**Supplementary Fig. 1** Histologic features of gangliogliomas with various genetic alterations.

a,b Ganglioglioma in the spinal cord of a 5 year old girl with *KIAA1549-BRAF* gene fusion (SF-GG-24).

c Ganglioglioma in the temporal lobe of a 9 year old girl with *CDC42BPB-BRAF* gene fusion (SF-GG-26).

d Ganglioglioma in the temporal lobe of a 32 year old woman with *KRAS* p.Q61K mutation (SF-GG-29).

e Ganglioglioma in the temporal lobe of a 28 year old man with germline *NF1* mutation and somatic loss of the remaining wildtype allele in the tumor (SF-GG-31).


g,h Ganglioglioma in the temporal lobe of a 7 year old boy with *FGFR2-KIAA1598* gene fusion (SF-GG-34).

i,j Ganglioglioma in the frontal lobe of a 2 year old boy with *ABL2-GAB2* gene fusion (SF-GG-37).
Supplementary Fig. 2  Snapshots from the Integrated Genome Viewer of genetic alterations identified in the 40 gangliogliomas.  a Gangliogliomas with BRAF p.V600E mutation. b Ganglioglioma with BRAF p.T599_W604delinsTDG mutation. c Gangliogliomas with BRAF p.R506delins mutation. d Ganglioglioma with KIAA1549-BRAF fusion. e Ganglioglioma with CDC42BPB-BRAF fusion. f Ganglioglioma with KLHL7-BRAF fusion. g Ganglioglioma with ERC2-RAF1 fusion. h Gangliogliomas with KRAS p.Q61K mutation. i Ganglioglioma in patient with a heterozygous germline NF1 p.Q514frameshift mutation with somatic loss of the remaining wildtype allele in the tumor. j Ganglioglioma with FGFR1 p.N546K mutation. k Ganglioglioma with FGFR2 exon 17 splice acceptor mutation. l Ganglioglioma with FGFR1-TACC1 fusion. m Ganglioglioma with FGFR2-KIAA1598 fusion. n Ganglioglioma with FGFR2-INA fusion. o Ganglioglioma with ABL2-GAB2 fusion.
**b**

BRAF p.T599_W604delinsTDG, c.1797_1812delinsTGATGGG

SF-GG-19
allele frequency 1%

**c**

BRAF p.R506delins

SF-GG-20
allele frequency 43%

SF-GG-21
allele frequency 19%

SF-GG-23
allele frequency 12%
SF-GG-24 peripheral blood

SF-GG-24 tumor

*KIAA1549-BRAF* fusion (exons 1-10 of *KIAA1549* to exons 9-18 of *BRAF*)
SF-GG-26

**CDC42BPB-BRAF fusion (exons 1-36 of CDC42BPB to exons 9-18 of BRAF)**
KLHL7-BRAF fusion (exons 1-4 of KLHL7 to exons 10-18 of BRAF)
ERC2-RAF1 fusion (exons 1-7 of ERC2 to exons 8-17 of RAF1)
**h**

**KRAS**

- p.Q61K, c.180_181delinsCA (SF-GG-29) and c.180_181delinsAA (SF-GG-30)
- allele frequency 29%

**SF-GG-29**

**SF-GG-30**

- allele frequency 20%

**i**

**NF1**

- p.Q514frameshift, c.1541_1542del

- SF-GG-31
  - peripheral blood
  - allele frequency 51%

- SF-GG-31
  - tumor
  - allele frequency 83%
**j**

*FGFR1* p.N546K, c.1638C>A

**SF-GG-33**
allele frequency 3%

**k**

*FGFR2* exon 17 splice acceptor, c.2199-2A>T

**SF-GG-36**
allele frequency 4%
FGFR1-TACC1 fusion (exons 1-18 of FGFR1 to exons 7-13 of TACC1)
**FGFR2-KIAA1598 fusion** (exons 1-17 of **FGFR2** to exons 7-17 of **KIAA1598**)

**SF-GG-34**

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This figure illustrates the fusion of exon 1-17 of **FGFR2** to exon 7-17 of **KIAA1598** in the SF-GG-34 sample.
*FGFR2-INA* fusion (exons 1-17 of *FGFR2* to exons 2-3 of *INA*)
ABL2-GAB2 fusion (exons 1-10 of ABL2 to exons 5-10 of GAB2)