

## Data S1: Explanation of patient's TNM stages

### Patient 1

#### TNM Staging: T1a, Nx, Mx

- T1a: Tumor is  $\leq 2$  cm and confined to the thyroid.
- Nx: Lymph nodes were not assessed.
- Mx: Distant metastasis not assessed.

**Summary:** Small, localized tumor in the thyroid with no lymph node or distant metastasis information. Early-stage thyroid cancer.

### Patient 2

- TNM Staging: T1b, N1b, Mx
- T1b: Tumor is  $>1$  cm but  $\leq 2$  cm, confined to the thyroid.
- N1b: Cancer has spread to lymph nodes in the lateral neck or mediastinum.
- Mx: Distant metastasis not assessed.

**Summary:** Small tumor with lymph node spread, making it a Stage II cancer.

### Patient 3

- TNM Staging: T4a, N0, Mx
- T4a: Tumor invades nearby structures (e.g., larynx, trachea) but is resectable.
- N0: No lymph node spread.
- Mx: Distant metastasis not assessed.

**Summary:** Locally advanced thyroid cancer invading nearby structures but no lymph node or distant spread.

### Patient 4

- TNM Staging: T1a, Nx, Mx
- T1a: Tumor is  $\leq 2$  cm and confined to the thyroid.
- Nx: Lymph nodes not assessed.
- Mx: Distant metastasis not assessed.

**Summary:** Small, localized tumor with no lymph node or metastasis information. Early-stage thyroid cancer with "Double Cancer" noted.

### Patient 5

- TNM Staging: T1a, N0, Mx
- T1a: Tumor  $\leq 2$  cm and confined to the thyroid.
- N0: No lymph node spread.
- Mx: Distant metastasis not assessed.

**Summary:** Small, localized tumor with no lymph node involvement. Early-stage thyroid cancer.

### Patient 6

- TNM Staging: T1b, Nx, Mx
- T1b: Tumor is  $>1$  cm but  $\leq 2$  cm, confined to the thyroid.

- Nx: Lymph nodes not assessed.
- Mx: Distant metastasis not assessed.

**Summary:** Small tumor with uncertain lymph node or metastasis status. Early-stage cancer.

### Patient 7

- TNM Staging: T1b, N0, Mx
- T1b: Tumor is  $>1$  cm but  $\leq 2$  cm, confined to the thyroid.
- N0: No lymph node spread.
- Mx: Distant metastasis not assessed.

**Summary:** Small, localized tumor with no lymph node involvement. Early-stage thyroid cancer.

### Patient 8

- TNM Staging: T2, N0, Mx
- T2: Tumor is  $>2$  cm but  $\leq 4$  cm, confined to the thyroid.
- N0: No lymph node spread.
- Mx: Distant metastasis not assessed.

**Summary:** Moderate-sized tumor confined to the thyroid with no lymph node involvement. Early-stage thyroid cancer.

### Patient 9

- TNM Staging: T1b, N1b, Mx
- T1b: Tumor is  $>1$  cm but  $\leq 2$  cm, confined to the thyroid.
- N1b: Lymph node spread to lateral neck or mediastinum.
- Mx: Distant metastasis not assessed.

**Summary:** Small tumor with lymph node spread. Classified as Stage IVA cancer due to lymph node involvement and recurrence.

### Patient 10

- TNM Staging: T2, N1, Mx
- T2: Tumor is  $>2$  cm but  $\leq 4$  cm, confined to the thyroid.
- N1: Spread to regional lymph nodes.
- Mx: Distant metastasis not assessed.

**Summary:** Moderate-sized tumor with regional lymph node spread. Stage II thyroid cancer.

### Patient 11

- TNM Staging: T1a, Nx, Mx
- T1a: Tumor is  $\leq 2$  cm and confined to the thyroid.
- Nx: Lymph nodes not assessed.
- Mx: Distant metastasis not assessed.

**Summary:** Small, localized tumor with uncertain lymph node or metastasis status. Early-stage thyroid cancer.