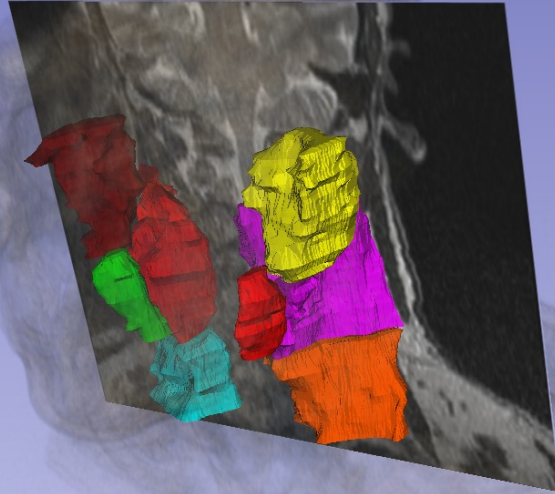


# The RT-MAC Challenge



Greg Sharp  
Carlos Cardenas  
Mark Gooding  
Abdallah Mohamed  
Harini Veeraraghavan  
Jinzhong Yang

**AAPM 2019** JUL 14–18



**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.

# Disclosures

- MG: Employee Mirada Medical
- GCS: National Science Foundation

**AAPM 2019** JUL 14–18

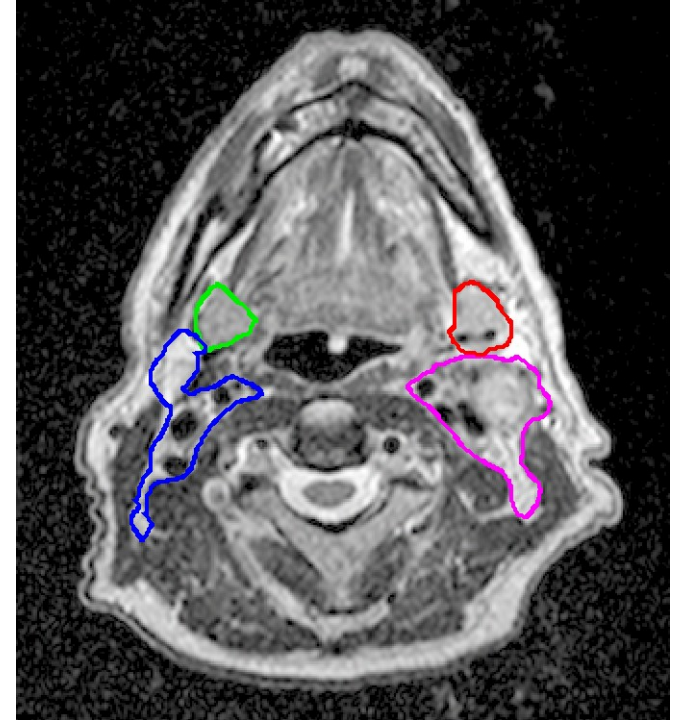


**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.

# RT-MAC Overview

- T2-weighted MRI head and neck
  - 31 training
  - 12 off-line testing
  - 12 on-line testing
- Single institute
- Single observer ground truth with QA



**AAPM 2019** JUL 14-18

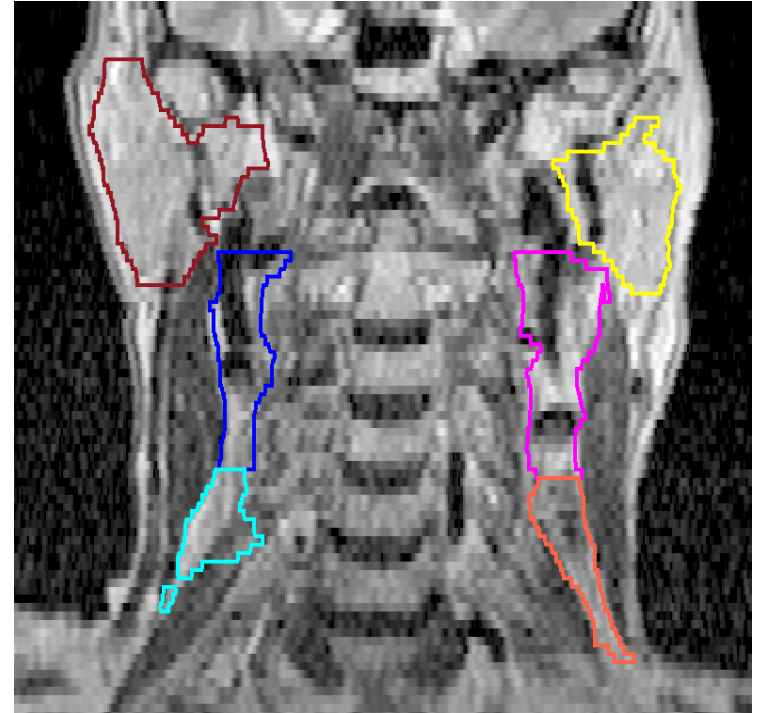


**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.

# RT-MAC Overview

- Parotid gland (x2)
- Submandibular gland (x2)
- Lymph nodes level II (x2)
- Lymph nodes level III (x2)
- Consensus guidelines  
Brouwer et al. 2015



**AAPM 2019** JUL 14-18



**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.

# RT-MAC Scoring

- Three metrics
  - Dice similarity coefficient
  - Mean surface distance
  - 95% Hausdorff distance
- Lymph node sup/inf borders cropped 1 cm to ground truth
- Lymph node level boundary reassigned to match ground truth

**AAPM 2019** JUL 14–18



**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.

# RT-MAC Scoring

- Score normalization

$$Score = \max\left(50 + 50 * \frac{T - R}{P - R}, 0\right)$$

**AAPM 2019** JUL 14-18



**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.

# RT-MAC Scoring

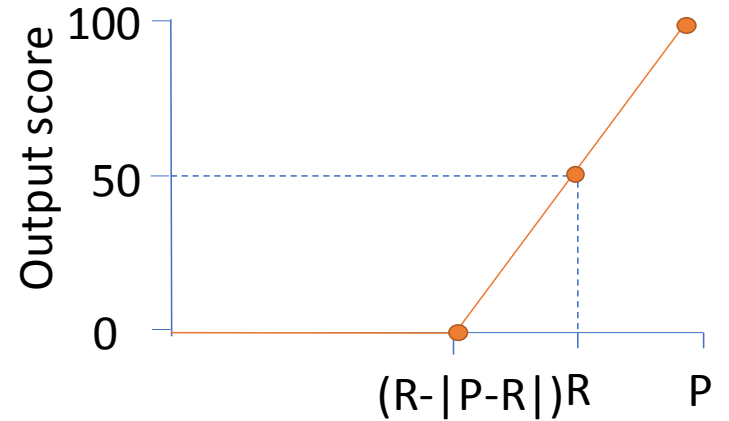
- Score normalization

$$Score = \max\left(50 + 50 * \frac{T - R}{P - R}, 0\right)$$

P = perfect score

T = test score

R = reference score



**AAPM 2019** JUL 14-18

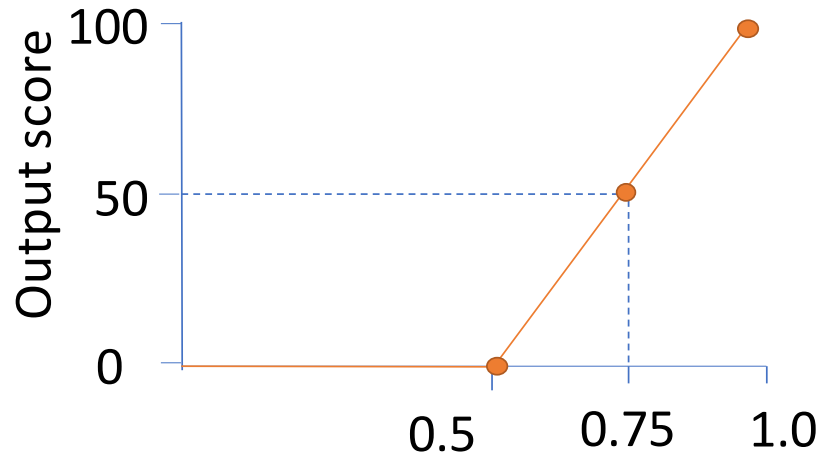


**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.

# RT-MAC Scoring

$$\text{Score} = \max\left(50 + 50 * \frac{0.75 - 0.5}{1 - 0.5}, 0\right)$$



**AAPM 2019** JUL 14-18



**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.



# Normalization coefficients

	Dice	Avg dist (mm)	H95 (mm)
Parotid	.85	1.6	6.1
Submandib.	.71	2.2	7.1
LN II	.79	2.0	8.5
LN III	.81	1.4	6.2

**AAPM 2019** JUL 14-18



**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.

# Off-line challenge

xuefeng	67.7
nuotong	65.9
pjordan	65.8
cjhsmile	63.0
jkorte	62.7
Zhao	61.9
markjoe	58.1
rachel.baggs	57.8
djrhee08	54.4

Reference score  
multi-atlas: 46.9

**AAPM 2019** JUL 14-18



**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.

# On-line challenge

TBD	TBD

**AAPM 2019** JUL 14-18



**61<sup>ST</sup> ANNUAL MEETING & EXHIBITION | SAN ANTONIO, TX**

BUILDING BRIDGES. CULTIVATING SAFETY. GROWING VALUE.