

# Perioperative Hypothermia is a Prognostic Factor of Cystectomy Especially for Stage II Muscle-Invasive Bladder Cancer

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## objectives

Intraoperative hypothermia has been reported to be associated with complications in several kinds of cancer surgeries.<sup>1-5</sup> Moreover, Lymphopenia due to hypothermia may be related to the suppression of the immune system for cancer, and could be an independent predictor for prognosis in several cancers.<sup>6-9</sup> The objective of this study was to evaluate intraoperative hypothermia as a predictor of complication and prognosis in patients with muscle-invasive bladder cancer (MIBC) treated with radical cystectomy (RC).

## Patients, materials, and methods

The data of 124 patients treated with RC for MIBC in our department from 2003 to 2016 were retrospectively collected. RCs were performed in open fashion with minimal standard template pelvic lymph node dissection. Complications were classified according to the Clavien-Dindo classification. Tumor stages were classified according to the 2009 TNM-UICC stage classification system. Esophageal temperatures were measured by the transesophageal approach at every 5 minutes intervals, as intraoperative deep body temperature. A Warm-air unit (Bair Hugger) was used as the warming device. Intraoperative hypothermia was defined as the lowest intraoperative deep body temperature below 96.8° F (36.0° C) in accordance with the guideline of American Society of Anesthesiologist.

Characteristic	Normothermia	Hypothermia	P value
Patients, n	56	68	
Mean Follow-up, mo (range)	37.5 (2-163)	21.5 (4-174)	NS (0.07)
Sex, n (%)			
Male	41 (73.2)	52 (76.5)	
Female	15 (26.8)	16 (23.5)	NS (0.68)
Mean Age, yr (range)	69 (49-83)	72 (48-90)	NS (0.23)
PS, n (%)			
0-1	50 (89.3)	52 (76.5)	
2-4	6 (10.7)	16 (23.5)	NS (0.063)
Smoking, n (%)	26 (46.4)	30 (44.1)	NS (0.80)
Chemotherapy, n (%)	26 (46.4)	23 (33.8)	NS (0.15)
Epidural anesthesia, n (%)	46 (82.1)	53 (77.9)	NS (0.66)
Urinary diversion, n (%) (ileal conduit or neobladder)	35 (62.5)	39 (57.4)	NS (0.56)
Mean amount of bleeding, ml (range)	1395.5 (304-4720)	1281.5 (249-5223)	NS (0.28)
Mean Duration of surgery, min (range)	397 (160-774)	367.5 (160-720)	NS (0.36)
Complications (Clavien-Dindo), n (%)			
≤ II	48 (85.7)	53 (77.9)	
III-IV	8 (14.3)	15 (22.1)	NS (0.27)
Days to oral solids, n (%)			
≤3 days	38 (67.9)	43 (63.2)	
4 days <sup>2</sup>	18 (32.1)	25 (36.8)	NS (0.59)
Stage, n (%)			
II	24 (42.9)	26 (38.2)	
III	18 (32.1)	11 (16.2)	
IV	14 (25.0)	31 (45.6)	0.029
LN metastasis, n (%)	12 (21.4)	23 (33.8)	NS (0.13)
Vascular Invasion, n (%)	29 (51.8)	33 (48.5)	NS (0.72)
Recurrence, n (%)	25 (44.6)	39 (57.4)	NS (0.16)
Recurrence within 12 months, n (%)	10 (17.9)	26 (38.2)	0.013

The patients were divided into two separate groups according to their lowest intraoperative body temperature, i.e., the hypothermia group (< 96.8° F) and the normothermia group (≥ 96.8° F). Preoperative and intraoperative variables were compared among the two groups, and factors associated with complications, recurrences and survivals were statistically analyzed.

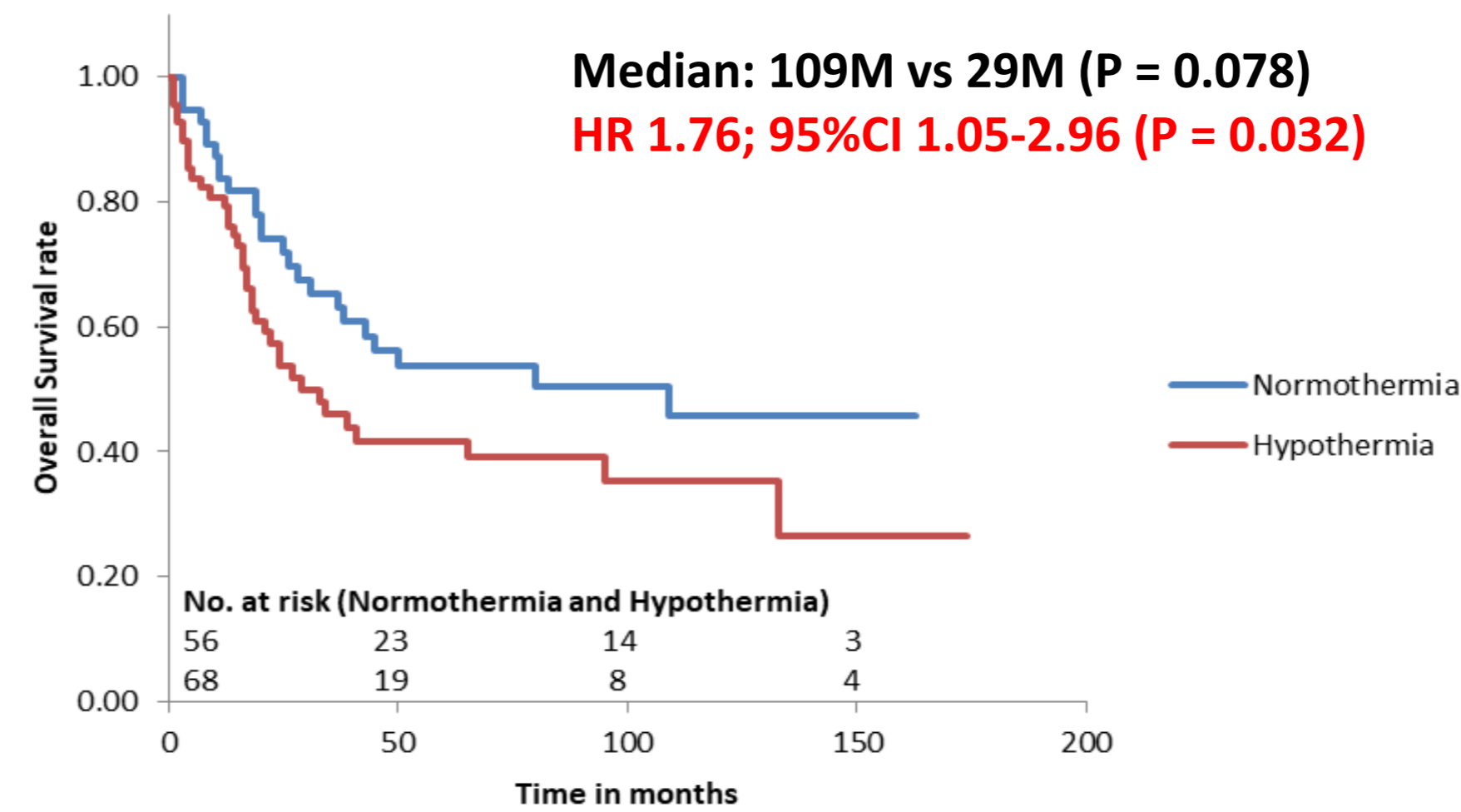
**Table 1.** Distributions of patient characteristics and clinicopathological findings.

## References

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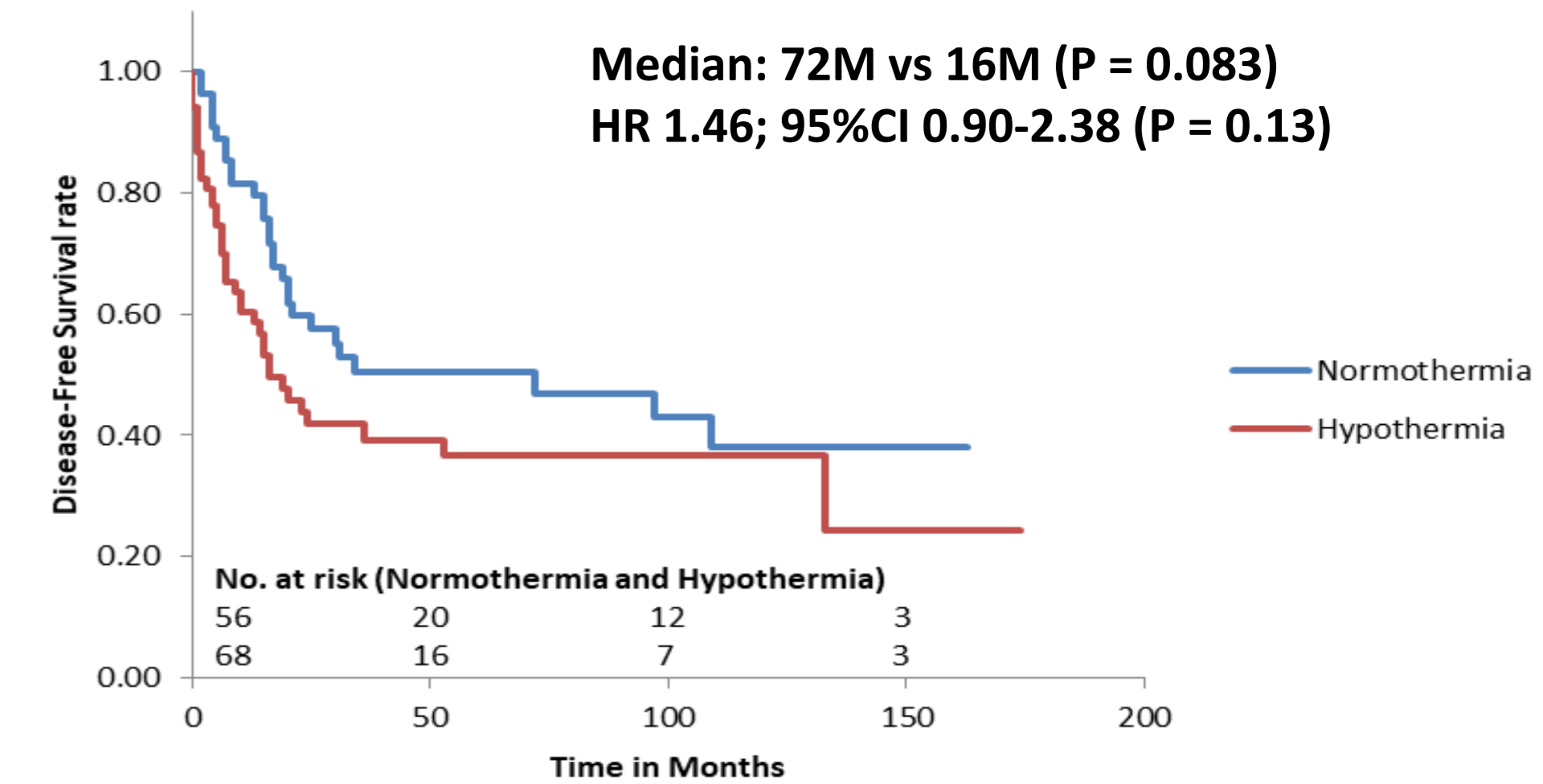
## Results

**Overall Survival (All MIBC)**



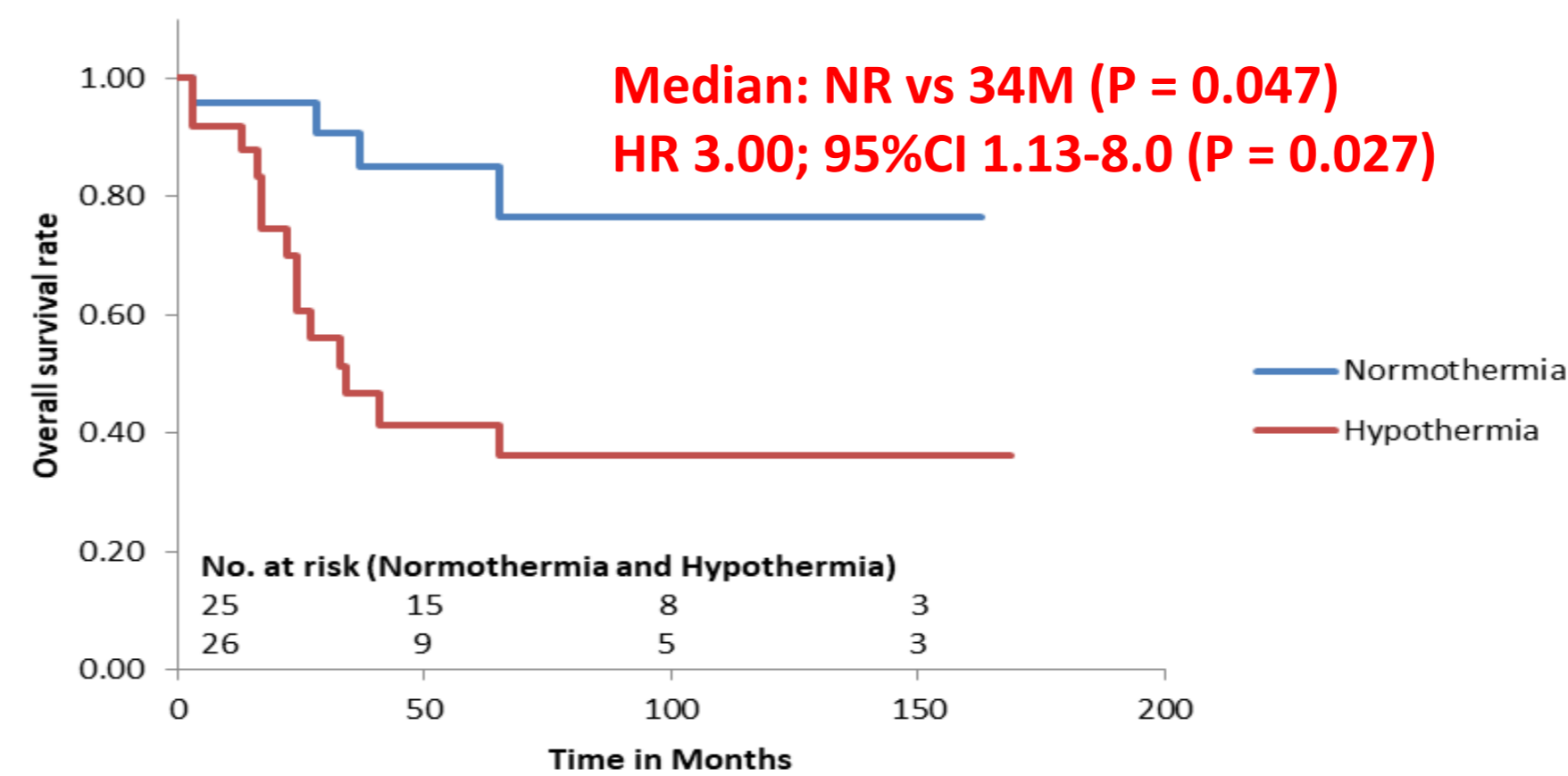
**Figure 1.** Kaplan-Meier analysis of OS for all MIBC.

**Disease-Free Survival (All MIBC)**



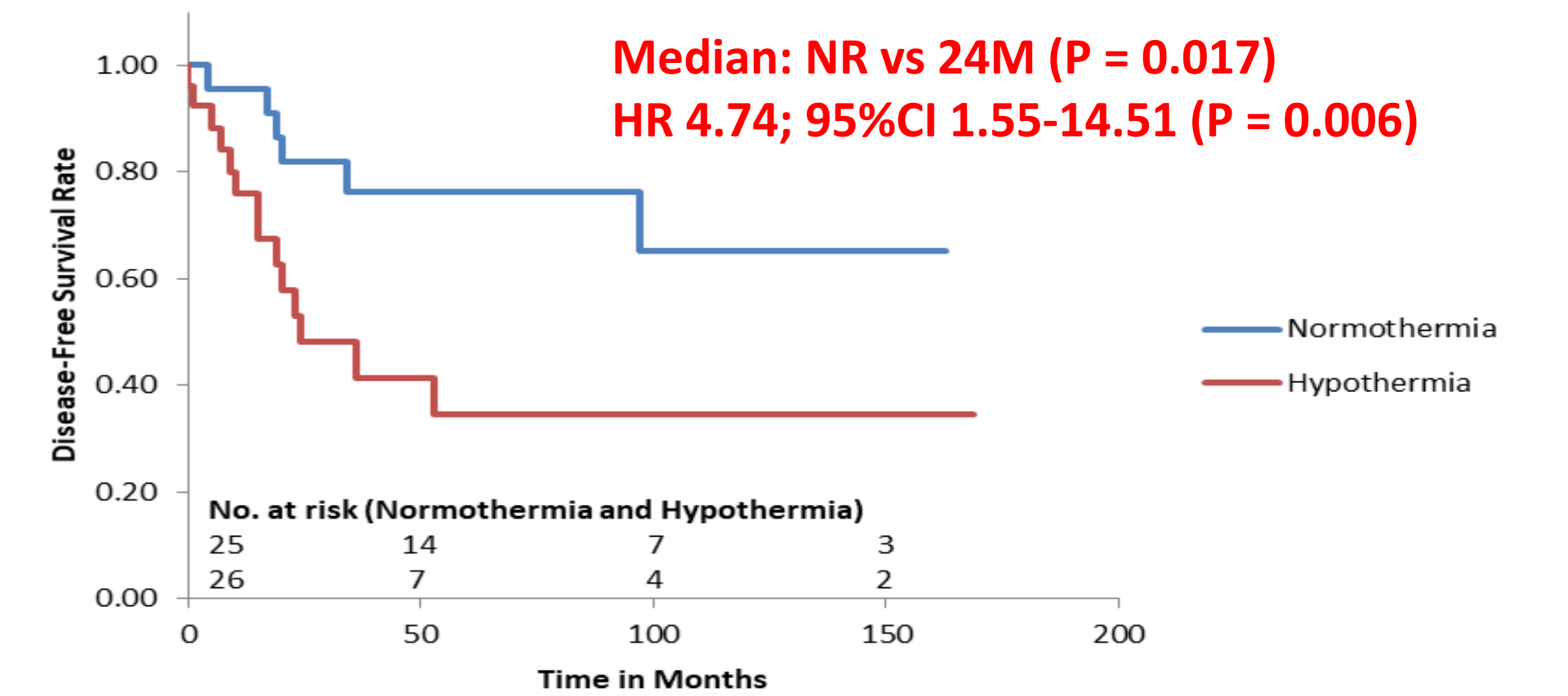
**Figure 2.** Kaplan-Meier analysis of DFS for all MIBC.

**Overall Survival (Stage II)**



**Figure 3.** Kaplan-Meier analysis of OS for stage II MIBC.

**Disease-Free Survival (Stage II)**



**Figure 4.** Kaplan-Meier analysis of DFS for stage II MIBC.

## Conclusion

The data presented in this study suggest the usefulness of intraoperative hypothermia as a predictive factor for OS and DFS in patients with MIBC treated with RC. These data may be helpful for urologists, because careful management or close follow-up after RC for patients who presented intraoperative hypothermia may improve prognosis.