Investigation of Treatment Procedure to Optimize Photoimmunotherapy for Head and Neck Cancer

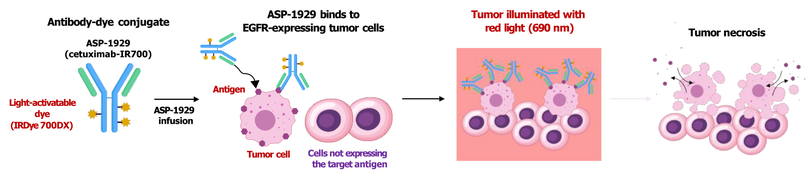
Nobuhiro Hanai[1]; Kiyoaki Tsukahara[2]; Takeshi Shinozaki[3]; Ryuichi Hayashi[3]; Hirotaka Shinomiya[4]; Dai Imamura[5]; Manami Tabuchi[5] | **AHNS 2026**

[1]Aichi Cancer Center Hospital; [2]Tokyo Medical University; [3]National Cancer Center Hospital East; [4]Kobe University; [5]Rakuten Medical K.K.

Background

Photoimmunotherapy (PIT)

PIT is a targeted treatment for head and neck cancer. It combines a drug with light-activating dye for killing the tumors.[1]



ASP-1929: Cetuximab (anti-EGFR antibody) + IRDye® 700DX (light-activatable dye)

- Clinical studies[2][3] of ASP-1929 PIT in head and neck cancer have demonstrated meaningful antitumor activity and a manageable safety profile.
- In ASP-1929-401 study, meaningful tumor volume responses were observed (ORR 60.8% and DCR 95.9% per laser-illuminated lesion), and the safety profile was consistent with previous studies.
- The impact of illumination method and tumor coverage on treatment outcomes has not been fully characterized.

Methods

Open-label observational study (ASP-1929-401)

24 centers	77 patients*

*Including 1 ineligible patient

Endpoints:

- Primary endpoint: Antitumor effect per laser-illuminated lesion, measured by tumor volume reduction rate
- Key secondary endpoint: Incidence of treatment-related adverse events
- Key exploratory endpoint: Impact of PIT procedures on efficacy and safety

Patient eligibility:

- Unresectable, locally advanced/recurrent head and neck cancer
- Medical Imaging Data Availability for Review

Current analysis:

- Association of tumor coverage within the effective illumination range with tumor volume reduction
- The impact of illumination procedures on TRAEs

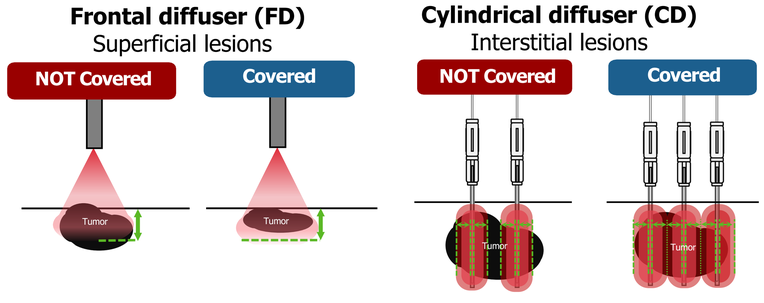
Data Review Board established (four physicians):

Evaluation of tumor coverage using two different definitions of the effective illumination range and risks of interest under outcome-blinded assessment

Effective illumination range

Definition	FD : depth	CD: radius
Initial assumption	10 mm	10 mm
Refined hypothesis*	5 mm	7 mm

*Based on the clinical impression of physicians experienced in PIT, a refined effective illumination range was defined as FD 5 mm depth and CD 7 mm radius, and tumor coverage was evaluated using this range

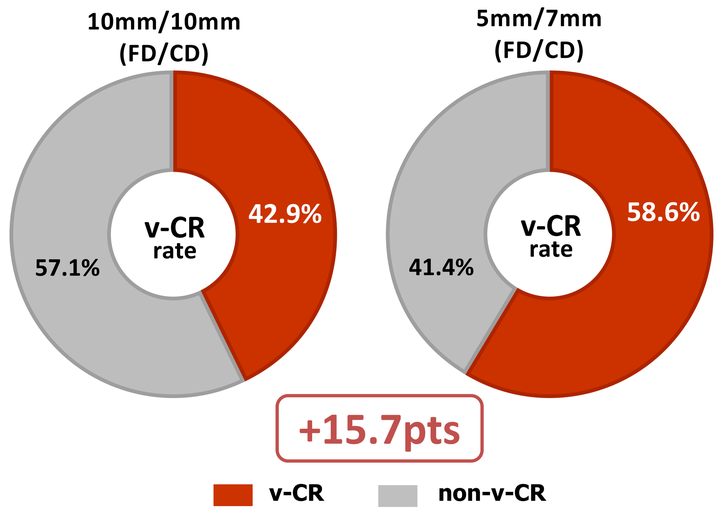


Key findings

- v-CR rate was higher with complete tumor coverage at every illumination using FD/CD 5 mm/7 mm than using FD/CD 10 mm/10 mm (58.6% vs 42.9%)
- With an effective illumination range of FD 5 mm depth and CD 7 mm radius, complete tumor coverage at all illuminations was significantly associated with more favorable tumor responses (CR/PR/SD/PD) than incomplete coverage at ≥1 illumination (p = 0.0065)
- Careful treatment planning is required to optimize efficacy and safety

Results

v-CR rate by effective illumination range with complete tumor coverage at every illumination



Refined effective illumination range was associated with a higher v-CR rate

Patient characteristics
- Median age: 73.5 years
- Male: 75.0%
- ~94.7% squamous cell carcinoma

Prior treatment
- Surgery: 77.8%
- Radiotherapy: 46.0%
- Chemoradiation: 54.0%
- Chemotherapy: 36.5%

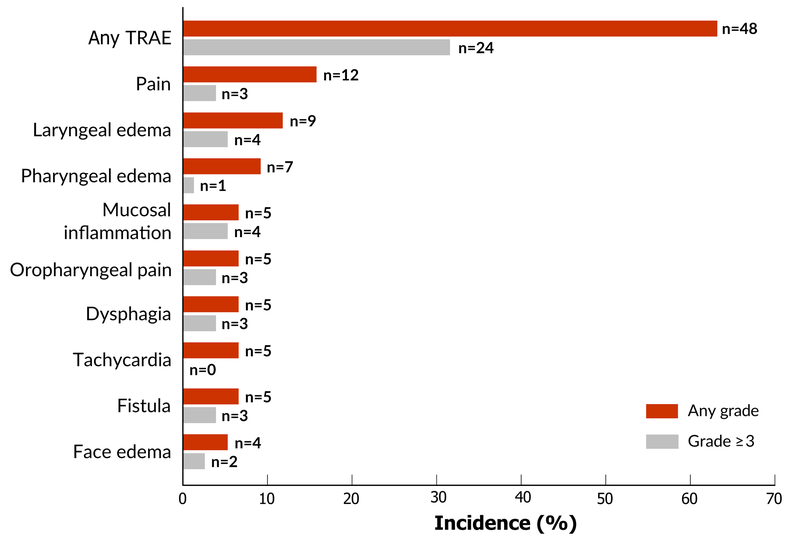
Tumor characteristics and PIT implementation

Tumor size and illumination strategy varied across patients, reflecting real-world clinical practice.

Baseline characteristic		
Target lesions for PIT (n=78 lesions)	**Oropharynx**	**24 (30.8%)**
	Oral cavity	**16 (20.5%)**
	Regional lymph node	**12 (15.4%)**
	Paranasal sinuses	**10 (12.8%)**
	Nasopharynx	6 (7.7%)
	Hypopharynx	1 (1.3%)
	Larynx	1 (1.3%)
	Major salivary gland	1 (1.3%)
	Other	7 (9.0%)
Tumor volume (cm^3) (n=74 lesions)	Mean ± SD	7.4289 ± 17.0220
	Median	3.2855
PIT cycle (N=76 patients)	1 cycle	30 (39.5%)
	2 cycles	23 (30.3%)
	3 cycles	15 (19.7%)
	4 cycles	8 (10.5%)

Safety

Treatment-related adverse events (TRAEs)



Risks of interest assessed by Data Review Board

Risks of interest (N=76)	With risk	Without risk
Severe Bleeding	3	73
Airway Obstruction	22	54**
Fistula	2	74
Other AEs Affecting Severe Function Impairment*	3	73

*cerebrospinal fluid leak, visual impairment, blindness
**Includes 16 patients with tracheostomy prior to PIT illumination

Occurrence of TRAEs associated with risks of interest

TRAEs by risks of interest (N=76)	# of cases	With risk	Without risk
Severe Bleeding	1 (1.3%)*	0	1
Airway Obstruction**	6 (7.9%)	4	2
Fistula	5 (6.6%)	2	3
Other AEs Affecting Severe Function Impairment***	0	0	0

* Grade 2
**Any grade tracheal stenosis, Grade 3 or higher laryngeal edema or pharyngeal edema
***cerebrospinal fluid leak, visual impairment, blindness

Limitations

Exploratory retrospective analysis with potential reviewer bias.

Conclusions

- Complete coverage of the PIT-treated lesion appears to be important for tumor volume reduction in PIT
- Effective illumination range may be smaller than previously assumed:
  - FD: 5 mm depth
  - CD: 7 mm radius
- To minimize the risk of severe TRAEs or functional loss due to illumination, treatment planning should carefully consider the surrounding anatomy
- Pre-treatment imaging alone may not predict severe TRAEs or functional loss, underscoring the importance of thorough assessment and patient risk communication

v-CR: volume-based complete response; v-PD: volume-based progressive disease; v-PR: volume-based partial response; v-SD: volume-based stable disease; EGFR: epidermal growth factor receptor; TRAE: treatment-related adverse event; ORR: objective response rate; DCR: disease control rate; AE: adverse event

References: [1] Mitsunaga M et al. Nature Medicine. 2011;17(12):1685-91 [2] Cognetti DM et al. Head Neck. 2021;43:3875–87 [3] Tahara M et al. Int J Clin Oncol. 2021;26:1812–21