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## Background

- Breast cancer is the 2<sup>nd</sup> most frequent cancer and common female cancer globally.
- Brain metastasis is the end-stage in breast cance
- Poor prognosis with local therapies and rising inc **BCBM** highlights the need for better prediction o through precision medical care.

## Methods

- Systematic review conducted in PubMed, Embas Science, and Cochrane for relevant literature unt 2018.
- Initial abstract/title screen conducted in duplica excluded based on exclusion criteria.
- Full text studies screened and reviewed in duplic
- Studies selected for data extraction based on inc criteria.
- Data extracted and reviewed in duplicate.
- Qualitative and quantitative analysis performed



# Increased risk of breast cancer brain metastasis with EGFR and Ki-67 expression: a systematic review and meta-analysis

	Results												
d the most	Study	Experi	menta s Tota	l Event	Contro s Tota	4	Risk	Ratio	R	R 95	%-CI	Weigh (fixed	t Weigh (randon
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r progression.	aziz	2	1 1/4	4 1	1 14	1	_		1.0	0 0.55;	1.82]	53.7%	31.1
cidence of	Sezgin		2 4		3 10.	2			- 1.9	2 [1 44	5.501	23.0%	21.3
	Sibto		3 5	9 1	2 3	3 _			- 10	3 10 28	3 731	12.2%	13.4
	Sinto		5 5	<i>,</i>	0 15	,		f 11	1.0	5 [0.20,	5.75]	12.27	0 13.4
	Fixed effect model Random effects model Heterogeneity: $l^2 = 53\%$ ,	$\tau^2 = 0.163$	28 2, p =	B 0.10	45	<b>,</b>			1.4	2 [0.98; 2 [0.93;	2.06] 2.82]	100.0%	- 100.09
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til Octobor	Figure 2: P53 po	oled a	nary	SIS: PI	resen	сеот	p53+ s	tatus (e	ventsj	nad a	nor	i-sign	ificant
th October	elevated relative	e risk f	or B	CBM.									
te, studies													
		Experim	ental	C	ontrol						٧	Veight	Weight
cate.	Study	Events	Total	Events	Total		Risk Ra	atio	RR	95%	CI	(fixed) (	random)
clusion	lehihara	12	140	5	146		1	1	- 765 0	274-21	221	0.5%	10.2%
	Sanna	37	100	7	58				3.07	1 46 6	431	31 5%	24.6%
	Sezain	17	72	ò	82				2 15	1 02 4	521	20.0%	24.6%
	Shao	16	35	2	25			-	- 571 [	1 44 22 (	561	8.3%	14.2%
	Sihto	5	112	6	108		- 10	_	0.80	0.25: 2.	561	21.7%	17.2%
•													0.0.000
	Fixed effect model Random effects model Heterogeneity: $l^2 = 59\%$ , $\tau$	<sup>2</sup> = 0.3366	<b>459</b>	05	719	0.1	0.5 1	2 10	2.91	1.96; 4.3 1.48; 5.7	32] 10 70]		100.0%
aved	Figure 3. Ki-67 n	ooled	anal	vcic I	−liσh	Ki-67	evnres	sion had	d a hig	her re	lativ	vo rick	for
oved	BCBM.	UUICU	anai	y 515. I	iigii		CAPICS		a mg		lativ		
if: ference tpert utcome s that of BM in		Experin	nental	С	ontrol						W	eiaht	Weight
990, 5) nts.	Study	Events	Total	Events	Total		Risk R	atio	RR	95%-	CI (	fixed) (r	andom)
	aziz	21	70	17	245		1	- 100	- 4.32	2.42,7.7	3] 5	53.4%	50.5%
	shao	7	10	11	50				- 3.18	[1.64; 6.1	6] 2	25.9%	39.1%
	sihto	3	36	8	160				1.67	[0.46; 5.9	7] 2	20.8%	10.5%
	Fixed effect model Random effects model Heterogeneity: $I^2 = 0\%$ , $\tau^2$	= 0, <i>p</i> = 0	<b>116</b>		455	02	0.5 1	2 5	3.48	2.27; 5.3 2.30; 5.2	2] 10	0.0%	 100.0%

Figure 4: EGFR pooled analysis. Presence of EGFR+ status (events) had a higher relative risk for BCBM.



Biomarker	Nr. of papers
Neuron specific enolase	1
matrix metalloproteinase	1
CEA	1
CA 15-3	1
SNPs	1
COX2	1
Nestin	1
Ck18	1
E-cadherin	1
KIT	1
GATA3	1
RANKL	1
androgen receptor	1
3q gene signature	1
Slit/Robo	1
Hyal1	1

Figure 5: Other biomarkers identified during systematic review of the literature.

## Conclusions

- This study summarizes the various biomarkers studied in the literature as they relate to BCBM.
- Greater risk for BCBM is associated with EGFR+ expressivity and high Ki-67 expression when data is analyzed under pooled analysis.
- P53 did not appear to increase relative risk for BCBM under pooled analysis.
- Further studies are needed to better characterize the relative risk on BCBM in the three biomarkers reported and the other biomarkers identified in the literature.





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