Not Evaluated	Non-PD	No	Unevaluable
PD	Any	Yes / no	Progressive Disease
Any	PD	Yes / no	Progressive Disease
Any	Any	Yes	Progressive Disease

Non-target lesions	New lesions	Overall response
CR	No	CR
Non-CR/non-PD	No	Non-CR / Non-PD
Not all evaluated	No	Unevaluable
Unequivocal PD	Yes or No	PD
Any	Yes	PD

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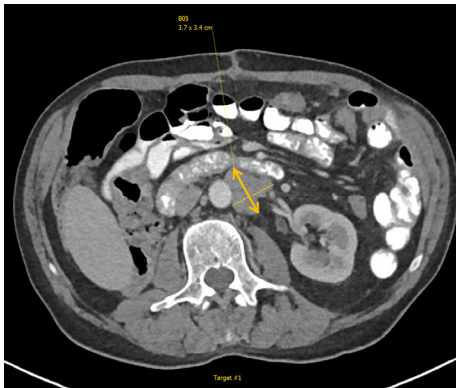


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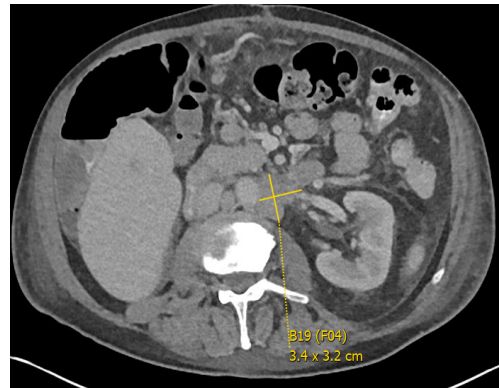
77 yo male. Bladder cancer, cystoprostatectomy

**Target lesion #1, Left Periaortic LAP, SAD**

**Baseline**



**Follow-up**

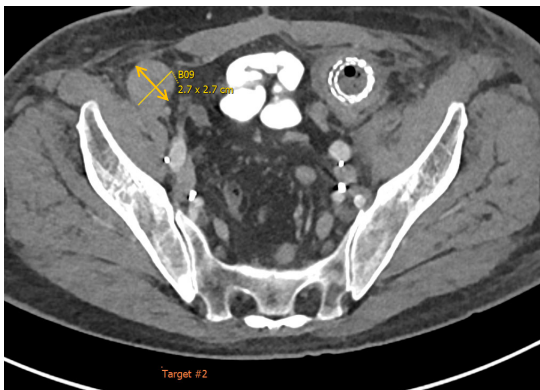


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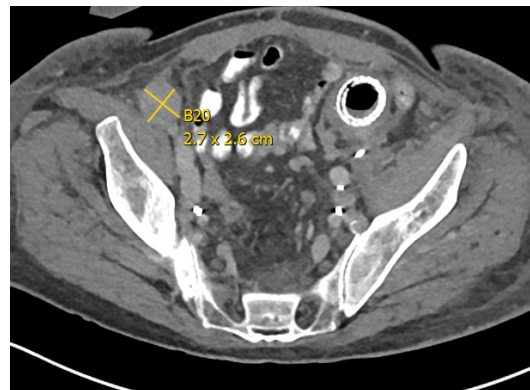
77 yo male. Bladder cancer, cystoprostatectomy

**Target lesion #2, Right External Iliac LAP, SAD**

**Baseline**



**Follow-up**

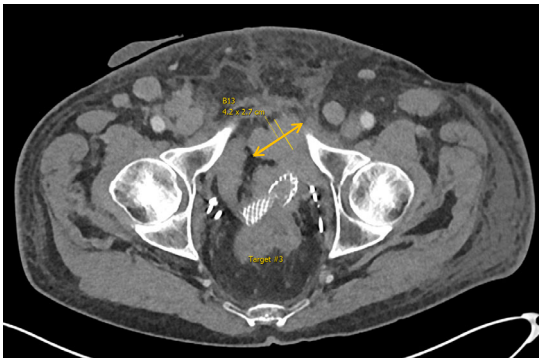


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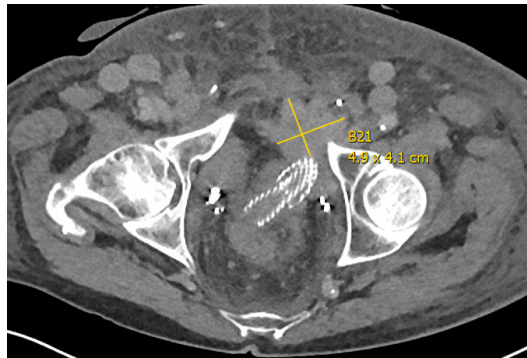
77 yo male. Bladder cancer, cystoprostatectomy

**Target lesion #3, Left Pelvic Lesion, LAD**

**Baseline**



**Follow-up**



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**Target Lesion Sum of Diameters**

- Sum of diameters baseline:  $3.4+2.7+4.2= 10.3$  cm
- Sum of diameters follow-up 1:  $3.2+2.6+4.9 =10.7$ cm
- 3.9% increase in size = SD (stable disease)
- No new lesion

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### Response Evaluation Criteria In Solid Tumours - RECIST 1.1

Details  
 ▲ Written by Jonathan Callidge Last updated 04 August 2019

Response Evaluation Criteria In Solid Tumours - RECIST 1.1 [▼ Print](#)

If you are on a small screen mobile device, turn to landscape and pinch zoom to fit the table in the view.  
**Important:** If the lesion is a node, tick the check box.  
**Important:** If NOT using nadir values, tick the check box at the bottom.

Node?	Baseline measurements (mm)	Nadir measurements (mm)	Current measurements (mm)
Lesion 1 <input checked="" type="checkbox"/>	3.4	0	3.2
Lesion 2 <input checked="" type="checkbox"/>	2.7	0	2.6
Lesion 3 <input type="checkbox"/>	4.2	0	4.9
Lesion 4 <input type="checkbox"/>	0	0	0
Lesion 5 <input type="checkbox"/>	0	0	0

Calculate without nadir values?  Tick checkbox above.

Sum of target lesion disease at baseline = 10.3 mm  
 Sum of target lesion disease at nadir = 0 mm  
 Sum of target lesion disease currently = 10.700000000000001 mm  
 Percentage change baseline to current = 3.883495145631071 %  
 Percentage change nadir to current = No nadir values used %  
 Status = Stable disease

Features of the RECIST 1.1 calculator version 1.0 Beta  
 Progressive disease is declared when there is an increase in sum of target disease ≥ 20%, nadir disease when the change is > 20% and a 20% partial response when there is a decrease in sum of target disease ≥ 30%, and complete response when all lesions have disappeared or all lesions have disappeared and all nodal disease is < 10 mm each.  
 If measurements from a previous scan of the nadir represent complete response, progressive disease will be declared if any measurement > 0 mm is entered for a target, unless the check box stating that the lesion is a node is checked, in which case only when the measurement is > 10 mm will progressive disease be declared. i.e. For a patient with complete response, a lesion that has disappeared repeatedly, there is no progressive disease.

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## Non-Target Lesion Assessment

The image displays six axial CT scan slices arranged in a 2x3 grid. The top row shows abdominal scans at different levels, highlighting various soft tissue masses and lymphadenopathy. The bottom row shows thoracic scans, including a cross-section of the lungs and mediastinum, with several nodules and enlarged lymph nodes visible. These images are used to illustrate non-target lesions in the context of RECIST 1.1 assessment.

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## Notes about assessment of progression of non-target lesions

- Unequivocal Progression: Substantial worsening in non-target lesions
- Modest increases not sufficient to call progressive disease

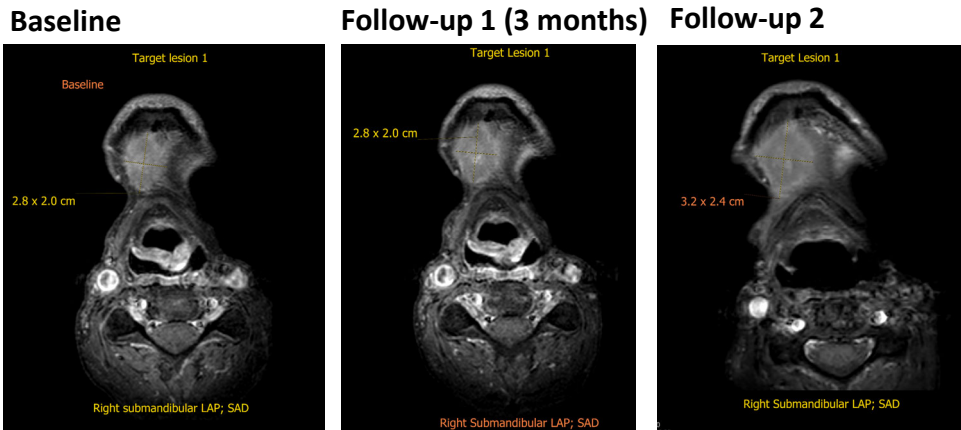
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## Response Criteria

- Target lesions that become “too small to measure” while on study should have their actual measurements recorded, if visible but cannot be measured a default value of 5 mm can be assigned
- Target lesions that become non-measurable, a value of 0 can be assigned

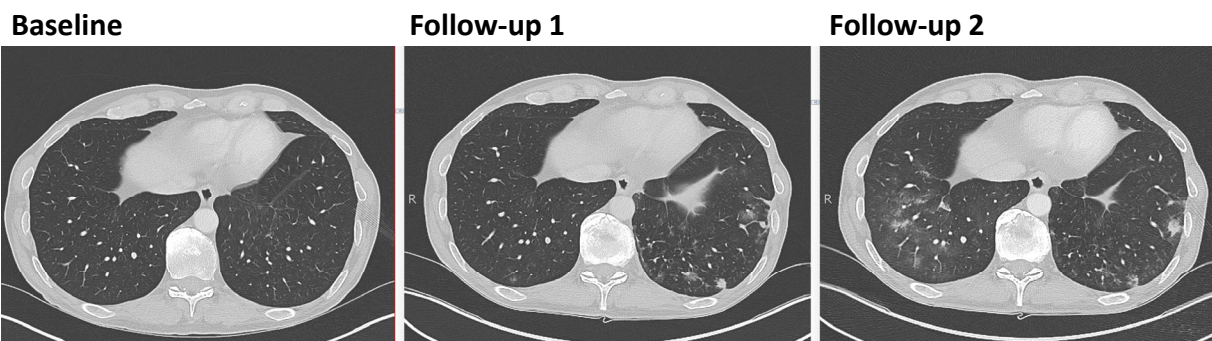
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Example: 51 yo male, esthesioneuroblastoma

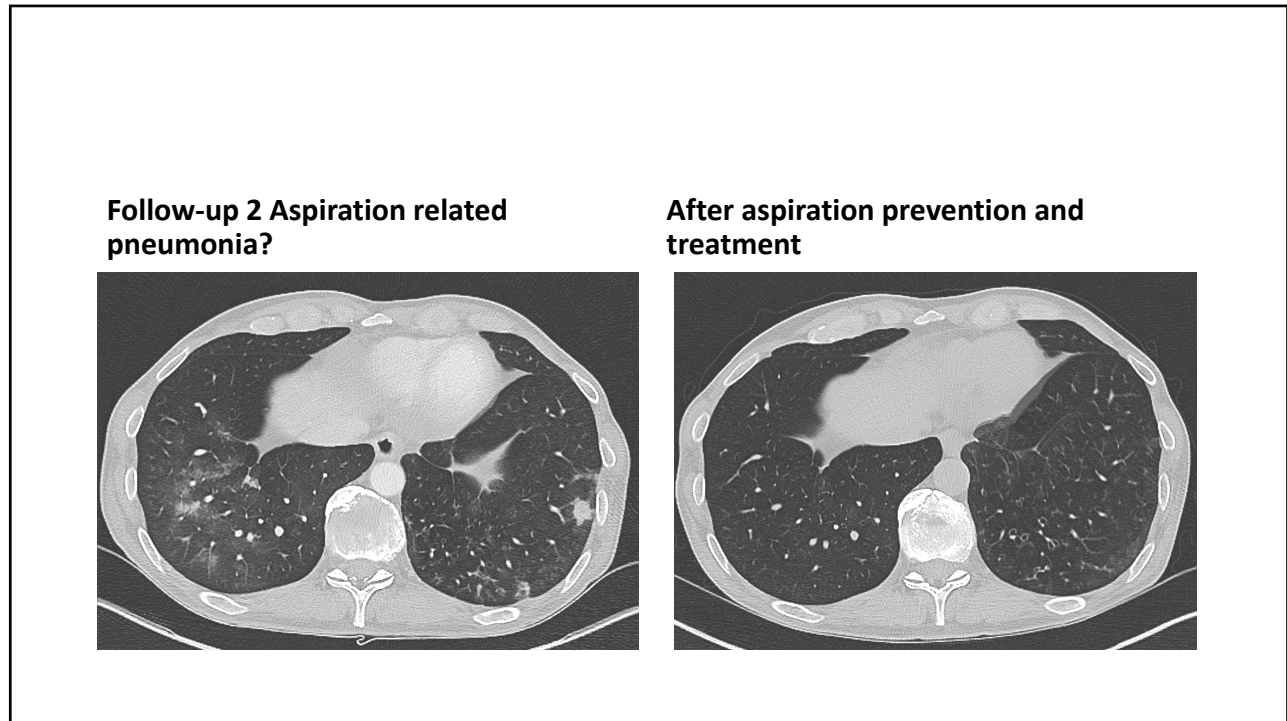


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Additional Finding

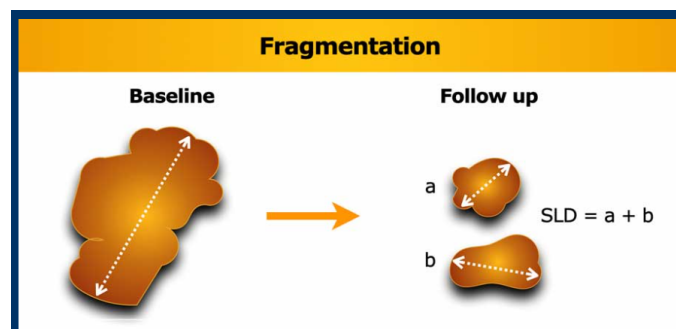


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## Fragmentation of a lesion



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## Radiology Workflow in NIH

- Image Processing Services section closed
- Teams assign their responsible person for tumor measurements
- Collaboration with radiology (AI in the protocol, co-authorship)

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## Main publications

- Eisenhauer EA et al. New response evaluation criteria in solid tumours: revised RECIST guideline (version 1.1). *Eur J Cancer*. 2009 Jan;45(2):228-47. PMID: 19097774.
- van Persijn van Meerten EL et al. RECIST revised: implications for the radiologist. A review article on the modified RECIST guideline. *Eur Radiol*. 2010 Jun;20(6):1456-67. doi: 10.1007/s00330-009-1685-y. Epub 2009 Dec 22. PMID: 20033179.
- Schwartz LH et al. RECIST 1.1-Update and clarification: From the RECIST committee. *Eur J Cancer*. 2016 Jul;62:132-7. doi: 10.1016/j.ejca.2016.03.081. Epub 2016 May 14. PMID: 27189322.

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## Websites

- <https://radiologyassistant.nl/more/recist-1-1/recist-1-1>
- <https://www.radiologytutor.com/index.php/cases/oncol/139-recist>

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## Thank You!

- Elizabeth Jones
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- Alex Ling
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- Brad Wood
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- James Gulley
- Manuk Manukyan
- Julius Strauss
- Jason Redman
- Charalampos Floudas
- Fatima Karzai
- Ravi Madan
- Clara Chen
- Roberto Mass-Moreno
- Babak Saboury

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