SUPPLEMENTARY MATERIALS

Maternal BMI, diabetes, and gestational weight gain and risk for pediatric cancer in offspring: A systematic review and meta-analysis

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Supplementary Methods

Search Terms used in systematic literature search

The following search terms were used: ([‘childhood cancer’, OR ‘childhood malignancy’, OR ‘pediatric cancer’, OR ‘child’, OR ‘pediatric’,] AND [‘acute lymphoblastic leukemia’ OR ‘acute myeloid leukemia’, OR ‘osteosarcoma’, OR ‘Ewing sarcoma’, OR ‘neuroblastoma’, OR ‘Wilms tumor’, OR ‘hepatoblastoma’, OR ‘rhabdomyosarcoma’, OR ‘retinoblastoma’, OR ‘germ cell tumor’, OR ‘ependymoma’, OR ‘medulloblastoma’, OR ‘astrocytoma’, OR ‘glioblastoma’, OR ‘glioma’, OR ‘central nervous system tumor’, OR ‘non-Hodgkin’s lymphoma’, OR ‘Hodgkin’s lymphoma’, OR ‘lymphoma’,] AND [‘pre-pregnancy BMI’, OR ‘prepregnancy BMI’, OR ‘prenatal BMI’, OR ‘prenatal obesity’, OR ‘maternal obesity’, OR ‘diabetes’, OR ‘maternal diabetes’, OR ‘gestational weight gain’, OR ‘pre-pregnancy characteristics’, OR ‘prepregnancy characteristics’, OR ‘perinatal characteristics’, OR ‘perinatal exposures’, OR ‘maternal characteristics’, OR ‘maternal exposures’].

Supplementary Table 1. Main characteristics of pre-pregnancy BMI studies included in the meta-analysis[a]

Study	Design	Study Period	Country	Cancer(s)	Cohort: sample (cases) Case-control: controls /cases	Age range	Ascertainment of BMI	Number of mothers in (BMI) categories	Ascertainment of cancer diagnosis	OR (95% CI)	Adjusted covariates
McLaughlin, et al. 2006 (1)	Case-cohort	1993-2001	US (NY)	Hepatoblastoma	1850/33	1 month-5 years	Birth records	Cases: 3 (<20), 10 (20-24), 12 (25-29), 8 (30+) Controls: 207 (<20), 895 (20-24), 447 (25-29), 301 (30+)	New York State Cancer registry	<20: 1.4 (0.3-4.9), 20-24: referent, 25-29: 2.9 (1.2-7.6), 30+: 2.1 (0.7-6.1)	birth year, birth weight
Spector, et al. 2007 (2)	case control	1996-2002	US	Acute lymphoblastic leukemia & acute myeloid leukemia	255/240	<1 year	Self-report (interview)	Cases: 132 (<25), 71 (25-29.9), 37 (30+) Controls: 157 (<25), 53 (25-29.9), 45 (30+)	Children's Oncology Group	<25: referent, 25-29.9: 1.61 (1.04-2.48), 30+: 1.01 (0.61-1.68)	sex, race, maternal education
Greenop, et al. 2014 (3)	case control	2005-2010	Australia	All Childhood Brain tumors	1,079/319	0-14	Self-report (questionnaire/survey)	Cases: 21 (<18.5), 202 (18.5-24.9), 59 (25-29.9), 31 (30+) Controls: 41 (<18.5), 557 (18.5-24.9), 153 (25-29.9), 92 (30+)	National pediatric oncology centers	<18.5: 1.8 (0.7–2.1), 18.5-24.9: referent, 25-29.9: 1.1 (0.8–1.5), 30+: 0.9 (0.6–1.5)	Child's age at diagnosis or recruitment, child's sex, state of residence, child's year of birth, maternal age, child's ethnicity
				Low grade gliomas	1,079/151			Cases: 10 (<18.5), 94 (18.5-24.9), 26 (25-29.9), 20 (30+) Controls: 41 (<18.5), 557		<18.5: 1.2 (0.6–2.6), 18.5-24.9: referent, 25-29.9: 1.1 (0.8–1.8), 30+: 1.3 (0.8–2.3)	Child's age at diagnosis or recruitment, child's sex, state of residence, child's year of birth,

								(18.5-24.9), 153 (25-29.9), 92 (30+)			maternal age, child's ethnicity
				Embryonal tumors	1,079/75			Cases: 3 (<18.5), 47 (18.5-24.9), 19 (25-29.9), 4 (30+) Controls: 41 (<18.5), 557 (18.5-24.9), 153 (25-29.9), 92 (30+)		<18.5: 0.6 (0.8–2.0), 18.5-24.9: referent, 25-29.9: 1.4 (0.8–2.5), 30+: 0.5 (0.9–1.5)	Child's age at diagnosis or recruitment, child's sex, state of residence, child's year of birth, maternal age, child's ethnicity
Heck, et al. 2015 (4)	case control	2006-2011	US and Canada	Retinoblastoma (unilateral)	136/165	0-14	Self-Report (telephone interview)	Cases: 10 (<18.5), 101 (18.5-24.9), 45 (25-29.9), 28 (30+) Controls: 5 (<18.5), 90 (18.5-24.9), 31 (25-29.9), 19 (30+)	Wills Eye Hospital/Children's Oncology Group	<18.5: 2.6 (0.7-9.4), 18.5-24.9: referent, 25-29.9: 1.2 (0.7-2.3), 30+: 1.1 (0.5-2.5)	Child's age at interview, mother's race/ethnicity, mother's educational attainment, household income
				Retinoblastoma (bilateral)	136/87	0-14		Cases: 8 (<18.5), 50 (18.5-24.9), 20 (25-29.9), 17 (30+) Controls: 5 (<18.5), 90 (18.5-24.9), 31 (25-29.9), 19 (30+)		<18.5: 4.5 (1.0-20.1), normal: referent, 25-29.9: 1.2 (0.5-2.6), 30+: 1.0 (0.4-2.5)	Child's age at interview, mother's race/ethnicity, mother's educational attainment, household income
Petridou, et al. 2015 (5)	case-control	1973-2007	Sweden	Hodgkin Lymphoma	1,304,609 (18)	28 days-14 yr	Swedish Medical Birth Registry	Cases: 0 (<18.4), 8 (18.5-24.9), 10 (25+) Noncases: 35,632 (<18.4), 840,420 (18.5-24.9), 428,539 (25+)	Swedish National Cancer Registry	<18.4: 0.77 (0.24-2.44), 18.5-24.9: referent, 25+: 1.09 (0.76-1.57)	sex, maternal education, maternal age, gestational age, birth order

				Non-Hodgkin Lymphoma	1,304,609 (136)			Cases: 3 (<18.4), 87 (18.5-24.9), 46 (25+) Noncases: 35,629 (<18.4), 840,341 (18.5-24.9), 428,503 (25+)		<18.4: 0.77 (0.24-2.44), 18.5-24.9: referent, 25+: 1.09 (0.76-1.57)	sex, maternal education, maternal age, gestational age, birth order
Contreras, et al. 2016 (6)	Registry based case control	1988-2013	US (CA)	Overall	270,147/11,149	<6	Birth certificate	N/A	California Cancer Registry (ICCC-3)	N/A	
				Acute lymphoblastic leukemia	270,147/4,101			Cases: 5 (<18.5), 123 (18.5-24.9), 74 (25-29.9), 47 (30+) Controls: 1,249 (<18.5), 18,484 (18.5-24.9), 9,352 (25-29.9), 6,758 (30+)		<18.5: 0.62 (0.25-1.52), 18.5-24.9: referent, 25-29.9: 1.17 (0.88-1.57), 30+: 1.03 (0.73-1.45)	Year of birth, maternal/paternal race/ethnicity, maternal age
				Acute myeloid leukemia	270,147/706			Cases: 3 (<18.5), 57 (18.5-24.9), 34 (25-29.9), 23 (30+) Controls: 1,249 (<18.5), 18,484 (18.5-24.9), 9,352 (25-29.9), 6,758 (30+)		<18.5: insufficient cases, 18.5-24.9: referent, 25-29.9: 1.22 (0.80-1.88), 30+: 1.17 (0.71-1.91)	Year of birth, maternal/paternal race/ethnicity, maternal age
				Leukemia	270,147/5,034			Cases: 8 (<18.5), 195 (18.5-24.9), 125 (25-29.9), 80 (30+) Controls: 1,249 (<18.5), 18,484 (18.5-24.9), 9,352 (25-29.9), 6,758 (30+)		<18.5: 0.62 (0.31-1.27), 18.5-24.9: referent, 25-29.9: 1.27 (1.01-1.59), 30+: 1.13 (0.86-1.47)	Year of birth, maternal/paternal race/ethnicity, maternal age

Astrocytoma	270,147/990	Cases: 4 (<18.5), 51 (18.5-24.9), 30 (25-29.9), 20 (30+) Controls: 1,249 (<18.5), 18,484 (18.5-29.9), 9,352 (25-29.9), 6,758 (30+)	<18.5: insufficient cases, 18.5-24.9: referent, 25-29.9: 1.28 (0.81-2.03), 30+: 1.23 (0.73-2.09)	Year of birth, maternal/paternal race/ethnicity, maternal age
Embryonal tumor	270,147/709	Cases: 4 (<18.5), 44 (18.5-24.9), 21 (25-29.9), 8 (30+) Controls: 1,249 (<18.5), 18,484 (18.5-24.9), 9,352 (25-29.9), 6,758 (30+)	<18.5: insufficient cases, 18.5-24.9: referent, 25-29.9: 0.91 (0.54-1.53), 30+: 0.47 (0.22-1.00)	Year of birth, maternal/paternal race/ethnicity, maternal age
Germ cell tumors	270,147/445	Cases: 5 (<18.5), 34 (18.5-24.9), 16 (25-29.9), 10 (30+) Controls: 1,249 (<18.5), 18,484 (18.5-24.9), 9,352 (25-29.9), 6,758 (30+)	<18.5: 2.14 (0.83-5.51), 18.5-24.9: referent, 25-29.9: 0.94 (0.52-1.72), 30+: 0.82 (0.40-1.68)	Year of birth, maternal/paternal race/ethnicity, maternal age
Hepatoblastoma	270,147/337	Cases: 3 (<18.5), 38 (18.5-24.9), 14 (25-29.9), 16 (30+) Controls: 1,249 (<18.5), 18,484 (18.5-24.9), 9,352 (25-29.9), 6,758 (30+)	<18.5: insufficient cases, 18.5-24.9: referent, 25-29.9: 0.71 (0.38-1.31), 30+: 1.10 (0.60-1.99)	Year of birth, maternal/paternal race/ethnicity, maternal age
Neuroblastoma	270,147/1,378	Cases: 7 (<18.5), 112 (18.5-24.9), 55 (25-29.9), 43 (30+)	<18.5: 0.90 (0.42-1.94), 18.5-24.9: referent, 25-29.9: 1.05 (0.76-1.45), 30+: 1.16 (0.81-1.66)	Year of birth, maternal/paternal race/ethnicity, maternal age

								Controls: 1,249 (<18.5), 18,484 (18.5-24.9), 9,352 (25-29.9), 6,758 (30+) Cases: 2 (<18.5), 52 (18.5-24.9), 40 (25-29.9), 19 (30+)			
				Retinoblastoma	270,147/741			Controls: 1,249 (<18.5), 18,484 (18.5-24.9), 9,352 (25-29.9), 6,758 (30+) Cases: 2 (<18.5), 27 (18.5-24.9), 13 (25-29.9), 11 (30+)		<18.5: insufficient cases, 18.5-24.9: referent, 25-29.9: 1.40 (0.92-2.14), 30+: 0.88 (0.52-1.51)	Year of birth, maternal/paternal race/ethnicity, maternal age
				Rhabdomyosarcoma	270,147/463			Controls: 1,249 (<18.5), 18,484 (18.5-24.9), 9,352 (25-29.9), 6,758 (30+) Cases: 1 (<18.5), 78 (18.5-24.9), 33 (25-29.9), 22 (30+)		<18.5: insufficient cases, 18.5-24.9: referent, 25-29.9: 0.96 (0.49-1.88), 30+: 1.13 (0.55-2.30)	Year of birth, maternal/paternal race/ethnicity, maternal age
				Wilms tumor	270,147/1,052			Controls: 1,249 (<18.5), 18,484 (18.5-24.9), 9,352 (25-29.9), 6,758 (30+) Cases: 4 (18.5-24.9), 7 (25+)		<18.5: insufficient cases, 18.5-24.9: referent, 25-29.9: 0.85 (0.56-1.28), 30+: 0.79 (0.49-1.28)	Year of birth, maternal/paternal race/ethnicity, maternal age
Peckham-Gregory, et al. 2016 (7)	case-control	1995-2011	US (TX)	Hodgkin Lymphoma	1045/11	<16	Birth Records	Controls: 553 (18.5-24.9), 492 (25+) Cases: 6 (18.5-24.9), 10 (25+)	Texas Cancer Registry	18.5-24.9: referent, 25+: 1.97 (0.57-6.76)	univariate
				Non Burkitt non-	1045/16			Controls: 553		18.5-24.9: referent, 25+: 1.44 (0.51-4.11)	sex, maternal race/ethnicity,

				Hodgkin lymphoma				(18.5-24.9), 492 (25+)			maternal education, birth year
				Burkitt Lymphoma	1045/8			Cases: 7 (18.5-24.9), 1 (25+) Controls: 553 (18.5-24.9), 492 (25+)		18.5-24.9: referent, 25+: 0.17 (0.02-1.31)	univariate
Bailey, et al. 2017 (8)	Population based case control	2003-2004) & 2010-2011	France	Childhood brain tumors (any)	1,291/282	<15	Self-report (telephone interview)	Cases: 28 (<18.5), 207 (18.5-24.9), 38 (25-29.9), 9 (30+) Controls: 122 (<18.5), 915 (18.5-24.9), 189 (25-29.9), 65 (30+)	French National Registry of Childhood Cancers	<18.5: 1.1 (0.7-1.7), 18.5-24.9: referent, 25-29.9: 0.9 (0.6-1.3), 30+: 0.6 (0.3-1.3)	childs sex, child's age, year of birth group
				Ependymomas	1,291/29			Cases: 2 (<18.5), 20 18.5-24.9, 5 (25-24.9), 2 (30+) Controls: 122 (<18.5), 915 (18.5-24.9), 189 (25-29.9), 65 (30+)		<18.5: 0.9 (0.2-3.9), 18.5-24.9: referent, 25-29.9: 1.1 (0.4-3.1), 30+: 1.2 (0.3-5.5)	childs sex, child's age, year of birth group
				Astrocytomas	1,291/90			Cases: 10 (<18.5), 65 (18.5-24.9), 13 (25-29.9), 2 (30+) Controls: 122 (<18.5), 915 (18.5-24.9), 189 (25-29.9), 65 (30+)		<18.5: 1.3 (0.6-2.6), 18.5-24.9: referent, 25-29.9: 1.0 (0.5-1.9), 30+: 0.4 (0.1-1.9)	childs sex, child's age, year of birth group
				Embryonal Tumors	1,291/97			Cases: 10 (<18.5), 68 (18.5-24.9), 15 (25-29.9), 4		<18.5: 1.2 (0.6-2.4), 18.5-24.9: referent, 25-29.9: 1.1 (0.6-1.9), 30+: 0.9 (0.3-2.4)	childs sex, child's age, year of birth group

								(30+) Controls: 122 (<18.5), 915 (18.5-24.9), 189 (25-29.9), 65 (30+) Cases: 5 (<18.5), 49 (18.5-24.9), 4 (25-29.9), 1 (30+)			
				Other Gliomas	1,291/59			Controls: 122 (<18.5), 915 (18.5-24.9), 189 (25-29.9), 65 (30+) Cases: 109 (<18.5), 1,127 (18.5-24.9), 603 (25-29.9), 252 (30-34.9), 133 (35-39.9), 105 (40+)		<18.5: 0.8 (0.3- 2.1), 18.5-24.9: referent, 25-29.9: 0.4 (0.1-1.1), 30+: 0.3 (0.0-2.5)	childs sex, child's age, year of birth group
Stacy, et al. 2019 (9)	Registry based prospective cohort	2003-2016	US (PA)	Any cancer	1,812,131 (2,329)	<14	Self-report (birth registry data)	Total: 73,785 (<18.5), 876,860 (18.5-24.9), 495,932 (25-29.9), 203,211 (30-34.9), 95,205 (35-39.9), 67,138 (40+)	Pennsylvania Cancer Registry (ICD3)	<18.5: 1.18 (0.96-1.43), 18.5-24.9: referent, 25-29.9: 0.99 (0.90-1.09), 30-34.9: 1.02 (0.89-1.17), 30-34.9: 1.16 (0.96-1.38), 35-39.9: 1.32 (1.08-1.62)	Maternal age and/or race
								Cases: 33 (<18.5), 349 (18.5-24.9), 188 (25-29.9), 89 (30-34.9), 46 (35-39.9), 38 (40+)		<18.5: 1.14 (0.80-1.63), 18.5-24.9: referent, 25-29.9: 1.01 (0.84-1.20), 30-34.9: 1.17 (0.93-1.48), 35-39.9: 1.31 (0.96-1.78), 40+: 1.57 (1.12-2.20)	
				Leukemia	1,812,131 (743)			Total: 73,785 (<18.5), 876,860 (18.5-24.9),			Maternal age and/or race

			495,932 (25-29.9), 203,211 (30-34.9), 95,205 (35-39.9), 67,138 (40+)		
	Acute lymphoblastic leukemia	1,810,383 (581)	Cases: 26 (<18.5), 278 (18.5-24.9), 140 (25-29.9), 67 (30-34.9), 40 (35-39.9), 30 (40+) Total: 73,702 (<18.5), 876,011 (18.5-24.9), 495,469 (25-29.9), 203,026 (30-34.9), 95,112 (35-39.9), 67,063 (40+)	<18.5: 1.13 (0.75-1.68), 18.5-24.9: referent, 25-29.9: 0.95 (0.78-1.17), 30-34.9: 1.12 (0.86-1.47), 35-39.9: 1.45 (1.04-2.02), 40+: 1.59 (1.09-2.32)	Maternal age and race
	Neuroblastoma	1,810,383 (297)	Cases: 21 (<18.5), 148 (18.5-24.9), 78 (25-29.9), 32 (30-34.9), 12 (35-39.9), 6 (40+) Total: 73,702 (<18.5), 876,011 (18.5-24.9), 495,469 (25-29.9), 203,026 (30-34.9), 95,112 (35-39.9), 67,063 (40+)	<18.5: 1.74 (1.10-2.75), 18.5-24.9: referent, 25-29.9: 0.96 (0.73-1.26), 30-34.9: 0.97 (0.66-1.42), 35-39.9: 0.78 (0.43-1.41), 40+: 0.56 (0.25-1.27)	Maternal age and race

[a]BMI: body mass index, OR: odds ratio, CI: confidence intervals

Supplementary Table 2. Main characteristics of the diabetes studies included in the meta-analysis[a]

Study	Design	Study Period	Country	Cancer(s)	Cohort: sample (cases) Case-control: controls/ cases	Age range	Ascertainment of maternal diabetes diagnosis	Number with (type of) maternal diabetes	Ascertainment of cancer diagnosis	OR (95% CI)	Adjusted covariates
Cnattingius, et al. 1995 (10)	Nested case-control	1973-1989	Sweden	Acute Lymphoblastic Leukemia	3,065/613	not specified	Medical Birth Registry	Cases: 5 (any) Controls: 12 (any)	Swedish National Cancer Registry	Any: 2.1 (0.7-5.9)	Adjusted for postpartum asphyxia, supplementary oxygen, and birth weight; matching vairable: sex, birth year, birth month
Petridou, et al. 1997 (11)	Case control	1993-1994	Greece	Leukemia	300/153	0-14 years	Self-report (interview administered questionnaire)	Cases: 3 (any) Controls: 2 (any)	Nationwide network of childhood hematologists/oncologists	Any: 2.99 (0.30-29.56)	Sociodemographic variables, lifestyle variables, environmental variables, and biomedical variables
Åberg, et al. 2001	Case-control (registry based)	1987-1997	Sweden	Any malignancy	1,213,957/6304	<10	Swedish Medical Birth Registry	Cases: 20 (gestational), 20 (pregestational) Total: 8,684 (gestational), 3,874 (pregestational)	Hospital Discharge Registry, National Board of Health, Stockholm	Gestational: 0.91 (0.58-1.43), pregestational: 1.64 (1.06-2.54)	Year of birth, maternal age, parity, maternal smoking in early pregnancy
Hamrick, et al. 2001 (12)	Case control	1992-1994	USA and Canada	Neuroblastoma	504/504	<19	Self-report (structured interview)	Cases: 28 (pregestational) Controls: 24 (pregestational)	Children's Cancer Group/Pediatric Oncology Group	Pregestational: 1.1 (0.6-2.1)	Child's gender, mother's race and education, household income

Westbom, et al. 2002 (13)	Case-control	1987-1998	Sweden	Any malignancy	1,285,100 (1419)	1-?	Swedish Medical Birth Registry	Cases: 10 (any) Noncases: 4380 (any)	Swedish National Cancer Registry	Any: 2.25 (1.22-4.15)	Year of birth, maternal age, parity, multiple births, 500g birth weight class
Podvin, et al. 2006 (14)	Case-control	1981-2003	US (WA)	Leukemia	5535/549	<20 years	Birth Records	Cases: 13 (pregestational), 2 (gestational) Controls: 77 (pregestational), 9 (gestational)	Washington State Cancer Registry	Pregestational: 1.4 (0.8-2.7), gestational: 2.3 (0.5-11.0)	Maternal age
McLaughlin, et al. 2006 (15)	Case-cohort	1985-2001	US (NY)	Acute Lymphoblastic Leukemia	9,249/871	1 month-9 years	Birth certificates	Cases: 25 (gestational) Controls: 164 (gestational)	New York State Cancer Registry	Gestational: 1.44 (0.91-2.18)	Birth year, gender, race and ethnicity, maternal age, gestational age and birth weight
				Acute Myeloid Leukemia	9,249/146			Cases: 1 (gestational) Controls: 164 (gestational)		Gestational: 0.26 (0.02-1.18)	Birth year, gender, race and ethnicity, maternal age, gestational age and birth weight
Chow, et al. 2007 (16)	Case contol	1980-2004	US (WA)	Neuroblastoma	2,400/240 - any 2,060/206 - gestational	<20	Birth certificate, Comprehensive Hospital Abstract Reporting System	Cases: 12 (any) Controls: 72 (any) Cases: 12 (gestational) Controls: 67 (gestational)	Cancer Surveillance System of Western Washington (1980-1992); Washington State Cancer Registry (1993-2004). ICD-O-3	Any: 1.71 (0.91-3.22) Gestational: 1.84 (0.98-3.47)	Birth year Birth year
Milne, et al. 2007 (17)	Cohort	1980-2004	Australia	Acute Lymphoblastic Leukemia	576314 (243)	<15 years	Reproductive Technology Register and Western	Cases: 0 (pregestational), 3 (gestational)	Cancer registrations	Gestational: 1.03 (0.33-3.22)	Univariate

							Australian Birth Defects Registry	Noncases: 783 (pregestational), 9,587 (gestational) Cases: 0 (pregestational), 1 (gestational)			
				Acute Myeloid Leukemia	576314 (36)			Noncases: 783 (pregestational), 9,587 (gestational)		Gestational: 2.15 (0.29-15.72)	Univariate
Daniels, et al. 2008 (18)	Case-control	1999-2002	US and Canada	Wilms Tumor	517/521	<16	Self-report (telephone interview)	Cases: 22 (any) Controls: 30 (any)	National Wilms Tumor Study Group	Any: 0.9 (0.5-1.6)	Child's age, study region, child's sex, maternal education, household income
Johnson, et al. 2008 (19)	Case-cohort	1988-2004	US (MN)	Acute Lymphoblastic Leukemia	3304 (237)	28 days – 14 years	Birth Records	Cases: 8 (any) Cohort: 110 (any)	Minnesota Cancer Surveillance System	Any: 1.00 (0.48-2.08)	Birth year
				Acute myeloid leukemia	3304 (33)			Cases: 0 (any) Cohort: 110 (any)		NA	
Ognjanovic, et al. 2009 (20)	Case-control	1997-2002	US and Canada	Leukemia	173/158	<19	Self-report (telephone interview)	Cases: 16 (gestational) Controls: 19 (gestational)	Children's Oncology Group	Gestational: 0.87 (0.42-1.80)	Maternal age, maternal education, maternal race, child's sex, child's age
				Acute lymphoblastic leukemia	173/97			Cases:10 (gestational) Controls: 19 (gestational)		Gestational: 0.91 (0.39-2.11)	Maternal age, maternal education, maternal race, child's sex, child's age
				Acute myeloid leukemia	173/61			Cases: 6 (gestational) Controls: 19 (gestational)		Gestational: 0.86 (0.30-2.46)	Maternal age, maternal education, maternal race, child's sex, child's age
Heck, et al. 2012 (21)	Records based	1988-2007	US (CA)	Retinoblastoma	209,051/609	<5	Birth Certificates	Cases: 10 (pregestation	California Cancer Registry	Pregestational: 0.86 (0.46-1.62)	Year of birth, father's age, urban or rural

	case-control							al) Controls: 3755 (pregestational)			county of residence, mother's race and birthplace
Wu, et al. 2012 (22)	Cohort	1977-2008	Denmark	Any malignancy	1,781,576 (7314)	<30	Danish National Hospital Register and Danish National Diabetes Register	Cases: 65 (any), 19 (pregestational), 8 (gestational) Cohort: 25,651 (any), 12,401 (pregestational), 11,507 (gestational)	Danish National Hospital Register	Any: 1.3 (1.0-1.7), pregestational: 1.9 (1.2-3.0), gestational: 0.7 (0.3-1.3)	Excluded those with congenital malformations; adjusted for: maternal age, parity, sex, maternal education, maternal marital status, year, gestational age at birth, birth weight, square of birth weight
Musselman, et al. 2013 (23)	Case-control	2000-2008	US	Hepatoblastoma	387/383	<6	Self-report (telephone interview)	Not reported	Children's Oncology Group	Gestational: 0.79 (0.43-1.48)	Year of birth, birth weight, sex, maternal age, maternal smoking, plurality, maternal race
Heck, et al. 2015 (4)	Case-control	2006-2011	US and Canada	Retinoblastoma (unilateral)	136/165	0-14	Self-report (telephone interview)	Cases: 17 (any), 14 (gestational) Controls: 6 (any), 6 (gestational)	Wills Eye Hospital/Children's Oncology Group	Any: 2.2 (0.8-6.6), gestational: 1.9 (0.6-5.7)	Child's age at interview, mother's race/ethnicity, maternal education, household income, maternal age at childbirth, maternal tobacco smoking during pregnancy
				Retinoblastoma (bilateral)	136/87	0-14		Cases: 8 (any), 8 (gestational) Controls: 6 (any), 6 (gestational)		Any: 1.9 (0.6-6.6), gestational: 1.9 (0.6-6.6)	Child's age at interview, mother's race/ethnicity, maternal education, household income, maternal age at childbirth, maternal tobacco smoking during pregnancy

Petridou, et al. 2015 (5)	Cohort	1973-2007	Sweden	Hodgkin lymphoma	3,444,136 (169)	28 days-14 years	Swedish Medical Birth Registry	Cases: 1 (pregestational) Noncases: 14,972 (pregestational)	Swedish National Cancer Registry	Pregestational: 1.45 (0.20-10.4)	Sex, maternal education, maternal age, gestational age, birth order
				Non-Hodgkin lymphoma	3,444,136 (515)			Cases: 4 (pregestational) Noncases: 14,969 (pregestational)		Pregestational: 1.79 (0.67-4.79)	Sex, maternal education, maternal age, gestational age, birth order
Vienneau, et al. 2016 (24)	Case-control Registry based	2004-2008	Denmark, Sweden, Norway, Switzerland	Brain tumor (intercranial CNS)	624/347	7-19 years	Self-report (Interview)	Cases: 6 (any maternal diabetes) Controls: 14	Medical records	Any: 0.76 (0.29-2.02)	Matched on sex, age group, geographic region; adjusted for maternal age and parental education
Contreras, et al. 2016 (6)	case-control	1988-2013	US (CA)	Overall	270,147/11,149	<6	Birth records	N/A	California Cancer Registry (ICCC-3)	N/A	
				Acute lymphoblastic leukemia	270,147/4,101			Cases: 94 (pregestational), 17 (gestational) Controls: 4,289 (pregestational), 1,667 (gestational)		Pregestational: 1.37 (1.11, 1.69), gestational: 1.26 (0.77-2.05)	Year of birth, maternal/paternal race/ethnicity, maternal age
				Acute myeloid leukemia	270,147/706			Cases: 4 (pregestational), 4 (gestational) Controls:		N/A	

		4,289 (pregestational), 1,667 (gestational) Cases: 104 (pregestational), 24 (gestational) Controls: 4,289 (pregestational), 1,667 (gestational)		
Leukemia	270,147/5,034	Cases: 11 (pregestational), 6 (gestational) Controls: 4,289 (pregestational), 1,667 (gestational)	Pregestational: 1.23 (1.01-1.49), gestational: 1.14 (0.76-1.72)	Year of birth, maternal/paternal race/ethnicity, maternal age
Astrocytoma	270,147/990	Cases: 6 (pregestational), 5 (gestational) Controls: 4,289 (pregestational), 1,667 (gestational)	Pregestational: 0.71 (0.39-1.30), gestational: 1.32 (0.58-3.02)	Year of birth, maternal/paternal race/ethnicity, maternal age
Embryonal Tumor	270,147/709	Cases: 7 (pregestational), 2 (gestational) Controls: 4,289 (pregestational), 1,667 (gestational)	Pregestational: 0.54 (0.24-1.20), gestational: 1.25 (0.51-3.07)	Year of birth, maternal/paternal race/ethnicity, maternal age
Germ cell tumor	270,147/445		Pregestational: 0.97 (0.46-2.06), gestational: N/A	Year of birth, maternal/paternal race/ethnicity, maternal age

Hepatoblastoma	270,147/337	Cases: 7 (pregestational), 5 (gestational) Controls: 4,289 (pregestational), 1,667 (gestational)	Pregestational: 1.22 (0.58-2.60), gestational: 1.49 (0.60-3.70)	Year of birth, maternal/paternal race/ethnicity, maternal age
Neuroblastoma	270,147/1,378	Cases: 18 (pregestational), 12 (gestational) Controls: 4,289 (pregestational), 1,667 (gestational)	Pregestational: 0.85 (0.53-1.35), gestational: 1.31 (0.73-2.34)	Year of birth, maternal/paternal race/ethnicity, maternal age
Retinoblastoma	270,147/741	Cases: 11 (pregestational), 7 (gestational) Controls: 4,289 (pregestational), 1,667 (gestational)	Pregestational: 0.93 (0.51-1.69), gestational: 1.34 (0.63-2.88)	Year of birth, maternal/paternal race/ethnicity, maternal age
Rhabdomyosarcoma	270,147/463	Cases: 5 (pregestational), 1 (gestational) Controls: 4,289 (pregestational), 1,667 (gestational)	Pregestational: 0.66 (0.27-1.60), gestational: N/A	Year of birth, maternal/paternal race/ethnicity, maternal age
Wilms tumor	270,147/1,052	Cases: 25 (pregestational), 7 (gestational)	Pregestational: 1.45 (0.97-2.18), gestational: 1.23 (0.57-2.63)	Year of birth, maternal/paternal race/ethnicity, maternal age

								Controls: 4,289 (pregestational), 1,667 (gestational)			
Deleskog, et al. 2017 (25)	Registry-based cohort	1973-2015	Sweden	All cancers	4,239,965 (8,839)	0-15	ICD codes in Medical Brith Register, hospital inpatient/outpatient registers.	Cases: 26 (pregestational), 51 (gestational)	Nationwide Cancer Register (ICD-7/8)	Any: 1.06 (0.89-1.26), pregestational: 1.09 (0.74-1.60), gestational: 0.94 (0.72-1.24),	Child's sex, decade of birth, maternal age, parental education, birth order, birthweight, gestational age, child's diabetes status, child birth defects
				Brain	4,239,965 (2,079)			Cases: 7 (pregestational), 4 (gestational)		Any: 0.56 (0.35-0.91), pregestational: 1.24 (0.59-2.60), gestational: 0.34 (0.13-0.90),	Child's sex, decade of birth, maternal age, parental education, birth order, birthweight, gestational age, child's diabetes status, child birth defects
				Leukemia	4,239,965 (2,687)			Cases: 8 (pregestational), 24 (gestational)		Any: 1.47 (1.13-1.92), pregestational: 1.10 (0.55-2.20), gestational: 1.41 (0.94-2.11)	Child's sex, decade of birth, maternal age, parental education, birth order, birthweight, gestational age, child's diabetes status, child birth defects
				Acute lymphoblastic leukemia	4,239,965 (2,091)			Cases: 7 (pregestational), 20 (gestational)		Any maternal diabetes: 1.64 (1.23-2.18), pregestational: 1.24 (0.59-2.60), gestational: 1.51 (0.97-2.35)	Child's sex, decade of birth, maternal age, parental education, birth order, birthweight, gestational age, child's diabetes status, child birth defects
				Lymphoma	4,239,965 (901)			Cases: 4 (pregestation		Any: 1.45 (0.90-2.36), pregestational:	Child's sex, decade of birth, maternal age, parental education,

								al), 8 (gestational)		1.64 (0.61-4.40), gestational: 1.56 (0.78-3.15)	birth order, birthweight, gestational age, child's diabetes status, child birth defects
Søegaard, et al. 2018 (26)	Registry based cohort	1996-2015	Denmark	Acute lymphoblastic leukemia	1,187,482 (492)	<15	Danish National Patient Register	Cases: 6 (pregestational), 14 (gestational) Total: 5,409 (pregestational), 24,306 (gestational)	Nordic Society of Paediatric Haematology and Oncology	Pregestational: 2.91 (1.30–6.51), gestational: 1.75 (1.02–2.98)	Maternal age, ethnicity, birth order, maternal smoking, birth cohort, birth weight, gestational age, mode of delivery
Borsari, et al. 2019 (27)	Population-based cohort study	1998-2017	Italy	Acute lymphoblastic leukemia	241,958 (145)	<15	Hospital discharge records (ICD-9)	Cases: 2 (pregestational) Total: 1,321 (pregestational)	National Childhood Cancer Register	Pregestational: 2.7 (0.7-11.1)	"Maternal demographic characteristics"
Bauer, et al. 2019 (28)	Case-control	2010-2011	France	Wilms Tumor	1,097/117	<11	Self-report (telephone interview)	Cases: 13 (gestational) Controls: 107 (gestational)	French National Registry of Childhood Cancer	gestational: 1.3 (0.7-2.4)	Age, gender, birth order, maternal age
Kessous, et al. 2019 (29)	Population-based retrospective cohort	1991-2014	Israel	Any malignancy	236,893 (241)	<18	Hospital obstetrics and gynecology database (ICD-9)	10,294 with gestational diabetes	Hospital database (ICD-9)	Gestational: 1.03 (0.58-1.82)	Maternal age, hypertensive disorders, gestational age at delivery
Seppälä, et al. 2020 (30)	Case-control	1996-2014	Finland	Any malignancy	10,103/2,029	<20	Medical Birth Register and the Care Register for Health Care	Cases: 241 (any), 29 (pregestational), 212 (gestational) Controls: 940 (any), 128 (pregestational), 812 (gestational)	Finnish Cancer Registry	Any: 1.28 (1.10-1.50), gestational: 1.31 (1.11-1.54), pregestational: 1.11 (0.73-1.69)	Maternal age, parity, smoking

[a] BMI: body mass index, OR: odds ratio, CI: confidence intervals, ICD: International Classification of Diseases

Supplementary Table 3. Main characteristics of gestational weight gain studies included in the meta-analysis[a]

Study	Design	Study Period	Country	Cancer(s)	Cohort: sample (cases) Case-control: controls/ cases	Age range	Ascertainment of weight gain	Number of mothers in (weight gain categories)	Ascertainment of cancer diagnosis	OR (95% CI)	Adjusted covariates
McLaughlin, et al. 2006a (15)	Case-cohort	1988-2001	US (NY)	Acute lymphoblastic leukemia	3860/467	1 month-9 years	Birth certificates	Cases: 60, (<8.6 kg) , 65 (9.1-11.3 kg), 83 (11.8-13.6 kg), 158 (14.1-18.1 kg), 101 (18.6+ kg) Controls: 511 (<8.6 kg), 696 (9.1-11.3 kg), 749 (11.8-13.6 kg), 1,138 (14.1-18.1 kg), 766 (18.6+ kg)	New York State Cancer Registry	<8.6 kg: 1.31 (0.90-1.91), 9.1-11.3 kg: referent, 11.8-13.6 kg: 1.12 (0.79-1.59), 14.1-18.1 kg: 1.42 (1.04-1.94), 18.6 kg+: 1.38 (0.99-1.94)	Birth year, gender, race and ethnicity, maternal age, gestational age and birth weight
				Acute myeloid leukemia	3860/98			Cases: 19 (<8.6 kg), 18 (9.1-11.3 kg), 17 (11.8-13.6 kg), 25 (14.1-18.1 kg), 19 (18.6+ kg) Controls: 511 (<8.6 kg), 696 (9.1-11.3 kg), 749 (11.8-13.6 kg), 1,138 (14.1-18.1 kg), 766 (18.6+ kg)		<8.6 kg: 1.45 (0.73-2.90), 9.1-11.3 kg: referent, 11.8-13.6 kg: 0.90 (0.44-1.84), 14.1-18.1 kg: 0.88 (0.47-1.71), 18.6 kg+: 0.83 (0.41-1.68)	Birth year, gender, race and ethnicity, maternal age, gestational age and birth weight
McLaughlin, et al. 2006b (1)	Case-cohort	1988-2001	US (NY)	Hepatoblastoma	3,879/46	1 month - 5 years	Birth records	Cases: 4 (<10 lbs), 9 (10-19 lbs), 16 (20-29 lbs), 10 (30-39 lbs), 7 (40+ lbs) Controls: 120 (<10 lbs), 394 (10-19 lbs), 1,143 (20-29 lbs), 1,236 (30-39 lbs), 986 (40+ lbs)	New York State Cancer Registry	<10 lbs: 1.5 (0.4-4.6), 10-19 lbs: 1.0 (0.4-2.5), 20-29 lbs: referent, 30-39 lbs: 0.7 (0.3-1.5), 40+ lbs: 0.5 (0.2-1.3)	Birth year, birth weight
Podvin, et al. 2006 (14)	Case control	1989-2002	US (WA)	Leukemia	2,415/245	<20 years	Birth records	Cases: 10 (<10 lbs), 82 (10-29 lbs), 135 (30-49lbs), 18 (50+lbs) Controls: 66 (<10 lbs),	Washington State Cancer Registry	<10lbs: 1.5 (0.7-3.0), 10- 29 lbs: referent, 30-49 lbs:	Maternal age

								817 (10-29 lbs), 1,296 (30-49 lbs), 236 (50+lbs)		1.0 (0.8-1.4), 50+ lbs: 0.8 (0.5-1.3)	
Puumala, et al. 2007 (31)	Case-cohort	1988-2004	US (MN)	Wilms tumor	8,890 (138)	28 days - 14 years	Birth certificate	Cases: 17 (<24lbs), 32 (25-30lbs), 16 (31-36lbs), 23 (>36lbs) Subcohort: 1,029 (<24lbs), 1,295 (25-30lbs), 616 (31-36lbs), 910 (>36lbs)	Minnesota Cancer Surveillance System	<24lbs: referent, 25-30lbs: 1.46 (0.80-2.67), 31-36lbs: 1.63 (0.81-3.26), 36+ lbs: 1.53 (0.81-2.90)	Sex, birth year
Spector, et al. 2007 (2)	Case-control	1996-2002	US	Acute lymphoblastic leukemia & acute myeloid leukemia	255/240	< 1 year	Self-report (interview)	Cases: 46 (<9.07 kg), 72 (9.53-13.61 kg), 61 (13.61-18.14 kg), 61 (>18.14kg) Controls: 55 (9.07 kg), 82 (9.53-13.61 kg), 63 (13.61-18.14 kg), 55 (>18.14 kg)	Childrens Oncology Group	<9.07 kg: referent, 9.52-13.61 kg: 1.16 (0.68-1.99), 13.61-18.14 kg: 1.25 (0.71-2.21), 18.14+ kg: 1.50 (0.84-2.68)	Sex, race, maternal education, pre-pregnancy BMI
McLaughlin, et al. 2009 (32)	Registry based case-cohort	1985-2001	US (NY)	Neuroblastoma	7,294/397	1 month - 14 years	Birth certificate	Cases: 72 (<9.1 kg), 78 (9.1-13.2 kg), 177 (13.6+ kg) Controls: 1,172 (<9.1 kg), 1,501 (9.1-13.2 kg), 3,235 (13.6+ kg)	New York State Cancer Registry (ICD-O-3)	<9.1kg: referent, 9.1–13.2kg: 0.8 (0.6-1.2), 13.6+kg: 0.9 (0.6-1.2)	Birth year, region, child's gender, race, birthweight
Greenop, et al. 2014 (3)	Case control	2005-2010	Australia	Any childhood brain tumor	1,079/319	0-14	Self-report (questionnaire/ survey)	Cases: 108 (inadequate), 56 (appropriate), 93 (excessive) Controls: 225 (inadequate), 208 (appropriate), 236 (excessive)	National pediatric oncology centers	Inadequate: 1.8 (1.2-2.6), appropriate: referent, excessive: 1.4 (1.0-2.1)	Child's age at diagnosis or recruitment, child's sex, state of residence, child's year of birth group, maternal age group, maternal pre-pregnancy supplementation
				Low grade gliomas	1,079/151			Cases: 53 (inadequate), 25 (appropriate), 44 (excessive) Controls: 225 (inadequate), 208		Inadequate: 1.9 (1.1-3.3), appropriate: referent, excessive: 1.5 (0.9-2.6)	Child's age at diagnosis or recruitment, child's sex, state of residence, child's year of birth group,

								(appropriate), 236 (excessive)			maternal age group, maternal pre-pregnancy supplementation
				Embryonal tumors	1,079/75			Cases: 23 (inadequate), 17 (appropriate), 22 (excessive) Controls: 225 (inadequate), 208 (appropriate), 236 (excessive)		inadequate: 1.2 (0.6-2.4), appropriate: referent, excessive: 1.1 (0.6-2.7)	Child's age at diagnosis or recruitment, child's sex, state of residence, child's year of birth group, maternal age group, maternal pre-pregnancy supplementation
Heck, et al. 2015 (4)	Case control	2006-2011	US and Canada	Retinoblastoma (unilateral)	136/165	0-14	Self-report (telephone interview)	Cases: 26 (inadequate), 64 (appropriate), 87 (excessive) Controls: 23 (inadequate), 51 (appropriate), 61 (excessive)	Wills Eye Hospital/ Children's Oncology Group	Inadequate: 0.8 (0.4-1.8]), appropriate: referent, excessive: 1.1 (0.6-1.8)	Child's age, maternal race/ethnicity, maternal education, household income
				Retinoblastoma (bilateral)	136/87			Cases: 12 (inadequate), 34 (appropriate), 46 (excessive) Controls: 23 (inadequate), 51 (appropriate), 61 (excessive)		Inadequate: 0.8 (0.3-2.0), appropriate: referent, excessive: 0.8 (0.4-1.6)	Child's age, maternal race/ethnicity, maternal education, household income
Contreras, et al. 2016 (6)	Registry based case-control	1988-2013	US (CA)	Overall	270,147/ 11,149		Birth certificate (maternal weight at delivery minus pre-pregnancy weight)	N/A	Californal Cancer Registry (ICCC-3)	N/A	
				Acute lymphoblastic leukemia	270,147/ 4,101	<6		Cases: 50 (inadequate), 83 (appropriate), 112 (excessive) Controls: 8,098		Inadequate: 0.78 (0.55-1.11), appropriate:	Year of birth, maternal/paternal race/ethnicity, maternal age

		(inadequate), 10,698 (appropriate), 16,550 (excessive)	referent, excessive: 0.86 (0.65-1.14)	
Acute myeloid leukemia	270,147/ 706	Cases: 35 (inadequate), 31 (appropriate), 50 (excessive) Controls: 8,098 (inadequate), 10,698 (appropriate), 16,550 (excessive)	Inadequate: 1.50 (0.92-2.43), appropriate: referent, excessive: 1.05 (0.67-1.64)	Year of birth, maternal/paternal race/ethnicity, maternal age
Leukemia	270,147/ 5,034	Cases: 94 (inadequate), 132 (appropriate), 177 (excessive) Controls: 8,098 (inadequate), 10,698 (appropriate), 16,550 (excessive)	Inadequate: 0.93 (0.71-1.21), appropriate: referent, excessive: 0.86 (0.69-1.08)	Year of birth, maternal/paternal race/ethnicity, maternal age
Astrocytoma	270,147/ 990	Cases: 22 (inadequate), 24 (appropriate), 59 (excessive) Controls: 8,098 (inadequate), 10,698 (appropriate), 16,550 (excessive)	Inadequate: 1.28 (0.72-2.28), appropriate: referent, excessive: 1.56 (0.97-2.50)	Year of birth, maternal/paternal race/ethnicity, maternal age
Embryonal	270,147/ 709	Cases: 21 (inadequate), 27 (appropriate), 28 (excessive) Controls: 8,098 (inadequate), 10,698 (appropriate), 16,550 (excessive)	Inadequate: 1.05 (0.59-1.86), appropriate: referent, excessive: 0.66 (0.39-1.13)	Year of birth, maternal/paternal race/ethnicity, maternal age
Germ cell	270,147/ 445	Cases: 18 (inadequate), 18 (appropriate), 29 (excessive) Controls: 8,098 (inadequate), 10,698 (appropriate), 16,550 (excessive)	Inadequate: 1.31 (0.68-2.52), appropriate: referent, excessive: 1.07 (0.59-1.94)	Year of birth, maternal/paternal race/ethnicity, maternal age
Hepatoblastoma	270,147/ 337	Cases: 13 (inadequate), 20 (appropriate), 37	Inadequate: 0.85 (0.42-1.72),	Year of birth, maternal/paternal

								(excessive)		appropriate: referent, excessive: 1.25 (0.72-2.16)	race/ethnicity, maternal age
								Controls: 8,098 (inadequate), 10,698 (appropriate), 16,550 (excessive)			
								Cases: 39 (inadequate), 68 (appropriate), 106 (excessive)			
				Neuroblastoma	270,147/1,378			Controls: 8,098 (inadequate), 10,698 (appropriate), 16,550 (excessive)		Inadequate: 0.80 (0.54-1.19), appropriate: referent, excessive: 1.00 (0.74-1.36)	Year of birth, maternal/paternal race/ethnicity, maternal age
								Cases: 22 (inadequate), 33 (appropriate), 57 (excessive)			
				Retinoblastoma	270,147/741			Controls: 8,098 (inadequate), 10,698 (appropriate), 16,550 (excessive)		Inadequate: 0.88 (0.51-1.52), appropriate: referent, excessive: 1.15 (0.74-1.76)	Year of birth, maternal/paternal race/ethnicity, maternal age
								Cases: 10 (inadequate), 16 (appropriate), 27 (excessive)			
				Rhabdomyosarcoma	270,147/463			Controls: 8,098 (inadequate), 10,698 (appropriate), 16,550 (excessive)		Inadequate: 0.85 (0.38-1.87), appropriate: referent, excessive: 1.06 (0.57-1.97)	Year of birth, maternal/paternal race/ethnicity, maternal age
								Cases: 31 (inadequate), 45 (appropriate), 58 (excessive)			
				Wilms tumor	270,147/1,052			Controls: 8,098 (inadequate), 10,698 (appropriate), 16,550 (excessive)		Inadequate: 0.93 (0.59-1.47), appropriate: referent, excessive: 0.80 (0.54-1.19)	Year of birth, maternal/paternal race/ethnicity, maternal age
								Cases: 81 (inadequate), 91 (appropriate), 63 (excessive)			
Bailey, et al. 2017 (8)	Population based case-control	2003-2004 & 2010-2011	France	Childhood brain tumors (any)	1,113/235	<15	Self-report (telephone interview)	Controls: 334 (inadequate), 407 (appropriate), 372 (excessive)	French National Registry of Childhood Cancers	Inadequate: 1.1 (0.8-1.5), appropriate: referent, excessive: 0.8 (0.5-1.1)	Child's sex, child's age, year of birth group

				Ependymomas	1,113/20			Cases: 4 (inadequate), 10 (appropriate), 6 (excessive) Controls: 334 (inadequate), 407 (appropriate), 372 (excessive)		Inadequate: 0.6 (0.2-1.5), appropriate: referent, excessive: 0.7 (0.3-1.7)	Child's sex, child's age, year of birth group
				Astrocytomas	1,113/79			Cases: 26 (inadequate), 31 (appropriate), 22 (excessive) Controls: 334 (inadequate), 407 (appropriate), 372 (excessive)		Inadequate: 1.0 (0.6-1.7), appropriate: referent, excessive: 0.8 (0.5-1.4)	Child's sex, child's age, year of birth group
				Embryonal	1,113/77			Cases: 22 (inadequate), 31 (appropriate), 24 (excessive) Controls: 334 (inadequate), 407 (appropriate), 372 (excessive)		Inadequate: 0.9 (0.5-1.6), appropriate: referent, excessive: 0.8 (0.5-1.4)	Child's sex, child's age, year of birth group
				Other Gliomas	1,113/54			Cases: 25 (inadequate), 18 (appropriate), 11 (excessive) Controls: 334 (inadequate), 407 (appropriate), 372 (excessive)		Inadequate: 1.6 (0.9-3.0), appropriate: referent, excessive: 0.7 (0.3-1.5)	Child's sex, child's age, year of birth group
Stacy, et al. 2019 (9)	Registry based prospective cohort	2003-2016	US (PA)	Any cancer	1,812,131 (2,329)	<14	Delivery weight minus pre-pregnancy weight (pre-pregnancy weight contained in birth registry [self-reported by mother])	Cases: 216 (<5 kg), 314 (5-9 kg), 731 (10-14 kg), 647 (15-19 kg), 266 (20-24 kg), 93 (25-29 kg), 62 (30+ kg) Toal: 163,192 (<5 kg), 260,046 (5-9 kg), 588,353 (10-14 kg), 475,775 (15-19 kg), 202,800 (20-24 kg), 72,759 (25-29 kg), 49,206 (30+ kg)	Pennsylvania Cancer Registry (ICD3)	<5 kg: referent, 5-9 kg: 0.91 (0.76-1.08), 10-14 kg: 0.92 (0.79-1.06), 15-19 kg: 0.97 (0.83-1.13), 20-24 kg: 0.94 (0.79-1.13), 25-29 kg: 0.92 (0.72-1.17), 30+ kg: 0.91 (0.68-1.20)	Maternal age and/or race/ethnicity

	Leukemia	1,812,131 (743)	Cases: 82 (<5 kg), 105 (5-9 kg), 228 (10-14 kg), 198 (15-19 kg), 82 (20-24 kg), 30 (25-29 kg), 18 (30+ kg) Total: 163,192 (<5 kg), 260,046 (5-9 kg), 588,353 (10-14 kg), 475,775 (15-19 kg), 202,800 (20-24 kg), 72,759 (25-29 kg), 49,206 (30+ kg)	<5 kg: referent, 5-9 kg: 0.80 (0.60-1.06), 10-14 kg: 0.75 (0.58-0.96), 15-19 kg: 0.78 (0.60-1.01), 20-24 kg: 0.76 (0.56-1.04), 25-29 kg: 0.78 (0.51-1.19), 30+ kg: 0.69 (0.42-1.16)	Maternal age and/or race/ethnicity
	Acute lymphoblastic leukemia	1,810,383 (581)	Cases: 65 (<5 kg), 80 (5-9 kg), 176 (10-14 kg), 157 (15-19 kg), 65 (20-24 kg), 21 (25-29 kg), 17 (30+ kg) Total: 163,192 (<5 kg), 260,046 (5-9 kg), 588,353 (10-14 kg), 475,775 (15-19 kg), 202,800 (20-24 kg), 72,759 (25-29 kg), 49,206 (30+ kg) Total: 163,041 (<5 kg), 259,812 (5-9 kg), 587,798 (10-14 kg), 475,285 (15-19 kg), 202,599 (20-24 kg), 72,687 (25-29 kg), 49,161 (30+ kg)	<5 kg: referent, 5-9 kg: 0.76 (0.55-1.06), 10-14 kg: 0.73 (0.55-0.96), 15-19 kg: 0.77 (0.58-1.03), 20-24 kg: 0.76 (0.54-1.07), 25-29 kg: 0.69 (0.42-1.12), 30+ kg: 0.83 (0.48-1.41)	Maternal age and/or race/ethnicity
	Neuroblastoma	1,810,383 (297)	Cases: 22 (<5 kg), 28 (5-9 kg), 104 (10-14 kg), 85 (15-19 kg), 31 (20-24 kg), 13 (25-29 kg), 14 (30+ kg) Total: 163,192 (<5 kg), 260,046 (5-9 kg), 588,353 (10-14 kg), 475,775 (15-19 kg),	<5 kg: referent, 5-9 kg: 0.79 (0.45-1.38), 10-14 kg: 1.28 (0.81-2.02), 15-19 kg: 1.27 (0.79-2.03), 20-24 kg: 1.10 (0.63-1.90), 25-29 kg: 1.29 (0.65-2.56),	Maternal age and/or race/ethnicity

		202,800 (20-24 kg), 72,759 (25-29 kg), 49,206 (30+ kg) Total: 163,041 (<5 kg), 259,812 (5-9 kg), 587,798 (10-14 kg), 475,285 (15-19 kg), 202,599 (20-24 kg), 72,687 (25-29 kg), 49,161 (30+ kg)	30+ kg: 2.07 (1.06-4.04)

[a]BMI: body mass index, OR: odds ratio, CI: confidence intervals, ICD: International Classification of Diseases, kg: kilograms

Supplementary Table 4. Quality assessment of case-control/nested case-control studies in the meta-analysis according to the Newcastle-Ottawa scale (NOS)[a]

Study	Selection				Comparability	Exposure			Overall Score / Quality
	Case definition	Case representativeness	Control selection	Control definition	Comparability of cases and controls	Exposure ascertainment	Same method for cases/control	Non-response rate	
Cnattingius 1995	*	*	*	*	*	*	*	*	8 / high
Petridou 1997	*	*	0	*	**	0	*	*	7 / high
Hamrick 2001	*	*	*	*	*	0	*	*	7 / high
Åberg 2001	*	*	*	*	*	0	*	*	7 / high
Westbom 2002	0	*	0	0	*	*	*	*	5 / moderate
Podvin 2006	*	*	*	*	*	*	*	*	8 / high
Spector 2007	*	*	*	*	*	0	*	*	7 / high
Chow 2007	*	*	*	*	*	*	*	*	8 / high
Daniels 2008	*	*	*	*	*	0	*	*	7 / high
Ognjanovic 2009	*	0	*	*	*	0	*	*	6 / moderate
Heck 2012	*	*	*	*	*	*	*	*	8 / high
Musselman 2013	*	*	*	*	*	0	*	*	7 / high
Greenop 2014	*	*	*	*	*	0	*	0	6 / moderate
Heck 2015	*	*	*	*	*	0	*	*	7 / high
Contreras 2016	*	*	*	*	*	*	*	0	7 / high
Peckham-Gregory 2016	*	*	*	*	0	*	*	*	7 / high
Vienneau 2016	*	*	*	*	*	0	0	*	6 / moderate
Bailey 2017	*	*	*	*	*	*	*	0	7 / high
Seppälä 2020	*	*	*	*	*	*	*	*	8 / high
Bauer 2020	0	*	*	*	*	0	*	*	6 / moderate

[a]For NOS assessment, maximum of one star (*) can be given for selection, exposure, and outcome categories. Maximum of two stars (**) can be given for comparability category. Scores of 7-9 were considered high quality, scores of 4-6 considered moderate quality, scores of 1-3 were considered poor quality

Supplementary Table 5. Quality assessment of cohort/case-cohort studies in the meta-analysis according to the Newcastle-Ottawa scale (NOS)[a]									
Study	Selection				Comparability	Outcome			Overall Score / Quality
	Cohort representativeness	Selection of non-exposed	Exposure ascertainment	Outcome not present at start	Cohort comparability on basis of design or analysis	Outcome assessment	Sufficient time for follow-up	Adequacy of follow-up cohorts	
McLaughlin 2006(1)	*	*	*	*	*	*	0	*	7 / high
McLaughlin 2006(2)	*	*	*	*	*	*	0	*	7 / high
Milne 2007	*	*	*	*	0	*	*	*	7 / high
Puumala 2007	*	*	*	*	*	*	*	*	8 / high
Johnson 2008	*	0	*	*	*	*	*	*	7 / high
McLaughlin 2009	*	*	*	*	*	*	0	*	7 / high
Wu 2012	*	*	*	*	**	*	*	*	9 / high
Petridou 2015	*	*	*	*	*	*	*	*	8 / high
Deleskog 2017	*	*	*	*	**	*	*	*	9 / high
Søegaard 2018	*	0	*	*	*	*	*	*	7 / high
Kessous 2019	*	*	*	*	*	*	*	*	8 / high
Borsari 2019	*	*	*	*	*	*	*	*	8 / high
Stacy 2019	*	*	*	*	*	*	*	*	8 / high

[a]For NOS assessment, maximum of one star (*) can be given for selection, exposure, and outcome categories. Maximum of two stars (**) can be given for comparability category. Scores of 7-9 were considered high quality, scores of 4-6 considered moderate quality, scores of 1-3 were considered poor quality.

Supplementary Table 6. Subgroup analyses for the associations with childhood cancer risk according to geographic region and study design

Subgroup	No. of Studies	Summary OR (95% CI)	Heterogeneity	
			I^2, %	P[a]
Region				
Any cancer/pre-pregnancy BMI (5-unit)				
Total	9	1.02 (0.97-1.07)	41.5	0.03
North America	6	1.02 (0.97-1.08)	39.0	0.05
Other[b]	3	1.00 (0.87-1.14)	53.6	0.09
Any cancer/pregestational diabetes				
Total	11	1.19 (1.02-1.37)	28.8	0.11
North America	4	1.07 (0.92-1.25)	9.8	0.35
Other[c]	7	1.50 (1.18-1.91)	23.3	0.24
Any cancer/gestational diabetes				
Total	15	1.20 (1.09-1.33)	0.0	0.65
North America	7	1.26 (1.05-1.51)	0.0	0.82
Other[d]	8	1.14 (0.96-1.35)	22.1	0.25
Any cancer/any diabetes				
Total	25	1.20 (1.12-1.29)	1.7	0.44
North America	11	1.14 (1.03-1.27)	0.0	0.70
Other[e]	14	1.30 (1.14-1.48)	20.4	0.21
ALL/gestational diabetes				
Total	6	1.40 (1.12-1.75)	0.0	0.81
North America	3	1.29 (0.95-1.75)	0.0	0.64
Other[b]	3	1.55 (1.11-2.14)	0.0	0.70
ALL/any diabetes				
Total	9	1.46 (1.28-1.67)	0.0	0.59
North America	4	1.32 (1.12-1.56)	0.0	0.81
Other[f]	5	1.75 (1.39-2.19)	0.0	0.69
Any leukemia/gestational diabetes				
Total	7	1.32 (1.08-1.61)	0.0	0.60
North America	3	1.15 (0.84-1.58)	16.9	0.31
Other[g]	4	1.52 (1.12-2.05)	0.0	0.87
Any leukemia/any diabetes				
Total	11	1.34 (1.19-1.51)	0.0	0.53
North America	5	1.22 (1.05-1.41)	0.0	0.68
Other[h]	6	1.63 (1.32-2.02)	0.0	0.74
Design				
Any cancer/pregestational diabetes				
Total	11	1.19 (1.02-1.37)	28.8	0.11
Case-control	6	1.11 (0.96-1.28)	14.2	0.30
Cohort	5	1.67 (1.17-2.38)	28.8	0.22
Any cancer/gestational diabetes				
Total	15	1.20 (1.09-1.33)	0.0	0.65
Case-control	9	1.25 (1.11-1.41)	0.0	0.89
Cohort/case-cohort[i]	6	1.11 (0.86-1.43)	26.2	0.22
Any cancer/any diabetes				
Total	25	1.20 (1.12-1.29)	1.7	0.44
Case-control/nested case-control[j]	17	1.20 (1.11-1.31)	0.0	0.58

Cohort/case-cohort[k]	8	1.30 (1.07-1.57)	29.5	0.17
ALL/any diabetes				
Total	9	1.46 (1.28-1.67)	0.0	0.59
Case-control/nested case-control[l]	3	1.34 (1.12-1.62)	0.0	0.66
Cohort/case-cohort[m]	6	1.60 (1.32-1.95)	0.0	0.52
Any leukemia/gestational diabetes				
Total	7	1.32 (1.08-1.61)	0.0	0.60
Case-control	3	1.11 (0.78-1.57)	0.0	0.52
Cohort/case-cohort[n]	4	1.44 (1.12-1.85)	0.0	0.59
Any leukemia/any diabetes				
Total	11	1.34 (1.19-1.51)	0.0	0.53
Case-control/nested case-control[o]	5	1.23 (1.05-1.45)	0.0	0.76
Cohort/case-cohort[m]	6	1.50 (1.23-1.83)	2.7	0.41

[a]Random effects models were used for statistical analyses. All tests were 2-sided. Abbreviations – ALL: acute lymphoblastic leukemia; OR: odds ratio; CI: confidence intervals

[b]n=2 studies from Europe, n=1 study from Australia

[c]All studies from Europe

[d]n=6 studies from Europe, n=1 study from Australia, n=1 study from Israel

[e]n=12 studies from Europe, n=1 study from Australia, n=1 study from Israel

[f]n=4 studies from Europe, n=1 study from Australia

[g]n=3 studies from Europe, n=1 study from Australia

[h]n=5 studies from Europe, n=1 study from Australia

[i]n=5 cohort studies, n=1 case-cohort study

[j]n=16 case-control studies, n=1 nested case-control study

[k]n=6 cohort studies, n=2 case-cohort studies

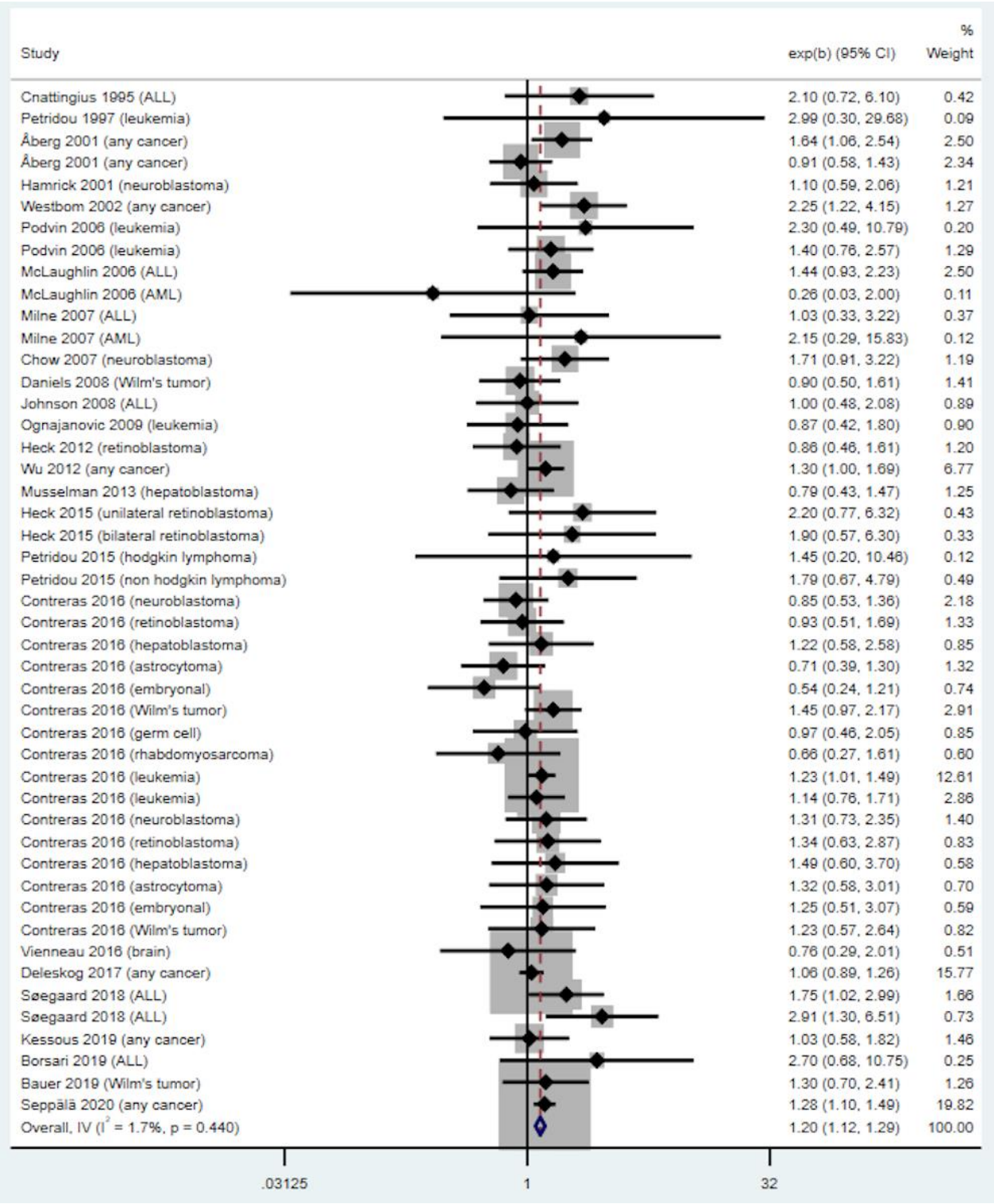
[l]n=2 case-control studies, n=1 nested case-control study

[m]n=4 cohort studies, n=2 case-cohort studies

[n]n=3 cohort studies, n=1 case-cohort study

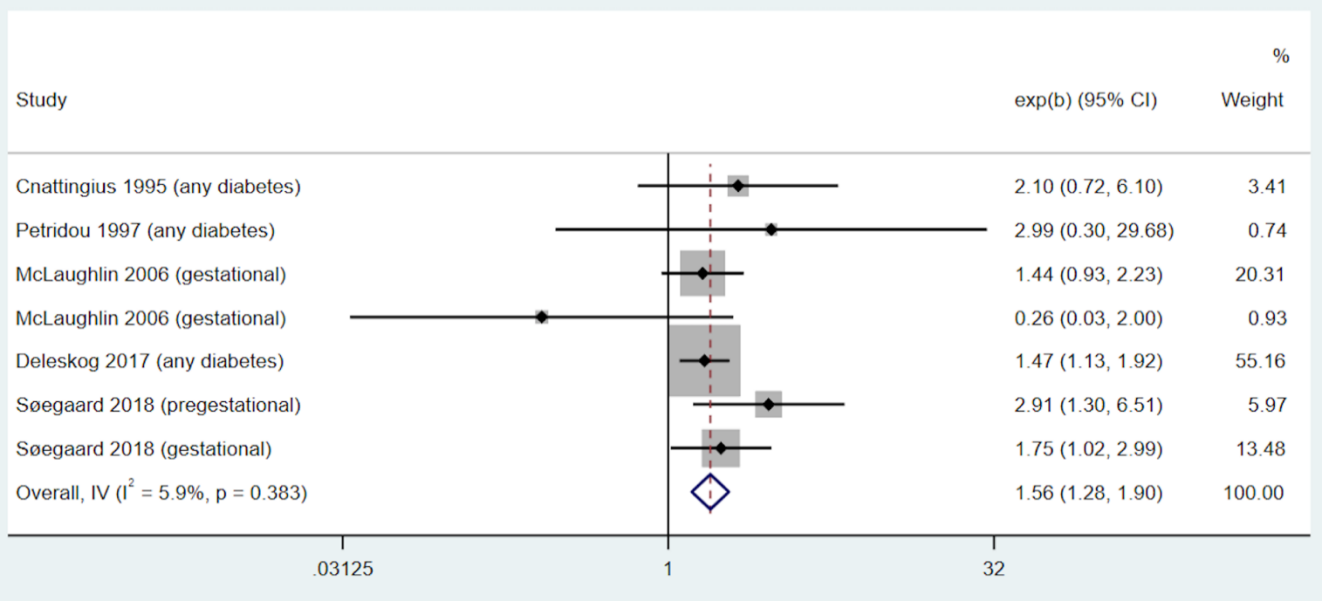
[o]n=4 case-control studies, n=1 nested case-control

Supplementary Figure 1. Forest plot: meta-analysis of the association between any diabetes and risk of any cancer. The error bars represent the 95% confidence intervals (CIs).

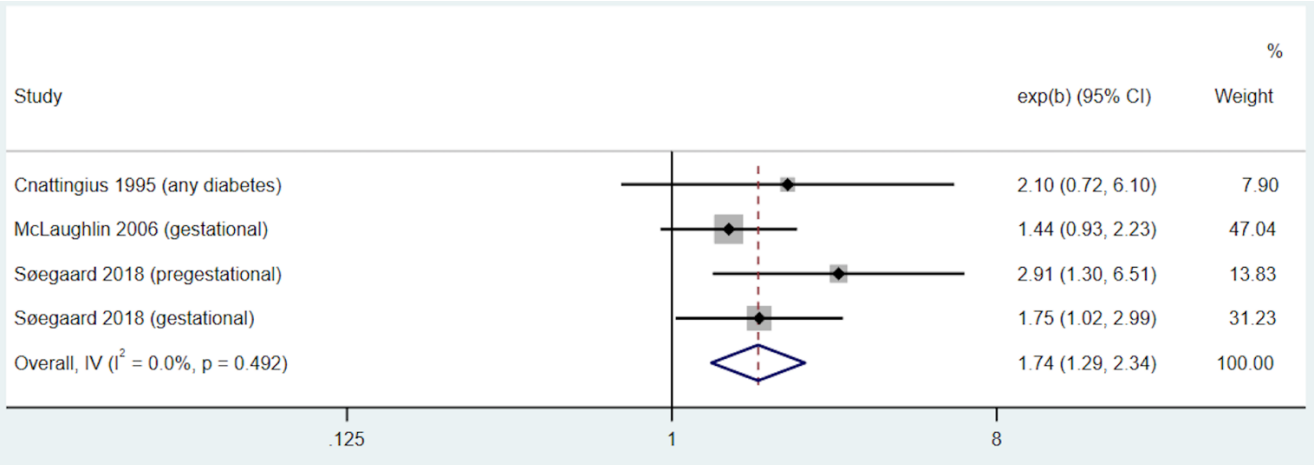


Supplementary Figure 2. Forest plot: meta-analysis of the association between any diabetes and risk of (A) any leukemia and (B) acute lymphoblastic leukemia among studies controlling for birthweight. The error bars represent the 95% confidence intervals (CIs).

A

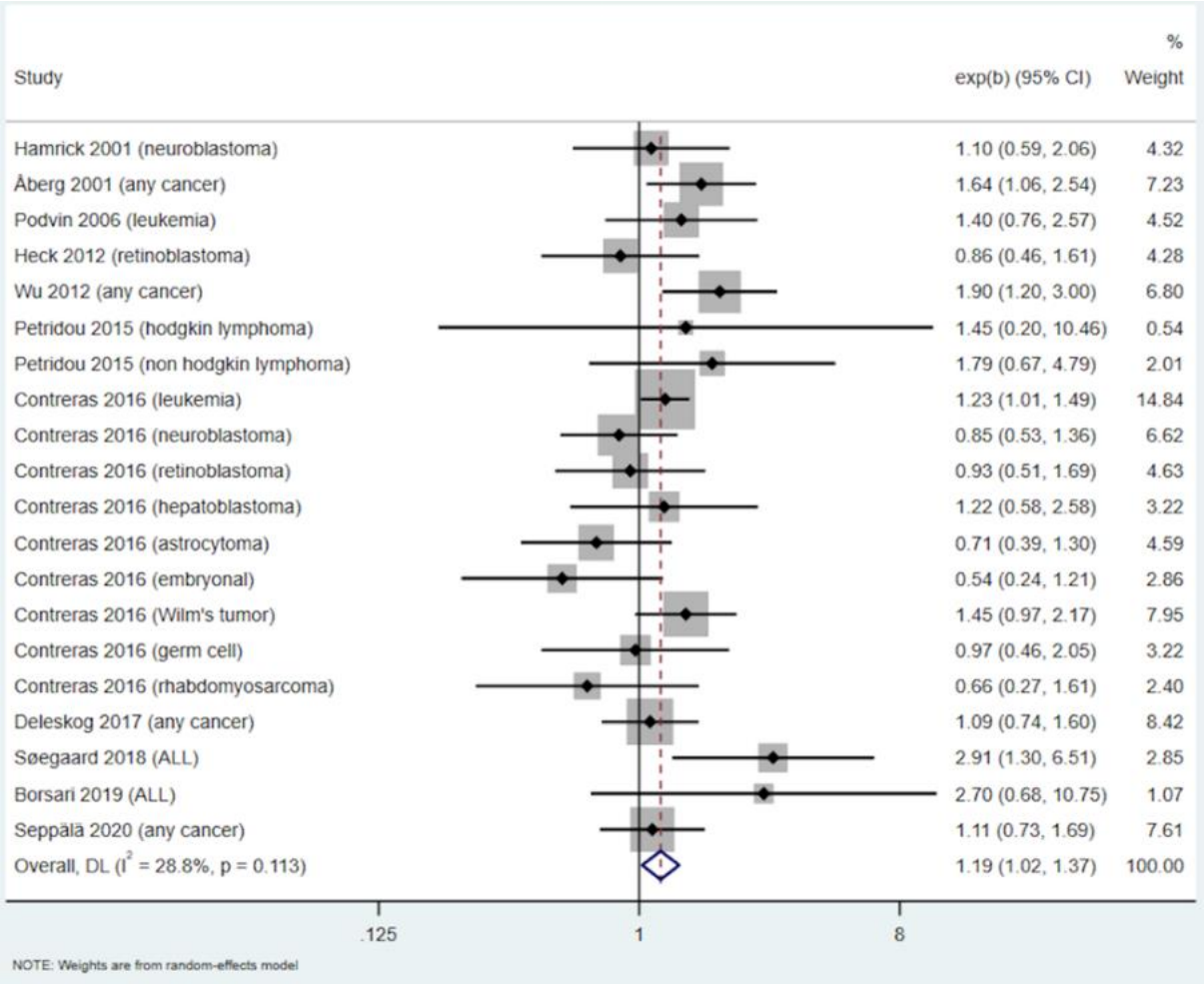


B

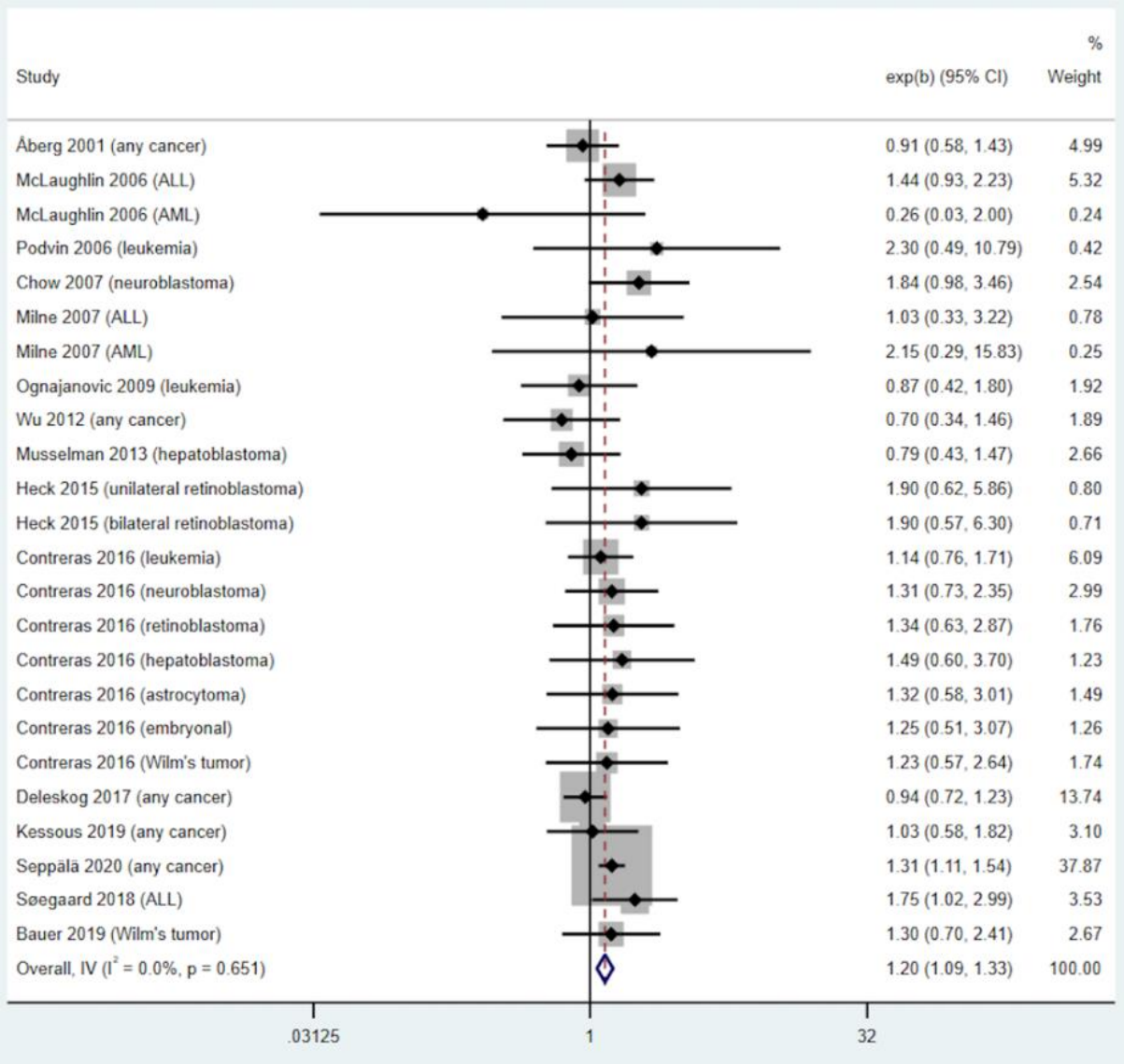


Supplementary Figure 3. Forest plot: meta-analysis of the association between (A) pregestational diabetes and (B) gestational diabetes and risk of any cancer. The error bars represent the 95% confidence intervals (CIs).

A



B


Study
exp(b) (95% CI)
% Weight
Åberg 2001 (any cancer) 0.91 (0.58, 1.43) 4.99
McLaughlin 2006 (ALL) 1.44 (0.93, 2.23) 5.32
McLaughlin 2006 (AML) 0.26 (0.03, 2.00) 0.24
Podvin 2006 (leukemia) 2.30 (0.49, 10.79) 0.42
Chow 2007 (neuroblastoma) 1.84 (0.98, 3.46) 2.54
Milne 2007 (ALL) 1.03 (0.33, 3.22) 0.78
Milne 2007 (AML) 2.15 (0.29, 15.83) 0.25
Ognajanovic 2009 (leukemia) 0.87 (0.42, 1.80) 1.92
Wu 2012 (any cancer) 0.70 (0.34, 1.46) 1.89
Musselman 2013 (hepatoblastoma) 0.79 (0.43, 1.47) 2.66
Heck 2015 (unilateral retinoblastoma) 1.90 (0.62, 5.86) 0.80
Heck 2015 (bilateral retinoblastoma) 1.90 (0.57, 6.30) 0.71
Contreras 2016 (leukemia) 1.14 (0.76, 1.71) 6.09
Contreras 2016 (neuroblastoma) 1.31 (0.73, 2.35) 2.99
Contreras 2016 (retinoblastoma) 1.34 (0.63, 2.87) 1.76
Contreras 2016 (hepatoblastoma) 1.49 (0.60, 3.70) 1.23
Contreras 2016 (astrocytoma) 1.32 (0.58, 3.01) 1.49
Contreras 2016 (embryonal) 1.25 (0.51, 3.07) 1.26
Contreras 2016 (Wilm's tumor) 1.23 (0.57, 2.64) 1.74
Deleskog 2017 (any cancer) 0.94 (0.72, 1.23) 13.74
Kessous 2019 (any cancer) 1.03 (0.58, 1.82) 3.10
Seppälä 2020 (any cancer) 1.31 (1.11, 1.54) 37.87
Søegaard 2018 (ALL) 1.75 (1.02, 2.99) 3.53
Bauer 2019 (Wilm's tumor) 1.30 (0.70, 2.41) 2.67
Overall, IV (I^2 = 0.0%, p = 0.651) 1.20 (1.09, 1.33) 100.00
.03125
1
32

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