# Prognostic Value of Single Drug Response Predictions (SDRP) in Canine T-cell Lymphoma

## OVERVIEW

This retrospective analysis uses clinical data from the ImpriMed database to assess the clinical utility of the **ImpriMed Single Drug Response Predictions (SDRP)** platform in 136 dogs with T-cell lymphoma, including treatment-naïve (n=68) and previously treated (n=68) patients. Given the aggressive nature and poorer historical prognosis of T-cell subtypes, precision medicine tools may play an important role in guiding treatment selection.

## Methodology

Patient responses were categorized using the Veterinary Cooperative Oncology Group (VCOG 1.0) clinical response criteria[1].

- **Positive Responders** | Patients transitioning to an improved remission state following single-agent administration.
- **Non-Responders** | Patients with no response in active disease or those experiencing a disease progression event.

The SDRP platform generated probability scores for a positive response across 13 common chemotherapeutic agents and corticosteroids. A 50% probability threshold was used to determine prediction scores as indicative of a positive response (above the threshold) or no response (below the threshold).

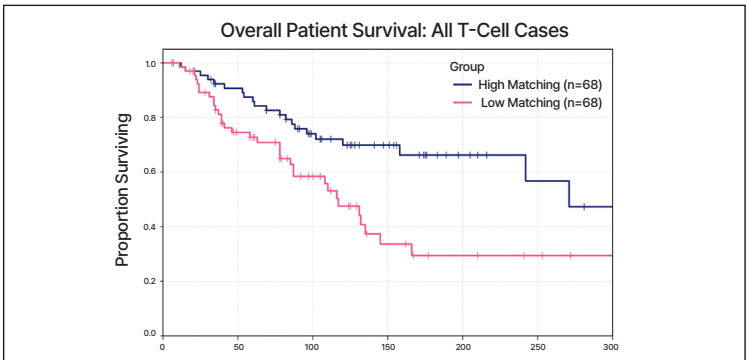
## Overall Survival and Treatment Matching

Overall survival (OS) was evaluated using a **matching-score approach**[2], comparing patients treated with drugs predicted to be effective (high-matching group) versus those treated with drugs predicted to be ineffective (low-matching group).

**Median OS**

271 days for the high-matching group vs.
117 days for the low-matching group

A statistically significant separation in OS was observed between groups (***p*=0.0078**). Treatment aligned with positive predictions (>0.5) were associated with a **two-fold improvement in survival** (hazard ratio=2.05).




| Days | 0 | 50 days | 100 days | 150 days | 200 days | 250 days | 300 days |
|---|---|---|---|---|---|---|---|
| High Matching (n=68) | 68 | 56 | 38 | 23 | 10 | 6 | 4 |
| Low Matching (n=68) | 68 | 42 | 24 | 9 | 5 | 3 | 1 |

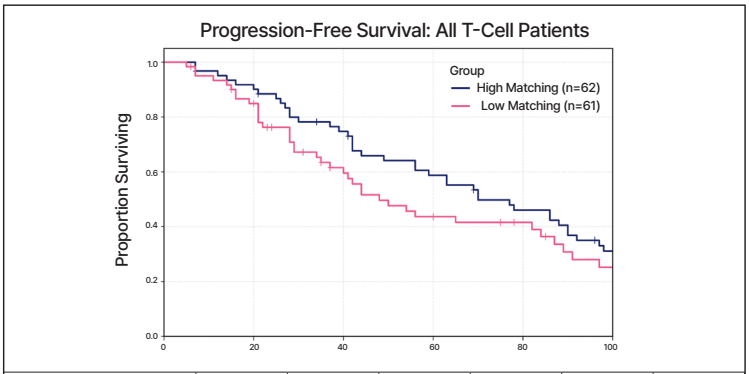
## Progression-Free Survival

Progression-free survival (PFS) was assessed in **123 T-cell cases** with available post-sampling survival data. Although statistical significance was not achieved, patients in the high-matching group demonstrated longer PFS:

**Median PFS**

70 days for the high-matching group vs.
48 days for the low-matching group

Patients receiving treatments aligned with positive predictions were **1.2 times more likely** to experience prolonged PFS. Trends for PFS were consistent with those observed for OS.




| Days | 0 | 20 days | 40 days | 60 days | 80 days | 100 days |
|---|---|---|---|---|---|---|
| High Matching (n=62) | 62 | 54 | 43 | 33 | 25 | 16 |
| Low Matching (n=61) | 61 | 49 | 30 | 21 | 16 | 9 |

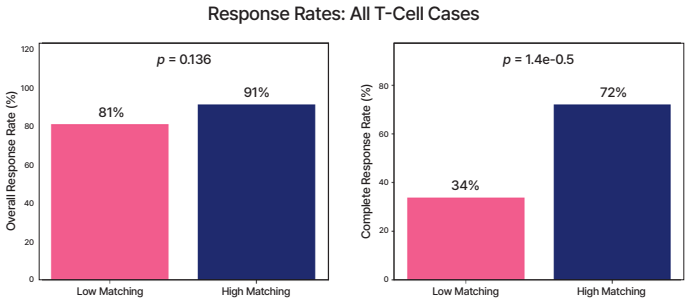

**References**

1. Vail, D. M. et al. Response evaluation criteria for peripheral nodal lymphoma in dogs (v1.0) – a Veterinary Cooperative Oncology Group (VCOG) consensus document. *Vet. Comp. Oncol.* **8**, 28–37 (2010).
2. Callegari, A. J. et al. Multimodal machine learning models identify chemotherapy drugs with prospective clinical efficacy in dogs with relapsed B-cell lymphoma. *Front. Oncol.* **14**, 1304144 (2024).

## Response Rates

While the overall response rate was modestly higher in the high-matching group, the most pronounced difference was observed in **complete remission rate**:

- **Overall Response Rate (ORR)**
  91% in the high-matching group vs.
  81% in the low-matching group ($p$=0.136)
- **Complete Response Rate (CR)**
  72% in the high-matching group vs.
  34% in the low-matching group ($p$=1.4×10$^{-5}$)




These findings indicate that ImpriMed-guided therapy is strongly associated with a higher likelihood of achieving CR.

## Subgroup Analysis: Naïve vs. Previously Treated Patients

### Naïve T-Cell Patients

- **Overall Survival (n=68)**
  Median OS was 271 days in the high-matching group versus 132 days in the low-matching group, with statistically significant separation ($p$=0.028; hazard ratio=2.61).
- **Progression-Free Survival (n=65)**
  Median PFS was 88 days for the high-matching group versus 56 days for the low-matching group; separation was not statistically significant.

### Previously Treated T-Cell Patients

- **Overall Survival (n=68)**
  Median OS was 242 days in the high-matching group versus 116 days in the low-matching group; separation was not statistically significant.
- **Progression-Free Survival (n=58)**
  Median PFS was 63 days for the high-matching group versus 36 days for the low-matching group; separation was not statistically significant.

### Summary of OS by Treatment Status

| Patient Category | Median OS (High vs. Low Match) | Statistical Significance | Hazard Ratio (95% CI) |
|---|---|---|---|
| **Naïve T-Cell** (n=68) | 271 days vs. 132 days | Significant ($p$=0.028) | 2.61 [1.07, 6.33] |
| **Previously Treated T-Cell** (n=68) | 242 days vs. 116 days | Non-significant | 1.58 [0.78, 3.22] |

## Interpretation and Clinical Relevance

These findings support the clinical utility of the SDRP platform in improving outcomes for canine T-cell lymphoma. Model performance demonstrated a balanced discrimination between responders and non-responders, with a **ROC-AUC of 76%**, indicating a meaningful ranking of treatment response probabilities. Notably, patients receiving treatments that aligned with positive predictions experienced significantly longer overall survival and markedly higher complete remission rates within the high matching groups compared to low matching groups.

While prospective validation is warranted, this analysis provides strong evidence that SDRP-guided treatment selection can enhance clinical decision-making and improve outcomes in canine T-cell lymphoma.

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