

Supplementary Table 1: Characteristics of included cases

Fetal post-mortem MRI	n=26
GA at MRI (weeks + days)	23+2 (±5 days) (range: 15+1 – 32+1)
Female/Male	14/12
Fetocide ^a	n=21
Drug-induced ^b	n=2
Spontaneous abortion	n=3
Hours spent <i>in utero</i> ^c	37 (±40) (range: 0 – 145)
Hours to MRI ^d	26 (±13) (range: 6 – 68)
Synthetic MRI ^e	n=25
MRF ^e	n=24
Indications for termination of pregnancy	
Agenesis of the corpus callosum	n=2
CDG syndrome	n=1
Coffin-Siris syndrome	n=2
Delayed gyration	n=1
Double outlet right ventricle	n=1
Duchenne muscular dystrophy	n=1
Fetal alcohol spectrum disorder	n=1
Hemimegalencephaly	n=1
Intracranial teratoma	n=1
Koolen-de Vries syndrome	n=1
Maternal complications ^f	n=3
Miscellaneous malformation	n=2
Mutation of ARX	n=1
Osteogenesis imperfecta	n=1
Renal agenesis	n=1
Rhombencephalosynapsis	n=1
Sacroccygeal teratoma	n=1
Spastic paraplegia type 47	n=1
Trisomy 21	n=1
Tubulinopathy	n=1
VACTERL association	n=1

^a Drug-assisted fetocide using mifepristone and misoprostol

^b Drug-induced termination of pregnancy using mifepristone and misoprostol

^c Hours spent *in utero* between the initiation of termination of pregnancy and delivery (available in n=21)

^d Hours between delivery and MRI

^e Total number of individual MRI sequences available

^f Spontaneous abortion prior to 20 weeks of gestation due to herpes simplex virus infection, prolapsed amniotic sac, and spontaneous unexplained preterm labor

ARX: Aristaless-related homeobox

CDG: Congenital disorder of glycosylation

GA: Gestational age

MRF: MR Fingerprinting

MRI: Magnetic resonance imaging

VACTERL: Vertebral; anorectal; cardiac; trachea-esophageal; renal; and limb anomalies

Supplementary Table 2: Post-mortem fetal MR protocol

Sequence	Plane	Voxel (mm)	FOV (mm)	Matrix	TR (ms)	TE (ms)	Time
T2 BLADE ^a	ax./sag./cor.	1x1x2	280	280x280x28	1550	110	00:37
T2 BLADE ^b	ax.	1x1x2	280	280x280x60	4960	110	01:59
T2 BLADE ^b	sag./cor.	1x1x2	280	280x280x35	1990	110	00:48
SWI ^a	ax.	0.2x0.2x1.6	180	180x180x32	28	20	09:02
T1 StarVIBE ^c	ax.	0.7x0.7x0.7	160	160x160x86	5.2	2.46	08:26
T1 SE ^a	ax.	0.3x0.3x2	160	160x160x31	496	7.8	06:57
T2 STIR ^c	cor.	0.7x0.7x2	233	233x233x44	3800	262	04:05
MDME ^d	ax./cor.	0.8x0.8x2.5	230	230x230x21	4060	24/107	05:12
SSFP/FISP ^d	ax./cor.	1x1x4.4	255	256x256x12	12	- ^e	04:39

^a Applies to brain imaging^b Applies to body imaging^c Applies to brain and body imaging^d Quantitative sequences^e No certain TE for MRF

BLADE: Vendor (Siemens)-specific designation for Periodically Rotated Overlapping Parallel Lines with Enhanced Reconstruction (PROPELLER)

FISP: Fast imaging with steady-state free precession

FOV: Field-of-view

MDME: Multi-dynamic multi-echo

SE: Spin-echo

SSFP: Steady-state free precession

STIR: Short-TI (inversion time) inversion recovery

SWI: Susceptibility-weighted imaging

TE: Time to echo

TR: Time to repeat

VIBE: Volumetric interpolated brain examination

Supplementary Table 3: Detailed information about included post-mortem cases

GA	Sex	Modus operandi ^a	Hours spent <i>in utero</i> ^b	Hours to MRI ^c	Diagnosis
15+1	M	Drug-induced ^d	- ^f	22	Trisomy 21
15+1	M	Fetocide ^e	- ^f	24	Duchenne muscular dystrophy
17+4	F	Spontaneous abortion	0	40	HSV-induced abortion
18+1	M	Fetocide ^e	8	24	Double outlet right ventricle
18+4	M	Drug-induced ^d	- ^f	28	Fetal alcohol spectrum disorder
18+5	F	Spontaneous abortion	0	10	Prolapsed amniotic sac
19+5	M	Spontaneous abortion	- ^f	24	Preterm labor
19+6	M	Fetocide ^e	- ^f	25	Renal agenesis
21+4	M	Fetocide ^e	3	27	VACTERL association
21+6	M	Fetocide ^e	6	19	Hemimegalencephaly
22+2	M	Fetocide ^e	34	24	Sacroccocygeal teratoma
23+3	F	Fetocide ^e	34	24	Osteogenesis imperfecta
23+4	F	Fetocide ^e	9	13	Intracranial teratoma
23+6	F	Fetocide ^e	38	22	Complex CNS malformation
24+0	F	Fetocide ^e	44	38	Delayed gyration
24+1	F	Fetocide ^e	14	8	CDG syndrome
24+2	M	Fetocide ^e	30	6	Spastic paraplegia type 47
25+0	F	Fetocide ^e	5	19	Koolen-de Vries syndrome
25+2	M	Fetocide ^e	4	9	Agenesis of the corpus callosum
26+1	M	Fetocide ^e	42	23	Coffin-Siris syndrome
27+1	F	Fetocide ^e	46	36	Rhombencephalosynapsis
28+0	F	Fetocide ^e	108	68	Agenesis of the corpus callosum
28+1	F	Fetocide ^e	79	47	Mutation of ARX
29+2	F	Fetocide ^e	99	26	Complex CNS malformation
31+2	F	Fetocide ^e	31	36	Tubulinopathy
32+1	F	Fetocide ^e	145	32	Coffin-Siris syndrome

^a Modus operandi with regard to the termination of pregnancy^b Hours spent *in utero* between the initiation of termination of pregnancy and delivery^c Hours between delivery and MRI^d Drug-induced termination of pregnancy using mifepristone and misoprostol^e Drug-assisted fetocide using mifepristone and misoprostol^f Data not available

ARX: Aristaless-related homeobox

CDG: Congenital disorder of glycosylation

CNS: Central nervous system

F: Female

GA: Gestational age

HSV: Herpes simplex virus

M: Male

MRI: Magnetic resonance imaging

VACTERL: Vertebral; anorectal; cardiac; trachea-esophageal; renal; and limb anomalies

Supplementary Table 4: Inter-rater reliability for manually determined Synthetic MRI- and MRF-derived quantitative imaging metrics

Region	ICC	
	Synthetic MRI	MRF
Medulla oblongata (T1R)	0.924 (CI: 0.836 – 0.966)	0.981 (CI: 0.957 – 0.992)
Medulla oblongata (T2R)	0.909 (CI: 0.806 – 0.959)	0.938 (CI: 0.864 – 0.973)
Midbrain (T1R)	0.957 (CI: 0.693 – 0.987)	0.973 (CI: 0.845 – 0.992)
Midbrain (T2R)	0.909 (CI: 0.805 – 0.959)	0.935 (CI: 0.732 – 0.977)

CI: Confidence interval

ICC: Intra-class correlation coefficient

MRF: MR Fingerprinting

MRI: Magnetic resonance imaging

T1R: T1-relaxation time

T2R: T2-relaxation time