

Supplementary Materials: Presence of the Human Cytomegalovirus in Glioblastomas—A systematic review

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<p>Interface: Ovid</p> <p>Date of Search: 31 August 2021</p> <p>Number of hits: 356</p> <p>Comment: In Ovid, two or more words are automatically searched as phrases; i.e. no quotation marks are needed</p>	<p>Field labels</p> <ul style="list-style-type: none"> • exp/ = exploded MeSH term • / = non exploded MeSH term • .ti,ab,kf. = title, abstract and author keywords • adjx = adjacent within x words, regardless of order • * = truncation of word for alternate endings
<ol style="list-style-type: none"> 1. Glioblastoma/ 2. Gliosarcoma/ 3. Glioma/ 4. (glioblastom* or gliosarcom* or gliom*).ti,ab,kf. 5. or/1-4 6. Cytomegalovirus/ 7. (human cytomegalovirus or human herpesvirus 5 or salivary gland virus* or CMV or HCMV or HHV-5).ti,ab,kf. 8. or/6-7 9. 5 and 8 10. 9 not (animals not humans).sh. 	
<p>Interface: embase.com</p> <p>Date of Search: 31 August 2021</p> <p>Number of hits: 268</p> <p>Comment: Emtree is the controlled vocabulary in Embase</p>	<p>Field labels</p> <ul style="list-style-type: none"> • /exp = exploded Emtree term • /de = non exploded Emtree term • ti,ab = title and abstract • NEAR/x = adjacent within x words, regardless of order • * = truncation of word for alternate endings
<ol style="list-style-type: none"> #1 'glioblastoma'/de #2 'gliosarcoma'/de #3 'glioma'/de 	

#4	glioblastom*:ti,ab,kw OR gliosarcom*:ti,ab,kw OR gliom*:ti,ab,kw
#5	#1 OR #2 OR #3 OR #4
#6	'human cytomegalovirus'/exp
#7	'human cytomegalovirus':ti,ab,kw OR 'human herpesvirus 5':ti,ab,kw OR 'salivary gland virus':ti,ab,kw OR hcmv:ti,ab,kw OR 'hhv 5':ti,ab,kw
#8	#6 OR #7
#9	#5 AND #8
#10	#9 NOT ([animals]/lim NOT [humans]/lim)
Interface: Clarivate Analytics	Field labels
Date of Search: 31 August 2021	<ul style="list-style-type: none"> • TS/Topic = title, abstract, author keywords and Keywords Plus • NEAR/x = adjacent within x words, regardless of order • * = truncation of word for alternate endings
Number of hits: 353	
TOPIC: ((glioblastom* or gliosarcom* or gliom*))	
AND	
TOPIC: ((human cytomegalovirus or human herpesvirus 5 or salivary gland virus* or HCMV or HHV-5))	
Interface: Google Scholar	
Date of Search: 2018-2021	
Number of hits: 51	
Search: glioblastoma gliosarcoma glioma "human cytomegalovirus" HCMV	

Figure S1. Illustration of the use of Boolean operators as support tools for the refinement process of the data search in MEDLINE (Ovid), Embase (Embase.com), and Web of Science until August 2021 and Google Scholar 2018 to 2021.

Table S1. Information about all 81 analysed articles.

#	Author	Year	Ref. No	Pos/No Pos	Positive Results	n =	Used Techniques for Detection of HCMV
1	Wrench et al.	2001	65	P	37	56	ELISA IgG
					22	22	IHC IE1-72 (only GMB)
					8	8	IHC EA
					10	10	IHC pp65
2	Coobs et al.	2002	2	P	2	2	Immunogold staining pp65
					8	8	ISH early gene RNA
					4	4	ISH total DNA
					7	9	Nested-PCR gB
3	Lau et al.	2005	78	N	0	8	IHC pp65

					0	8	IHC CCH2/PPG9
					0	8	ISH early gene (RNA)
					0	8	ISH total DNA
					0	8	PCR gB DNA
4	Sabatier et al.	2005	87	N	9	81	IHC IE1-72
					7	9	ISH HCMV DNA
5	Lehrer et al.	2011	79	N	0	5	Reverse Transcription PCR blood
					0	23	IHC IE1 68-72
					0	23	IHC EA
					0	23	IHC pp65
6	Poltermann et al.	2006	85	N	0	24	Nested PCR IE1
					0	24	Nested PCR gB
					0	23	Nested PCR IE1 blood
					0	23	Nested PCR gB blood
					21	26	IF US28
7	Soroceanu et al.	2011	60	P	6	26	IHC US28
					18	44	Reverse Transcription PCR US28
					42	45	IHC IE1-72
					30	33	IHC pp65
8	Mitchell et al.	2008	50	P	16	16	ISH HCMV DNA (whole DNA)
					21	34	Real time PCR IE1 (UL123)
					8	34	Real time PCR gB (UL55)
					16	20	Nested PCR gB blood
					21	21	IHC IE1-72
9	Scheurer et al.	2008	56	P	21	21	ISH HCMV DNA Early
10	Slinger et al.	2010	59	P	20	21	IHC IEA
					20	21	IHC US 28
11	Lucas et al.	2011	46	P	25	49	IHC pp65
					8	49	IHC IE1 68-72
12	Dziurzynski et al.	2011	32	P	5	5	Flow cytometry analysis pp65 specific T-cells
13	Sjöström et al.	2011	58	P	53	61	ELISA, IgG
					11	11	Nested PCR DNA
					6	6	Real time PCR UL123 GBM
14	Bhattacharjee * et al.	2012	25	P	9	12	WB IE1
					9	12	WB pp65
					3	3	WB gB
15	Fonseca et al.	2012	33	P	6	18	PCR pp65
					5	5	PCR gB (UL55)
					5	5	qPCR gB (UL55)
					5	5	PCRpp71 (UL82)
					5	5	qPCRpp71 (UL82)
					8	8	PCR US28
16	Ranganathan et al.	2012	55	P	8	8	qPCR US28
					4	5	PCR UL144
					4	5	qPCR UL144
					9	9	PCR UL17
					9	9	qPCR UL17
					5	5	PCR UL27

					5	5	qPCR UL27
					10	10	PCR UL69
					10	10	qPCR UL69
					12	12	PCR UL96
					12	12	qPCR UL96
					4	5	PCR US2
					4	5	qPCR US2
					9	9	PCR US11
					9	9	qPCR US 11
					12	12	PCR primers frozen
17	Ghazi et al.	2012	36	P	10	11	IHC IE1 72
					5	11	IHC pp65
					8	9	ISH CMV DNA
					11	11	IE specific T-cells in blood
					11	11	pp65 specific T-cells in blood
18	Rahbar et al.	2012	54	P	79	80	IHC IEA
					76	80	IHC LA
					6	7	ISH HCMV DNA IEA LA
19	Rahbar et al.	2013	52	P	74	75	IHC IEA
					70	75	IHC LA
20	Tang et al.	2013	93	N	19	19	ISH
					0	167	NGS
21	Matlaf et al.	2013	48	P	5	10	IF pp71
					10	15	Rt PCR
					7	10	Real Time PCR pp71
					10	10	qPCR pp71
					6	10	ELISA IgG
					2	10	ELISA IgM
					9	11	WB pp71
22	Stragliotto et al.	2013	19	P	42	42	IHC IEA
					42	42	IHC LA
23	Ahani et al.	2013	21	P	12	16	qPCR
24	Cosset et al.	2013	72	N	0	20	Nested PCR
					0	20	Nested PCR E1 E2
					14	31	ELISA IgG
					0	31	ELISA IgM
					0	20	NGS Metagenomic analysis
25	Garcia-Martinez et al.	2013	74	N	1	54	Real Time PCR DNA
26	Dos Santos et al.	2014	31	P	20	22	nPCR gB (UL55)
					11	20	nPCR gB blood
					21	22	qPCR pp65
					9	20	qPCR pp65 blood
27	Tang et al.	2015	94	N	0	34	NGS DNA
28	Cimino et al.	2014	71	N	0	21	NGS DNA
29	Ding et al.	2014	29	P	16	19	IHC IE1-72 (only GBM)
					15	19	IHC pp65 (only GBM)
					12	19	Nested PCR gB (UL55)
					7	19	Nested PCR gB blood
30	Yamashita et al.	2014	95	N	7	10	IHC IE1/2

					5	10	IHC pp65
					10	10	IHC pp28
					0	10	FISH DNA
					0	59	Real Time PCR gB
					0	59	qPCR IE
					0	5	WB IE1/2 and pp28
					0	10	IHC UL44
31	Solomon et al.	2014	89	N	0	68	IHC CCH2/DDG9
					55	68	IHC IE Clone 8B1.2
					0	68	IHC IE Clone 6F8.2
					55	68	IHC EA Clone QB1/42
32	Libard et al.	2014	4	P	55	68	IHC EA Clone BM204
					0	68	IHC LA Clone 2D4.2
					55	68	IHC LA Clone IG5.2
					55	68	IHC pp65 clone 2 and 6
					0	68	IHC CCH2+DDG9
					0	91	IHC IEA monoclonal MCA 2147
					0	91	IHC pp65 clone 26
33	Baumgarten et al.	2014	70	N	0	91	IHC CCH2/DDG9
					0	10	qPCR
					43	67	Chemiluminescent microparticle immunoassay (CMIA) IgG/IgM)
					0	17	Real Time PCR gB
					0	17	Real Time PCR UL123 IE1
34	Priel et al.	2014	86	N	0	19	Real Time PCR gB blood
					0	19	qPCR UL123 blood
					15	18	ELISA IgG
					0	18	ELISA IgM
					5	20	PCR HCMV miRNA UL112
35	Mohammad et al.	2014	51	P	13	20	ELISA IgG
					1	20	ELISA IgM
36	Ahani et al.	2014	20	P	12	16	Real Time PCR
					33	36	IHC IE1-72
					26	36	IHC LA
					28	36	IHC pp65
37	Shamran et al.	2015	57	P	10	11	Nested PCR IE1
					10	10	Nested PCR gB
					10	11	Nested PCR pp65
38	Hashida et al.	2015	75	N	0	39	qPCR gB
					0	39	qPCR IE
39	Leher et al.	2015	79	N	0	14	Reverse Transcription PCR blood
					14	24	IHC IE1-72
40	Wakefield et al.	2015	63	P	12	24	IHC pp65
					13	16	ISH IE pp65
					0	2	IHC CCH2/DDG9 (only GBM)
41	Sardi et al.	2015	88	N	0	2	RT PCR DNA
					2	2	ELISA IgG/IgM
42	Huang et al.	2015	41	P	25	25	IHC IE2-86 (only GBM)

					25	25	RT qPCR IE2-86
					25	25	WB
					30	43	IF IE1
					1	2	IF late
43	Bianchi et al.	2015	26	P	2	6	IE1-68-72 IF positive
					17	34	Nested PCR gB(UL55)
					0	8	pPCR UL55 in blood
					100	125	PCR HCMV IE DNA
					35	126	PCR HCMV IE RNA
					29	42	ELISA IgG
44	Rahbar et al.	2015	53	P	7	42	ELISA IgM
					10	12	Flow cytometry analysis IE specific T-cells in blood
					10	12	Flow cytometry analysis pp65 specific T-cells in blood
45	Dominguez-Valentin et al.	2016	30	P	33	108	qPCR pp65
					12	100	qPCR pp65 blood
					18	27	ELISA IgG
46	Taha et al.	2016	92	N	0	32	IHC CCH2/DDG9
					0	32	Real Time PCR
					0	30	IHC IEA 86-72
					0	30	IHC pp65
					0	30	CISH IE1
47	Holdhoff et al.	2016	76	N	0	30	CISH pp65
					0	25	Real Time PCR DNA US17
					4	38	Real Time PCR DNA US17 blood
					8	15	ELISA IgG
48	Stangherlin et al.	2016	61	P	4	10	IHC HCMV clone CMV 01 (only GBM)
					2	10	ISH RNA
					9	10	qPCR pp65 (UL83)
49	Lin et al.	2016	81	N	0	45	ddPCR UL55
50	Malekpour et al.	2016	86	N	20	199	qPCR
51	Strong et al.	2016	91	N	0	323	NGS RNA
					0	110	IHC CCH2/DDG9
52	Garcia-Martinez et al.	2017	73	N	0	30	Nested PCR
					3	122	RT-qPCR
53	Johnson et al.	2017	77	N	0	5	NGS RNA
					0	9	IHC IE1/2 68-72
54	Yang et al.	2017	96	N	0	9	ISH DNA Early
					0	116	Nested PCR UL144
					9	116	qPCR UL73
55	Strojnik et al.	2017	90	N	0	33	RT/PCR (UL55)
					40	158	IHC IE1 CCH2/DDG9
					65	172	qPCR gB
56	Bahador et al.	2017	24	P	26	159	qPCR pp65
					18	130	qPCR gB blood
					12	119	qPCR pp65 blood
					38	48	ELISA IgG

57	Basset et al.	2017	69	N	1	21	IHC IE1
					7	21	IHC pp65
58	Han et al.	2018	39	P	33	68	IF gB
					29	68	IF gH
					78	95	IHC IE1-72 (only GBM)
59	Han et al.	2017	38	P	65	95	IHC pp65 clones 2 and 6
					30	95	Nested PCR HCMV DNA
					65	95	ELISA IgG
					19	95	ELISA IgM
60	Hu et al.	2017	40	P	25	25	IHC IE86
61	Liang et al.	2017	43	P	23	23	IHC IE86
					0	7	IHC IE1
62	Zavala-Vega et al.	2017	67	P	7	7	Nested PCR IE1
					5	7	Semi nested PCR IE1
					3	7	PCR gB
63	Xing et al.	2016	66	P	40	43	IHC pp65
					28	43	ISH DNA pp65
					11	14	IHC IE1
64	Chen et al.	2017	27	P	11	14	IHC pp65
					9	14	Nested PCR UL55
					13	14	ELISA IgG
					2	14	ELISA IgM
					0	20	RT PCR DNA
65	Ahn et al.	2018	22	P	20	20	ELISA IgG
					0	20	ELISA IgM
66	Al-Sherify et al.	2019	23	P	8	14	Nested PCR gB
67	Deshpande et al.	2018	28	P	7	7	RT PCR RNA UL112-3p
68	Meng et al.	2018	49	P	21	21	Flow cytometry analysis pp65 specific T-cells in blood
69	Liu et al.	2018	45	P	107	151	Flow cytometry analysis pp65 specific T-cells in blood
70	Adnan et al.	2019	68	N	1	112	Nested PCR gB
71	Foster et al.	2019	34	P	97	188	ELISA IgG
					0	42	IHC IE1
72	Loit et al.	2019	82	N	1	28	qPCR tissue
					6	31	PCR blood
					32	47	ELISA IgG
					2	47	ELISA IgM
73	Nikolova et al.	2019	84	N	1	10	PCR tissue
					0	10	PCR blood
74	Frey et al.	2020	35	P	12	44	HCMV IgG
75	Goerig et al.	2020	37	P	12	44	RT PCR DNA
					23	44	ELISA IgG
76	Idriss et al.	2020	42	P	1	9	Nested PCR (GBM)
					0	82	IHC IE1 8B1.2
					0	82	IHC LA 2D4.2
77	Liman et al.	2020	44	P	0	82	IHC LA 1G5.2
					0	82	ISH RNA
					55	82	qPCR

78	Maleki et al.	2020	47	P	16	45	IHC pp65 clone 2 and 6
					44	45	RT PCR pp65
79	Weathers et al.	2020	64	P	61	65	pp65 T-cells blood
80	Yuan et al.	2020	97	N	0	111	NGS RNA
81	Ursu et al.	2021	62	P	16	69	RT PCR pp65
					69	103	ELISA IgG

HCMV; human cytomegalovirus; n; number, P; positive, N; negative, ELISA; RT; Reverse Transcription; IHC; immunohistochemistry; NGS; Next-Generation Sequencing; ISH; in situ hybridisation.