Previous studies have reported that the rate of change in CA19-9 levels after two courses of GnP was an early predictive marker of GnP efficacy (36, 37). A decrease in CA19-9 ≥50% or 60% after two courses of GnP led to significantly more prolonged OS than a lesser reduction in CA19-9 (36, 37). While these results are informative, the cutoff value remains controversial. In addition, in previous reports, the number of patients and examination factors in multivariate analysis were small, and no multivariate analyses included other indicators. To our knowledge, no study prior to ours performed ROC analysis to determine the cutoff value for the changing rate of CA19-9 after two cycles of GnP, or performed multivariate analysis including multiple indicators; thus, the results of this study may be considered more reliable. These results indicated that prognosis may be improved in the pre-low-risk and ineffective groups by changing the treatment.

Although progression-free survival in patients with UR-PDAC receiving GnP was reported to be 5.5 months in the MPACT trial, the time to most decrease and re-increase of the CA19-9 level were not mentioned (11). In the present study, it was clarified that there was a correlation between the effect of GnP and the period of decrease in CA19-9. This information may be useful if surgical resection is planned during the GnP treatment period.

This study has some limitations. Firstly, although there was no statistically significant difference in OS between the presence and absence of pre- and post-GnP treatments, the pre- and post-GnP treatments were not identical in all patients. In particular, concerning post-GnP treatments, a selection bias might have occurred. These variations may have skewed the outcomes during different periods of the study. Secondly, because patients with baseline CA19-9 ≤37 U/ml were excluded from this study, the results may not be generalizable to such patients. Finally, this was a retrospective study performed at a single institution, and included a limited number of participants. The biases inherent to such settings should be taken into consideration.

### Conclusion

In conclusion, we were able to predict the prognosis of PDAC patients who were treated with GnP, based on pre- and intra-chemotherapeutic factors. The CA19-9 level, the CONUT score, the rate of change in CA19-9 level over two treatment cycles, and the treatment validity period may be particularly useful for predicting prognosis in this setting. Future studies should aim to determine the prospective utility of these laboratory markers and construct the best therapeutic strategy for patients with PDAC who are being treated with GnP.

### Conflicts of Interest

The Authors declare that they have no competing interests.