



Disease Characteristics and Treatment Response in Plasma Cell Disorders Patients based on genetic abnormalities from Fluorescence In Situ Hybridization

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INTRODUCTION

Multiple myeloma (MM) represents the third most common hematologic malignancy in Thailand. Patient prognosis is strongly associated with cytogenetic abnormalities detected through fluorescence in situ hybridization (FISH). This study aimed to evaluate the proportion of genetic abnormalities, clinical characteristics of high-risk FISH findings, and treatment responses in MM patients at Siriraj Hospital.

OBJECTIVES

Primary objective:

- To study the genetic landscape of FISH in Thai Plasma cell disorders patients (MM and Plasma cell leukemia).

Secondary objective:

- To study disease characteristic and response rate in MM patients based on genetic abnormalities from FISH.
- To study progression free survival in MM patients based on genetic abnormalities from FISH.

METHODS

This retrospective and prospective study included 113 patients diagnosed with MM or plasma cell leukemia between January 2020 and December 2023 who underwent cytogenetic testing by FISH. The study analyzed their clinical characteristics, treatment regimens, and survival rates.

RESULTS

High-risk cytogenetics were detected in 20/113 patients (18%), comprising t(4;14) in 12%, t(14;16) in 1%, and del(17p) in 7% of cases. Gain1q21 and Amp1q21 was detected in 34% and 20% of patients, respectively.

Patients with high-risk cytogenetics showed distinct clinical characteristics compared to their non-high-risk counterparts. They demonstrated significantly elevated globulin levels (7.2 vs 5.0 g/dL, $P = 0.005$) and M-protein levels (5.0 vs 2.4 g/dL, $P = 0.001$), while had lower platelet counts (171.9 vs 222.6 $\times 10^3/\mu\text{L}$, $P = 0.028$).

Over a median follow-up period of 25 months, the overall cohort achieved a median PFS of 24 months and median OS of 91 months. Patients with high-risk FISH abnormalities demonstrated a median PFS of 30 months and median OS of 87 months.

While individual genetic abnormalities generally showed no significant impact on survival outcomes compared to FISH-negative cases, amp1q21 was significantly associated with poor prognosis, resulting in shorter PFS (11 vs 26 months, $P = 0.026$) and reduced OS (44 months vs NR, $P = 0.042$).

Table 1: Prevalence of cytogenetic abnormalities

Genetic abnormalities	Tested <i>N</i>	Abnormality <i>N</i> (%)
t(4;14)	105	13 (12)
t(14;16)	103	1 (1)
t(14;20)	15	0
Gain1q21	107	36 (34)
Amp1q21	107	21 (20)
del(1p)	107	7 (7)
del(17p)	107	7 (7)
del(13q)	21	8 (38)
IGH break apart	102	37 (36)

Figure 1: Progression free survival and overall survival in all cohort

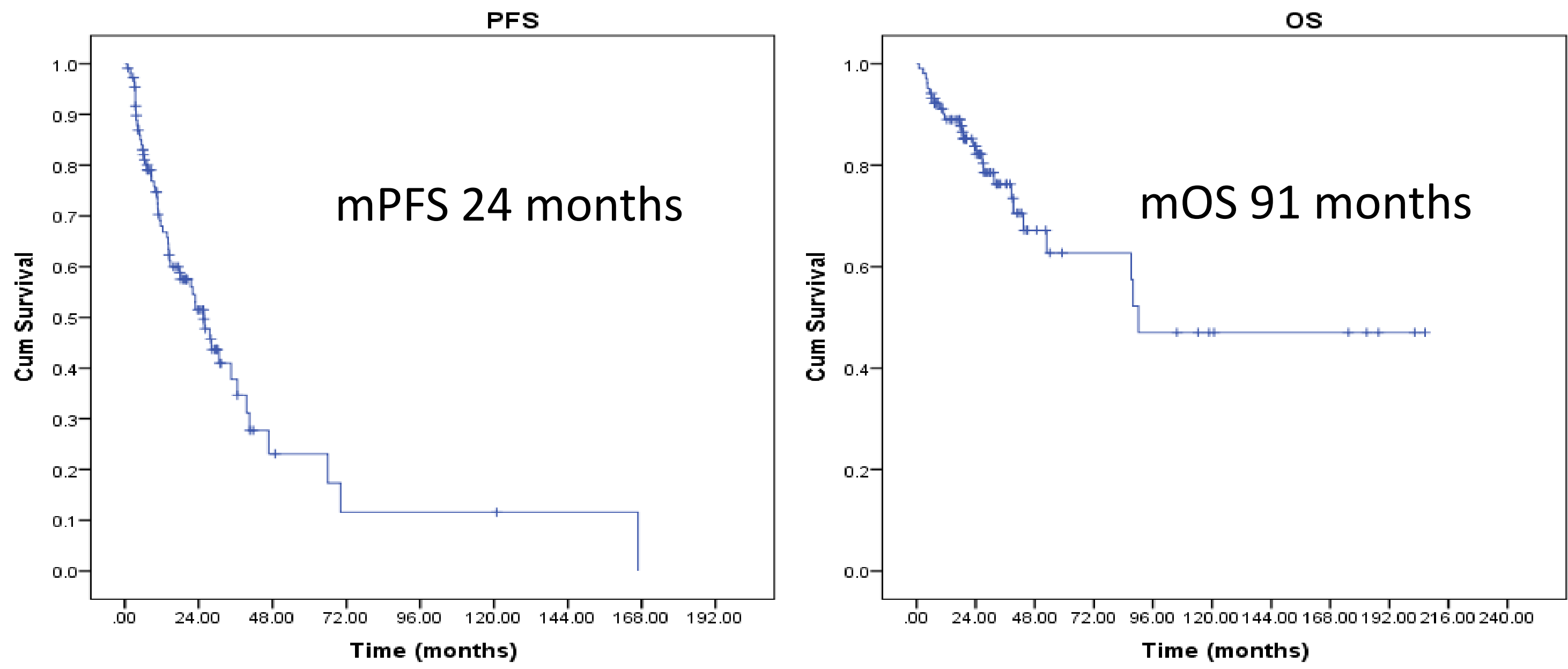


Figure 2: PFS of patients based on specific cytogenetic abnormalities

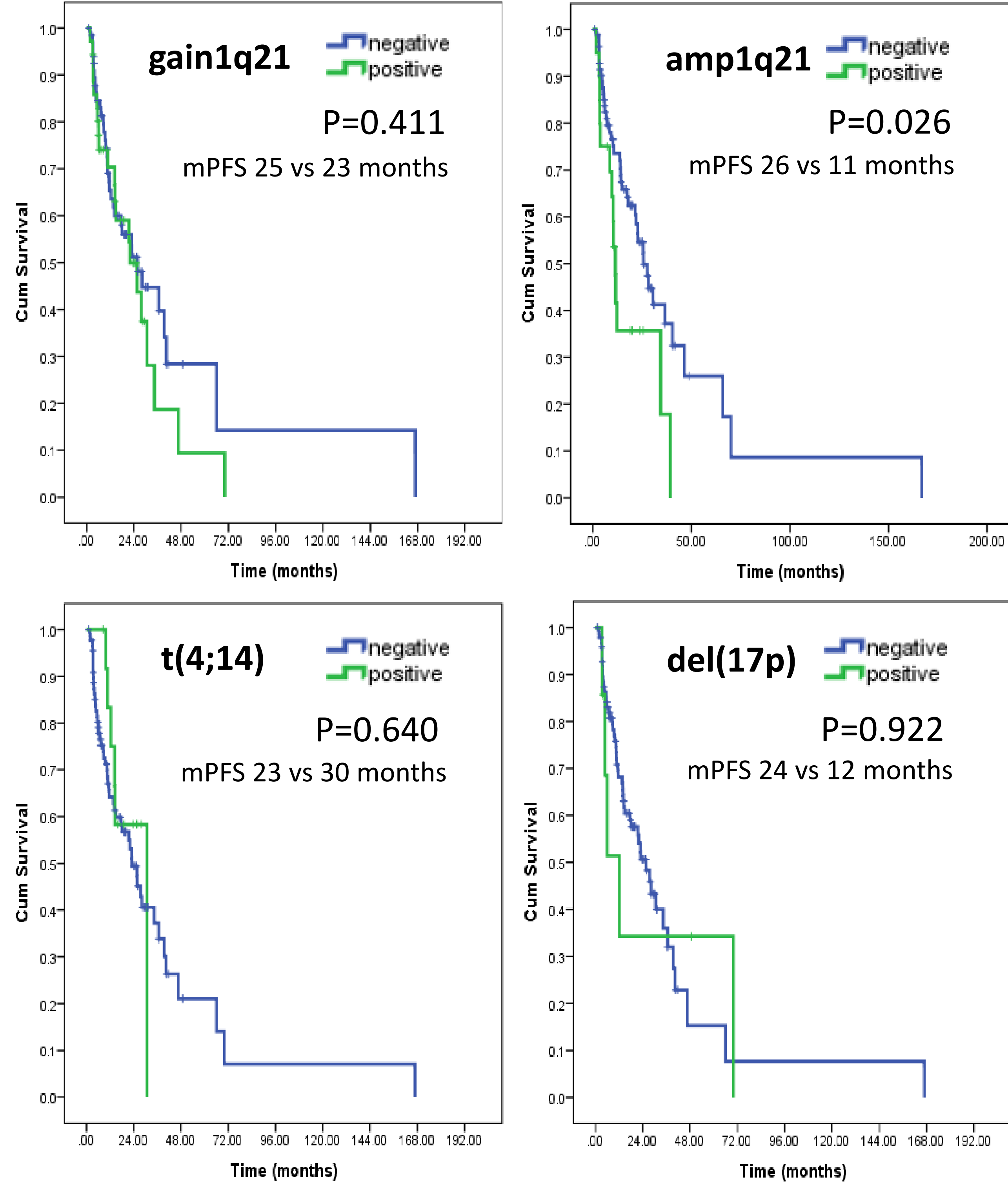
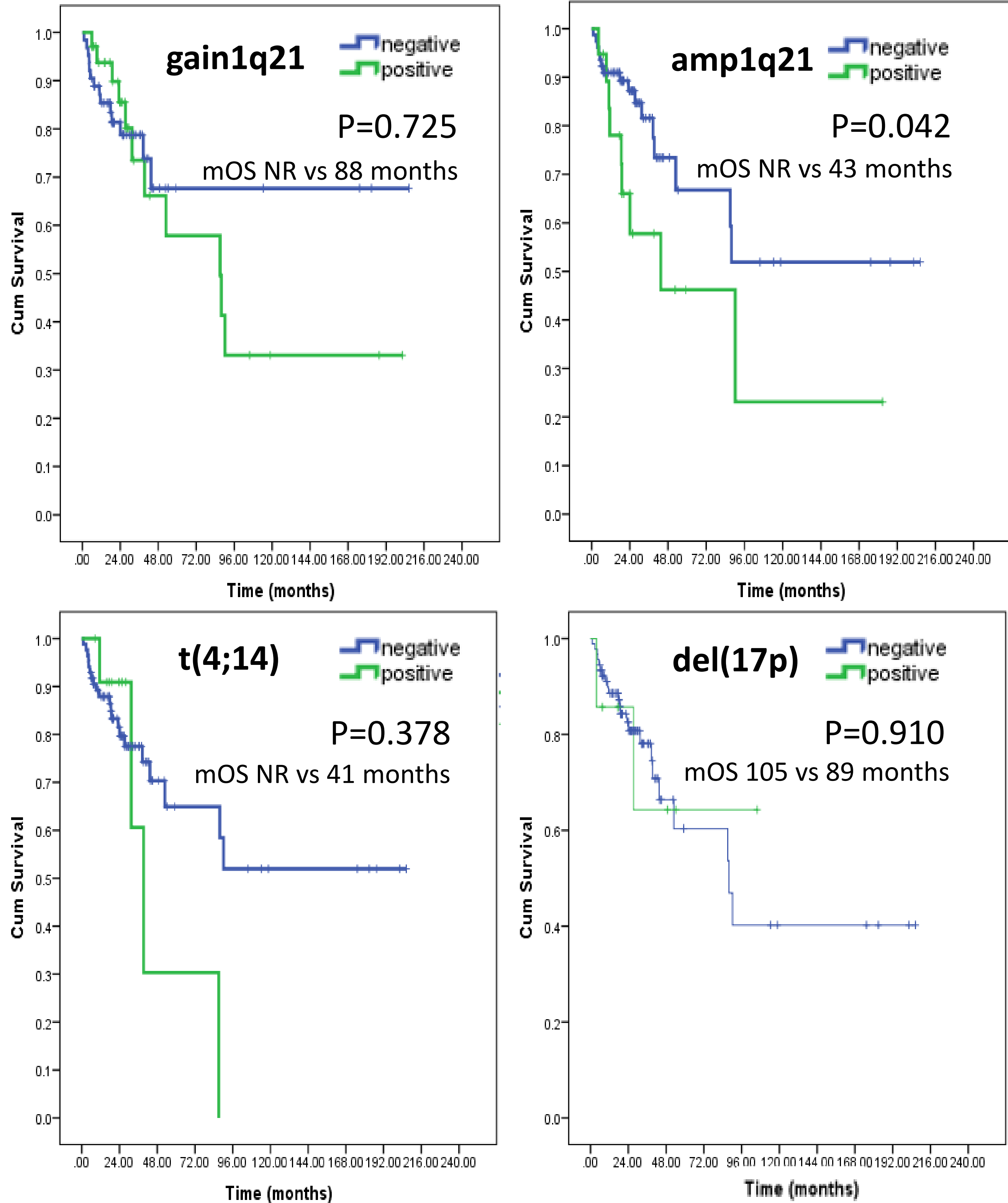


Figure 3: OS of patients based on specific cytogenetic abnormalities



CONCLUSION

This study reveals the prevalence of cytogenetic abnormalities detected by the FISH panel at Siriraj Hospital. Patients with amp1q21 demonstrated inferior survival outcomes compared to FISH-negative patients, highlighting the importance of FISH testing in identifying high-risk genetic factors that influence MM patient survival and guide treatment decisions.