



陆军军医大学 The Daping Hospital & Research Institute of Surgery of  
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大坪医院（野战外科研究所）

# Effect of intravenous chemotherapy on the nutritional status and growth of children with retinoblastoma

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## Background

- ➡ Retinoblastoma is an embryonic malignant tumor originating from the retina, which is the most common intraocular malignant tumor in infants and young children.
- ➡ The onset of retinoblastoma usually occurs in children younger than 3 years old and the prevalence has been estimated to be around 1 per 100,000 live births



## Background

- ➡ The main treatment for retinoblastoma is chemotherapy which is to cause volume reduction or calcification of the tumor.
- ➡ Infants and young children are in a critical period of growth development. Several studies have noted that malnutrition is common in children with cancer.





## Background

- ➡ However, no studies to date have reported whether systemic chemotherapy affects the nutritional status and growth development of children with retinoblastoma.
- ➡ Therefore, the present longitudinal study was carried out to examine the influence of intravenous chemoreductive therapy on the nutritional status and growth development of 88 pediatric patients with retinoblastoma.



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## Objective

To analyze the effect of chemotherapy on growth and hematologic indexes of children with retinoblastoma.





## Subjects and Methods

Patients :

☞ The inclusion criteria were: (1) retinoblastoma diagnosed in accordance with the aforementioned criteria; and (2) vincristine, etoposide and carboplatin (VEC) chemoreduction therapy was administered on at least one occasion



## Subjects and Methods

Patients :

☞ The exclusion criteria : (1) died within 48 hours of admission; (2) no data available for use in the analysis; and (3) lost to follow-up after only one round of VEC chemoreduction therapy.



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- ☞ The study was approved by the Ethics Committee of Daping Hospital, Army Medical University. The parents or guardians of all the participants provided informed consent for their inclusion in the study.





## Chemotherapy

- The VEC regimen was administered by intravenous infusion to all pediatric patients with retinoblastoma .
- The time interval between chemotherapy sessions was 21 days and the standard treatment course consisted of 6 sessions.
- The actual number of chemotherapy sessions for each patient was adjusted based on the clinical situation and the wishes of the parents.



## Measurements of height and weight

- ➡ Weight and height were measured according to standard methods
- ➡ For measurement of weight, the child was fasted overnight and in the morning was asked to stand steadily on the measuring instrument
- ➡ The weight measurement error was  $\leq 50$  g and the height measurement error was  $\leq 0.1$  cm.

# Measurement of hematologic indexes

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- ☞ All the patients were fasted for >8 h before blood sampling
- ☞ white blood cell count (WBC)
- ☞ total lymphocyte count (LYM)
- ☞ platelet count (PLT)
- ☞ hemoglobin (HGB)
- ☞ albumin (ALB)
- ☞ prealbumin (PA)
- ☞ aspartate transaminase (AST)
- ☞ alanine transaminase (ALT).
- ☞ Colorimetric and flow methods were used for liver function tests and routine blood tests, respectively.



## Data collection and analysis

- ☞ The weight, height and hematologic indexes of the patients were measured before every chemotherapy session.
- ☞ The data before the first chemotherapy session (i.e. at first hospitalization) were considered as the baseline, and the data after 3, 6 and 9 sessions of chemotherapy were compared with the baseline values.



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## Data collection and analysis

➡ Follow-up was performed every 3 months during the first year after chemotherapy, every 6 months during the second and third years after chemotherapy, and then every year. Follow-up included measurements of height, weight and hematologic indexes, routine ophthalmic ultrasound and fundal photography.





## Statistical analysis

- ☞ SPSS 17.0 software (SPSS Inc., Chicago, IL, USA) was used to perform the statistical analysis.
- ☞ Categorical variables are expressed as frequencies and percentages and were compared between groups using the chi-squared test.
- ☞  $P < 0.05$  was considered statistically significant



## Results--Baseline characteristics

Table 1. Comparison of the height and weight of the study participants at baseline with national reference values for children of the same age and gender.

Variable	Study patients (N=88)	Reference value	p
Height (cm)	83.83±14.59	85.50±15.38	<0.001
Weight (kg)	12.02±3.79	12.05±4.17	0.831

### Baseline characteristics

The mean height at baseline was  $83.83 \pm 14.59$  cm, which was significantly lower than the national reference value for normal children of the same age and gender ( $P < 0.001$ ).

The mean weight at baseline was  $12.02 \pm 3.79$  kg, which was not significantly different to the national reference value for normal children of the same age and gender

## Results-- Comparison of hematologic indexes before and after chemotherapy

Table 2 : Comparison of hematologic indexes measured at baseline and after 3, 6 and 9 sessions of chemotherapy.

	Index	Baseline	After chemotherapy	N	P
	WBC(109/L)	8.91±3.07	8.00±2.70	70	0.031
Three	HGB(g/L)	118.94±13.30	111.56±11.86	70	<0.001
Time	PLT(109/L)	325.60±110.25	321.56±103.28	70	0.814
The	LYM(109/L)	4.98±2.10	5.07±7.17	70	0.920
Healing	ALB(g/L)	42.61±7.05	44.13±3.80	68	0.088
Case	PA(mg/L)	186.31±59.02	190.23±41.62	65	0.612
case	AST(U/L)	37.86±17.13	41.76±19.32	68	0.013
	ALT(U/L)	22.65±19.98	25.43±20.74	68	0.077
	WBC(109/L)	8.40±2.31	7.39±2.16	33	0.026
Six	HGB(g/L)	117.00±9.49	111.21±13.74	33	0.005
Time	PLT(109/L)	318.79±96.07	303.12±109.63	33	0.544
The	LYM(109/L)	4.97±1.98	3.88±1.42	32	0.001
Healing	ALB(g/L)	41.70±8.52	43.65±3.42	32	0.255
Cas	PA(mg/L)	176.06±52.83	183.24±43.66	29	0.604
ecase	AST(U/L)	41.04±23.59	42.29±22.23	32	0.593
	ALT(U/L)	24.60±25.79	24.38±18.08	32	0.932
	WBC(109/L)	7.94±2.31	6.36±1.92	14	0.039
Nine	HGB(g/L)	115.93±8.42	112.43±12.35	14	0.283
Time	PLT(109/L)	301.93±81.80	294.00±80.39	14	0.788
The	LYM(109/L)	4.62±1.52	3.35±1.23	14	0.007
Healing	ALB(g/L)	41.69±3.89	44.10±4.23	14	0.091
Case	PA(mg/L)	186.88±36.77	194.79±37.84	14	0.520
case	AST(U/L)	45.29±30.71	36.72±17.77	14	0.100
	ALT(U/L)	29.23±33.91	21.96±19.57	14	0.131



Results--Comparison of hematologic indexes before and after chemotherapy

Table 2:

Chemotherapy was associated with small but significant decreases in WBC (after 3, 6 or 9 sessions of chemotherapy), HGB (after 3 or 6 sessions of chemotherapy but not after 9 sessions of chemotherapy) and LYM (after 6 or 9 sessions of chemotherapy but not after 3 sessions of chemotherapy) and a small but significant increase in AST (after 3 sessions of chemotherapy but not after 6 or 9 sessions of chemotherapy) (all  $P < 0.05$ ).



## Results-- Comparison of height and weight after chemotherapy with reference values for normal children

Table 3: 3, 6, 9 after the end of chemotherapy 3 months and the national age of the same sex children reference value difference

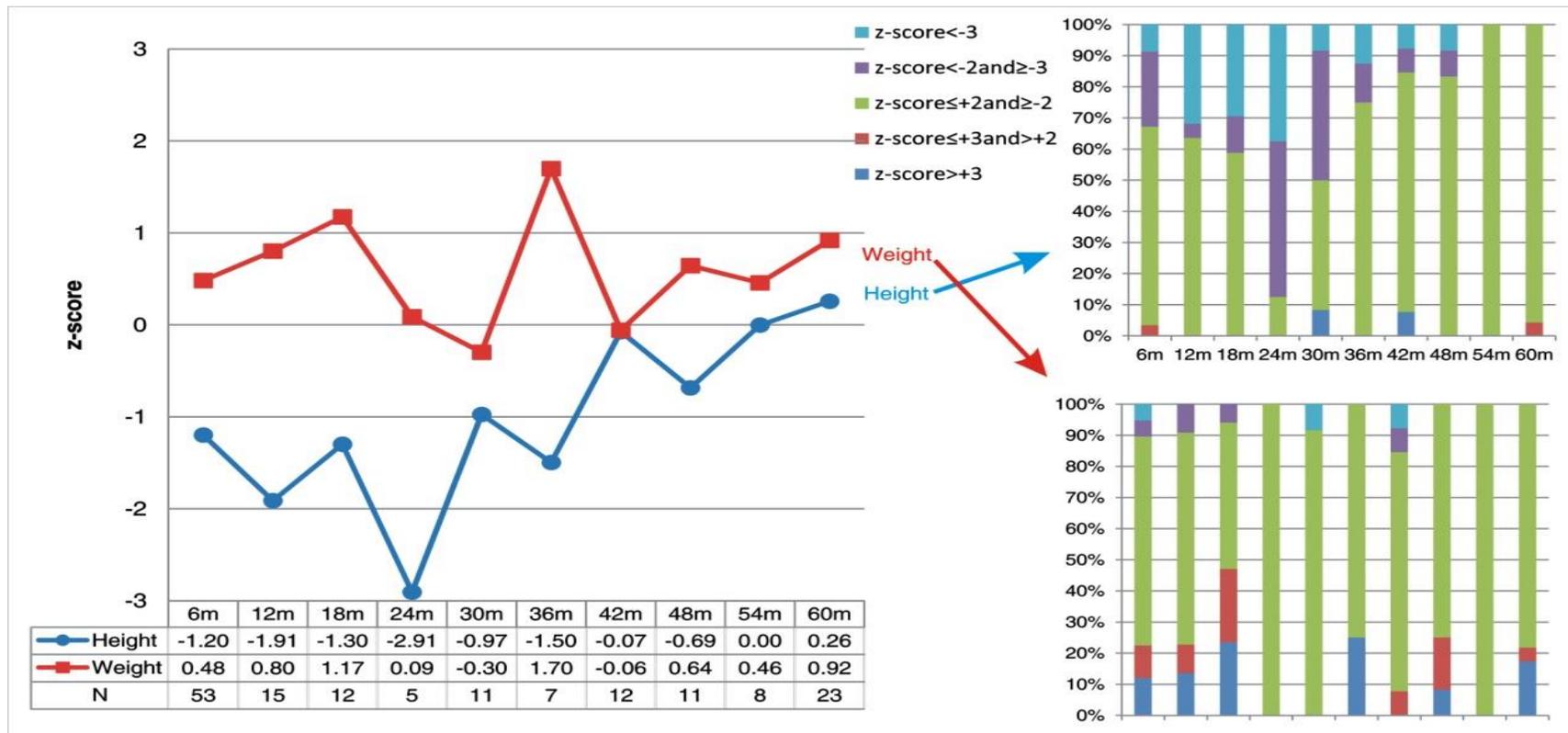
Number of chemotherapy	height ( cm )			weight ( kg )		
	The difference from the reference value	n	P	The difference from the reference value	n	P
≤3 times	2.48±2.88	36	<0.001	0.22±1.95	36	0.495
4-6 times	2.37±4.92	27	0.019	0.25±1.84	27	0.487
7-9 times	1.77±4.11	14	0.132	-0.38±1.10	14	0.222
≥10 times	2.48±3.80	11	0.056	-0.48±1.78	11	0.394

Three months after the completion of chemotherapy, patients who had received 1-3 or 4-6 sessions of chemotherapy had significantly lower height than the national reference values for children of the same age and gender ( $P < 0.05$ ; Table 4).



## Results--- Height and weight were compared with normal children after chemotherapy

Figure 1: height and weight of children undergoing chemotherapy





## Prognosis

- Prognosis The median follow-up time was 32.4 months (range, 5-106 months).
- Among the 88 study participants, 19 patients died due to recurrence and metastasis of advanced tumor,
- 36 patients received ophthalmectomy, and 33 patients were able to lead a normal life without complications.



## conclusion

- The mean baseline height of children with RB is lower than the standard height of the same gender at the same age
- The adverse effect of intravenous chemotherapy on the hematological indicators of children was different, and most of them returned to normal 3 months after the cessation of chemotherapy
- Intravenous chemotherapy had an effect on infant height in the short term and had no significant effect on body weight. Especially at the 24th month, the difference gradually decreased with the passage of time, and there was no significant difference in the development of normal children at the age of 5 years

thanks !

