Role of Image-defined risk factors in clinical practice of neuroblastoma: A systematic review and meta-analysis

Qiyang Shen[1], Qi Han[1], Hanjun Yin[2], Li Lu[3], Tao Li[1], and Jianfeng Zhou[1]

[1]Children's Hospital of Nanjing Medical University
[2]Suqian People's Hospital of Nanjing Drum-Tower Hospital Group
[3]Jiangsu Provincial Hospital of Chinese Medicine

June 22, 2020

Abstract

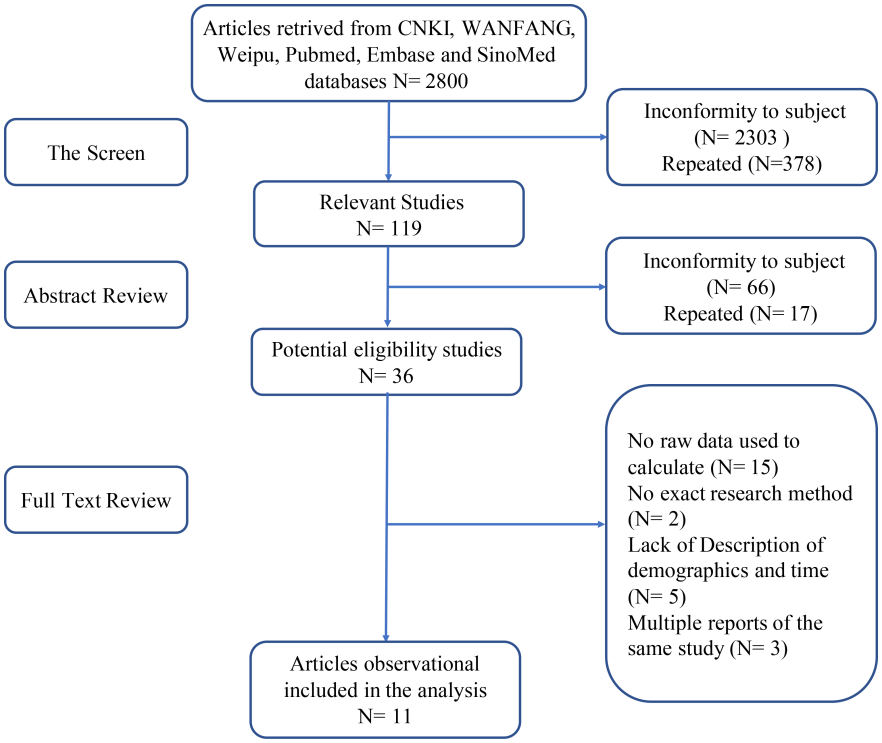
Purpose: To assess the role of image-defined risk factors in clinical practice of neuroblastoma. Methods: A systematic search was conducted to identify articles about IDRFs. Combined overall results were calculated using fixed effects models. Results: The literature search identified 11 articles including 1338 patients for analysis. There was no difference in amplification of MYCN and tumor site (abdominal tumor) between no IDRFs and any IDRFs group, but there was a significant increase of event free survival (OR: 2.43[1.69, 3.49]; P $<$ 0.00001) and overall survival (OR: 3.15[1.68, 5.89]; P = 0.0004) in no IDRFs group. The incidence of complications (OR: 0.21[0.15, 0.30]; P$<$ 0.00001) was higher in patients with any IDRFs. Furthermore, no IDRFs are correlated with higher rate of earlier INSS stage. Conclusions: IDRFs could be an important adjuvant image monitoring method in NB treatment. IDRFs are valuable to evaluate surgical indications for pediatric surgeon, regardless of surgical ability.

Hosted file

`TitlePage.doc` available at https://authorea.com/users/335737/articles/461544-role-of-image-defined-risk-factors-in-clinical-practice-of-neuroblastoma-a-systematic-review-and-meta-analysis

Hosted file

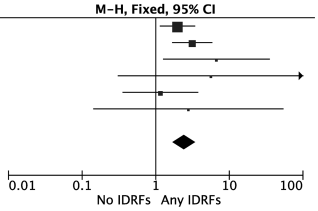
`manuscript.docx` available at https://authorea.com/users/335737/articles/461544-role-of-image-defined-risk-factors-in-clinical-practice-of-neuroblastoma-a-systematic-review-and-meta-analysis



EFS

Study or Subgroup	No IDRFs Events	Total	Any IDRFs Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
Simon, T	195	227	105	139	50.0%	1.97 [1.15, 3.38]	2008
Monclair, T	268	291	93	118	28.5%	3.13 [1.70, 5.78]	2015
Iehara, T	30	32	18	26	3.4%	6.67 [1.27, 34.92]	2019
Lucas, J. T., Jr	9	9	52	67	1.8%	5.61 [0.31, 101.92]	2019
Phelps, H. M	36	41	56	65	14.4%	1.16 [0.36, 3.73]	2019
Zhang, A. A	6	6	44	53	2.0%	2.78 [0.14, 53.58]	2019
Total (95% CI)		**606**		**468**	**100.0%**	**2.43 [1.69, 3.49]**	
Total events	544		368				

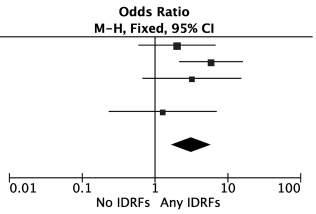
Heterogeneity: $Chi^2 = 4.53$, df = 5 (P = 0.48); $I^2 = 0\%$
Test for overall effect: Z = 4.76 (P < 0.00001)



OS

Study or Subgroup	No IDRFs Events	Total	Any IDRFs Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
Simon, T	222	227	133	139	31.9%	2.00 [0.60, 6.69]	2008
Monclair, T	285	291	105	118	27.1%	5.88 [2.18, 15.87]	2015
Pohl, A	14	16	59	86	20.3%	3.20 [0.68, 15.09]	2016
Iehara, T	32	32	26	26		Not estimable	2019
Phelps, H. M	28	31	22	25	20.7%	1.27 [0.23, 6.93]	2019
Total (95% CI)		**597**		**394**	**100.0%**	**3.15 [1.68, 5.89]**	
Total events	581		345				

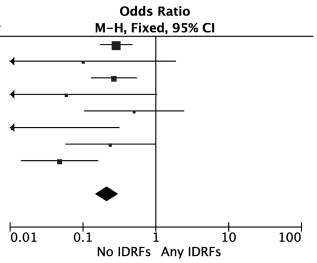
Heterogeneity: $Chi^2 = 3.16$, df = 3 (P = 0.37); $I^2 = 5\%$
Test for overall effect: Z = 3.57 (P = 0.0004)



Complications

Study or Subgroup	No IDRFs Events	Total	Any IDRFs Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
Simon, T	34	227	53	139	39.7%	0.29 [0.17, 0.47]	2008
Günther, P	0	21	7	39	3.7%	0.10 [0.01, 1.86]	2011
Monclair, T	15	291	20	118	19.2%	0.27 [0.13, 0.54]	2015
Yoneda, A	0	21	17	61	6.4%	0.06 [0.00, 1.03]	2016
Pohl, A	2	16	19	86	3.7%	0.50 [0.11, 2.41]	2016
Tanaka, Y	0	15	4	5	4.5%	0.01 [0.00, 0.31]	2016
Phelps, H. M	3	49	8	37	6.1%	0.24 [0.06, 0.96]	2019
Chenji	7	29	40	46	16.7%	0.05 [0.01, 0.16]	2019
Total (95% CI)		**669**		**531**	**100.0%**	**0.21 [0.15, 0.30]**	
Total events	61		168				

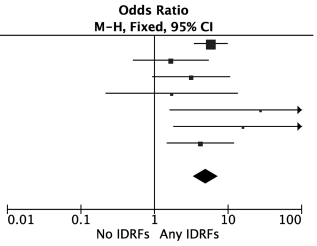
Heterogeneity: $Chi^2 = 12.81$, df = 7 (P = 0.08); $I^2 = 45\%$
Test for overall effect: Z = 8.67 (P < 0.00001)



INSS stage 1/2

Study or Subgroup	No IDRFs Events	Total	Any IDRFs Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
Simon, T	198	227	75	139	46.5%	5.83 [3.49, 9.73]	2008
Günther, P	7	21	9	39	16.4%	1.67 [0.52, 5.39]	2011
Pohl, A	12	16	42	86	12.9%	3.14 [0.94, 10.52]	2016
Tanaka, Y	8	15	2	5	5.5%	1.71 [0.22, 13.41]	2016
Yoneda, A	31	31	53	76	1.9%	27.67 [1.62, 471.52]	2016
Zhang, A. A	7	8	18	59	2.1%	15.94 [1.83, 139.27]	2019
Phelps, H. M	22	49	6	37	14.7%	4.21 [1.49, 11.91]	2019
Total (95% CI)		**367**		**441**	**100.0%**	**4.97 [3.40, 7.25]**	
Total events	285		205				

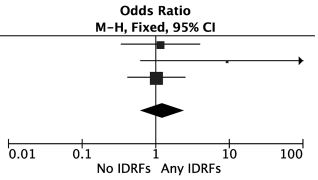
Heterogeneity: $Chi^2 = 7.89$, df = 6 (P = 0.25); $I^2 = 24\%$
Test for overall effect: Z = 8.30 (P < 0.00001)



MYCN

Study or Subgroup	No IDRFs Events	Total	Any IDRFs Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
Pohl, A	12	16	62	86	33.2%	1.16 [0.34, 3.96]	2016
Tanaka, Y	14	15	3	5	2.0%	9.33 [0.62, 139.57]	2016
Phelps, H. M	32	49	24	37	64.8%	1.02 [0.42, 2.50]	2019
Total (95% CI)		**80**		**128**	**100.0%**	**1.24 [0.62, 2.46]**	
Total events	58		89				

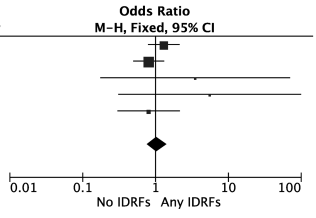
Heterogeneity: $Chi^2 = 2.33$, df = 2 (P = 0.31); $I^2 = 14\%$
Test for overall effect: Z = 0.60 (P = 0.55)



Tumor site

Study or Subgroup	No IDRFs Events	Total	Any IDRFs Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
Simon, T	176	227	101	139	36.5%	1.30 [0.80, 2.11]	2008
Monclair, T	199	291	86	118	50.2%	0.80 [0.50, 1.29]	2015
Tanaka, Y	14	15	4	5	0.5%	3.50 [0.18, 69.34]	2016
Pohl, A	16	16	74	86	0.9%	5.54 [0.31, 98.30]	2016
Phelps, H. M	35	49	28	37	11.8%	0.80 [0.30, 2.13]	2019
Total (95% CI)		**598**		**385**	**100.0%**	**1.04 [0.76, 1.42]**	
Total events	440		293				

Heterogeneity: $Chi^2 = 4.12$, df = 4 (P = 0.39); $I^2 = 3\%$
Test for overall effect: Z = 0.26 (P = 0.79)



Hosted file

Table 1.docx available at https://authorea.com/users/335737/articles/461544-role-of-image-

defined-risk-factors-in-clinical-practice-of-neuroblastoma-a-systematic-review-and-meta-analysis