

Cancer during pregnancy and follow up of the children

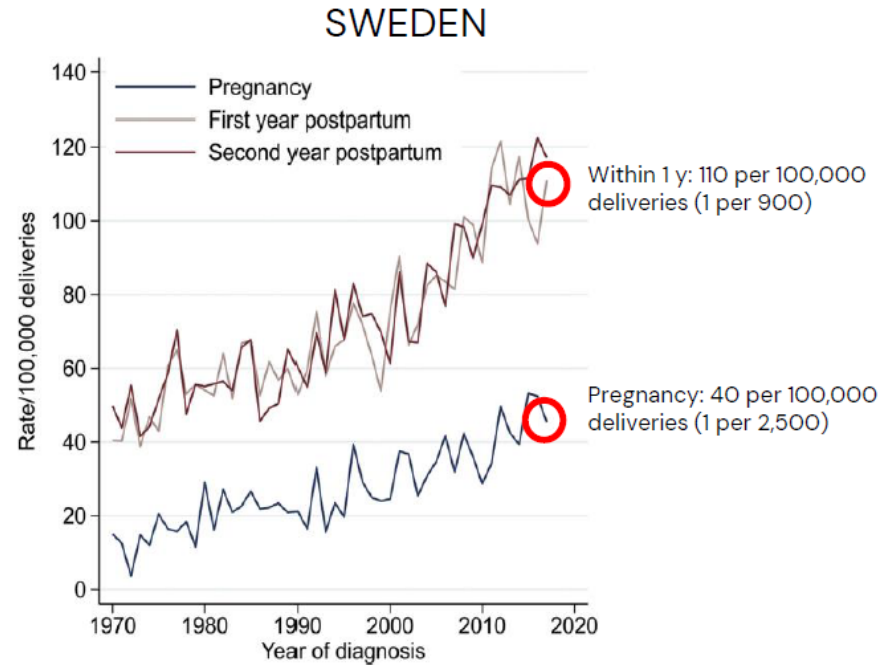
Frédéric Amant MD PhD

Take home message

- **Most cancer treatment options are possible during pregnancy**
- **Multidisciplinary setting in referral centres**
- **More pharmacological studies in pregnant women are needed**

Cancer survival in women diagnosed with pregnancy associated cancer: An overview using nationwide registry data in Sweden 1970-2018

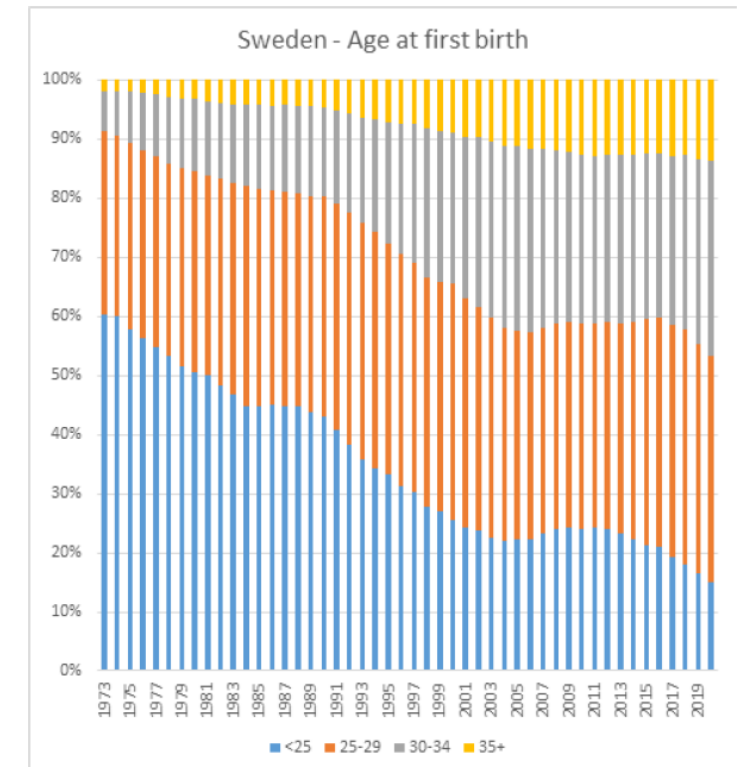
Johansson A et al. Eur J Ca 2021



Johansson et al, Eur J Cancer 2021

Only maternal age contributes to the increasing incidence

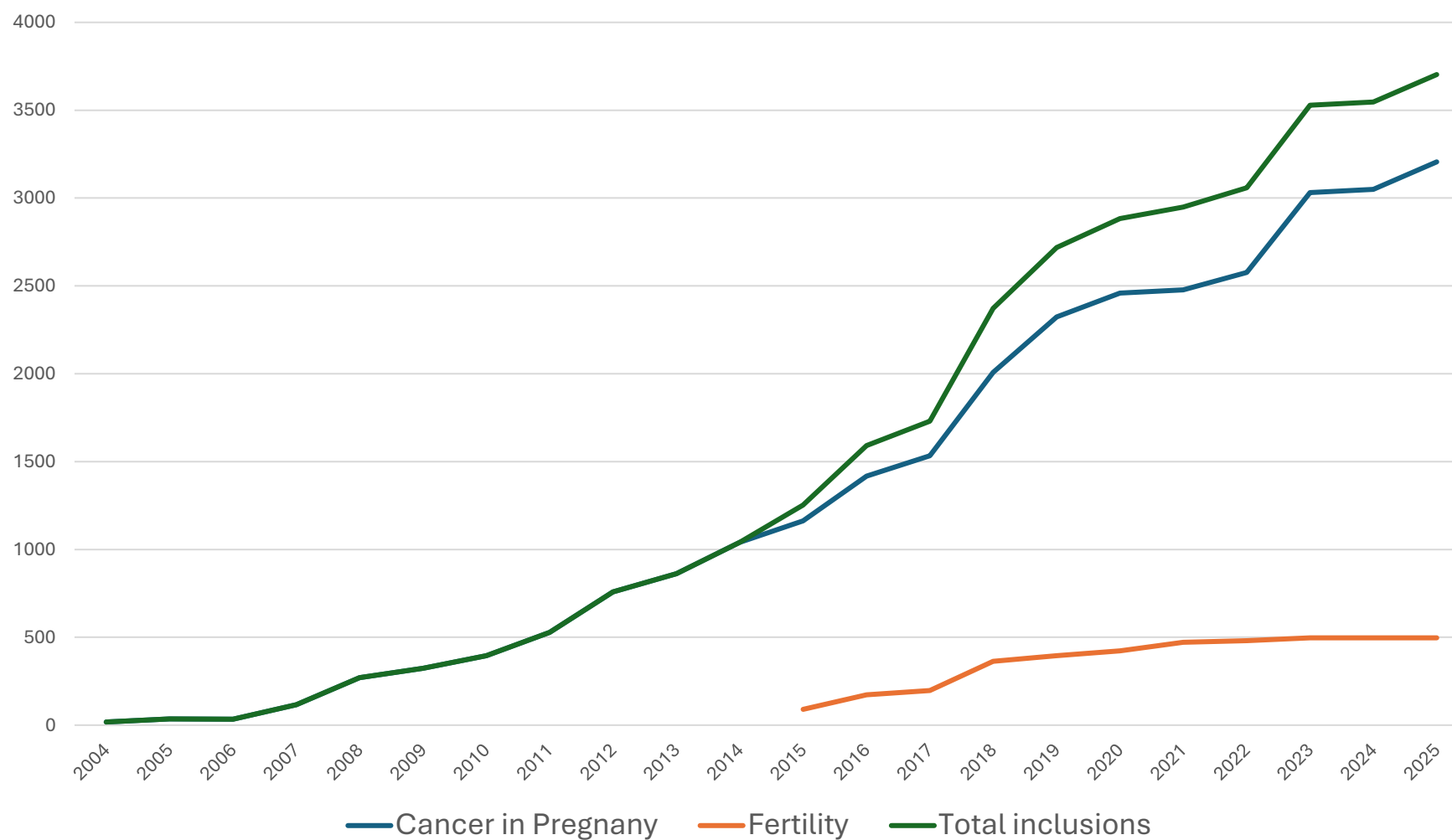
National Board of Health and Welfare, Sweden;
Medical Birth Registry



1970s: more than 50% first-time mothers <25y
2020s: more than 30% 30-34y, more than 10% ≥35y

Courtesy A Johansson

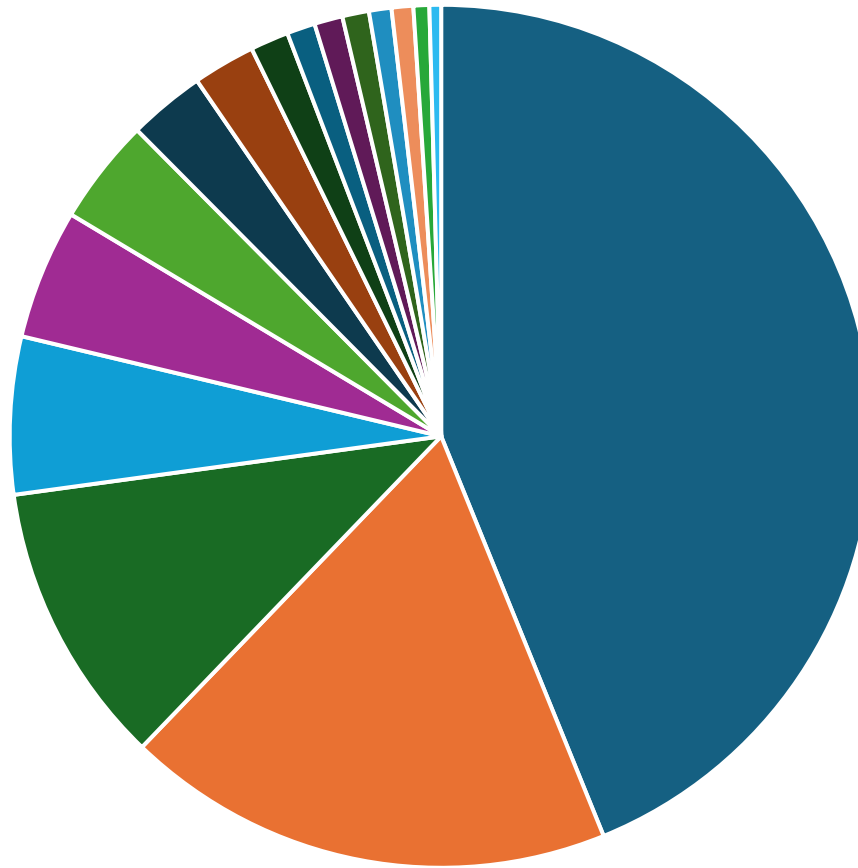
INCIP registration study - total patient inclusions



Distribution

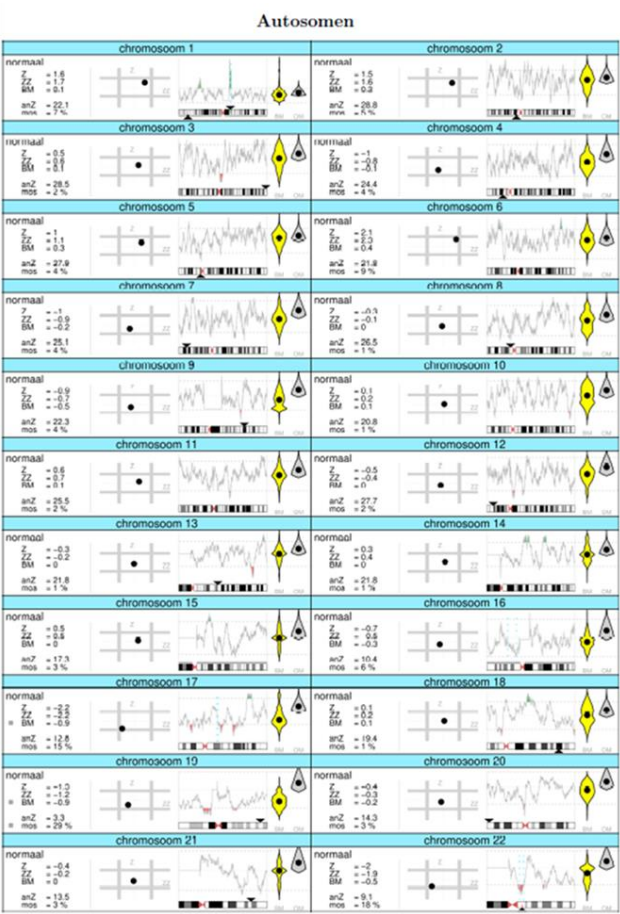
Cancer types during pregnancy

N = 3206

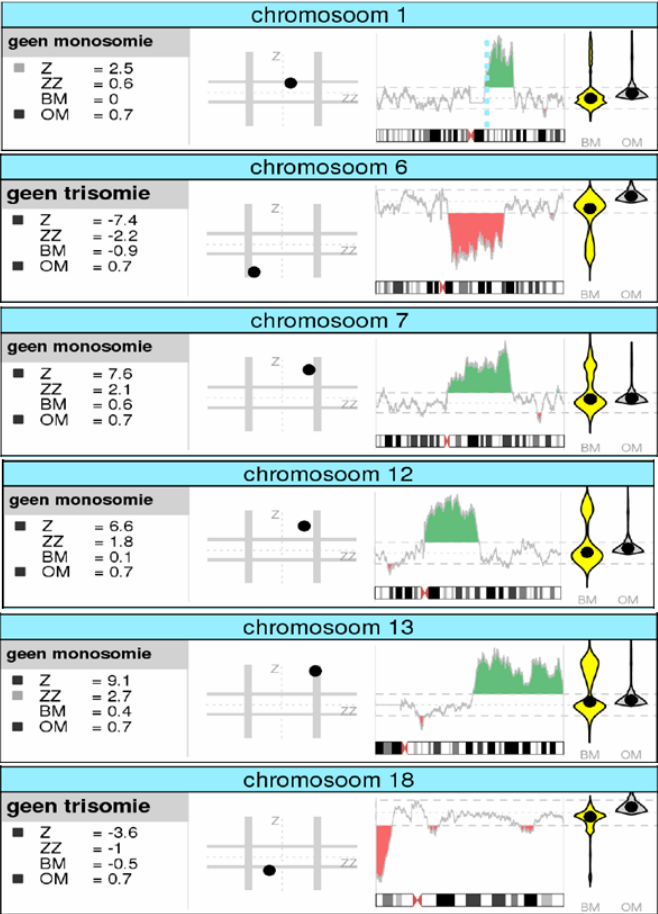


■ Breast cancer	43,85%
■ Hematological malignancies	18,34%
■ Cervical cancer	10,64 %
■ Ovarian cancer	5,90 %
■ Skin cancer	4,90 %
■ Gastro-intestinal	3,96 %
■ Thyroid cancer	2,87 %
■ Brain tumors	2,34 %
■ Sarcoma	1,43 %
■ Urological cancer	1,06%
■ Gestational trophoblastic neoplasm	1,06 %
■ Ear-nose-throat cancer	1,00 %
■ Lung cancer	0,84 %
■ Other	0,81 %
■ Vulvar-vaginal cancer	0,59 %
■ Endometrial cancer	0,44 %

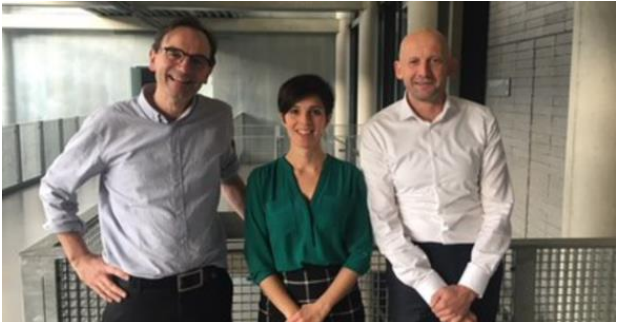
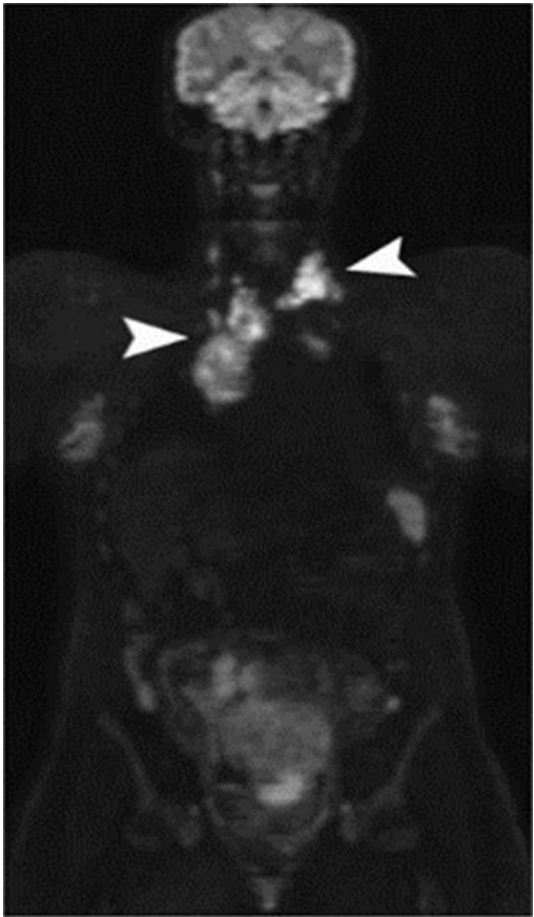
Normal NIPT



Suspicious NIPT



MRI scan



JAMA Oncology

Brief Report

Presymptomatic Identification of Cancers in Pregnant Women During Noninvasive Prenatal Testing

Cancer and pregnancy: Agenda

- ❖ **Case studies**

 - **Cervical cancer**

 - **Breast cancer**

 - **Pushing the boundaries**

- ❖ **When preservation of the pregnancy is not possible**

- ❖ **Follow up of children**

- ❖ **Breastfeeding**

- ❖ **Advisory Board Cancer Infertility Pregnancy (ABCIP)**

Successful cervical cancer treatment during a monochorionic diamniotic twin pregnancy in a patient with history of preterm delivery

Stage IB2 CxCa, squamous type, monochorial twin, 14 w

History: preterm twin delivered at 26w

Lejeune C et al., IJGC 2022



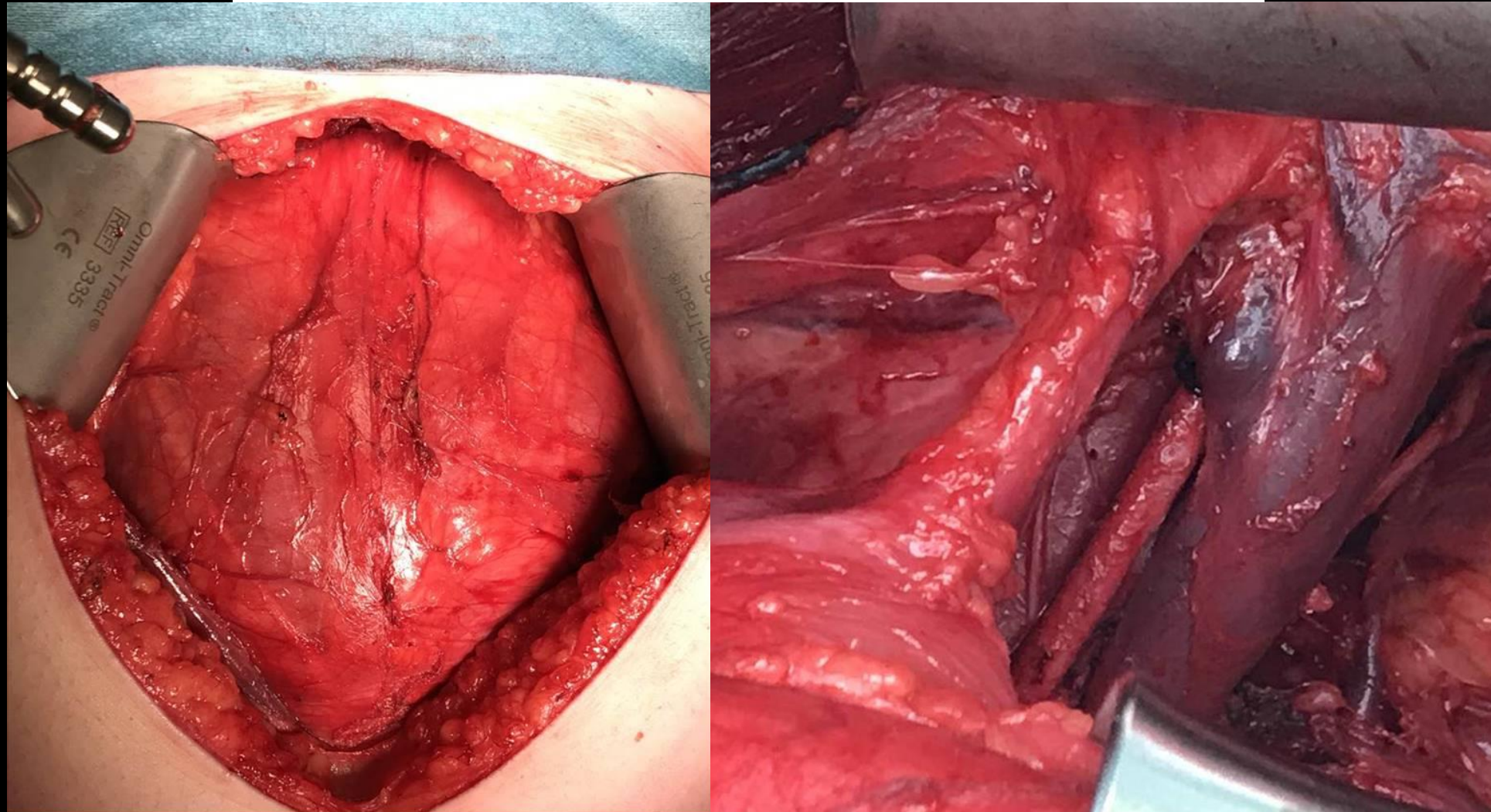
Clinical and radiological response after 3 cycles paclitaxel-carboplatin

Five cycles in total

C-Section at 34 5/7 w

Successful cervical cancer treatment during a monochorionic diamniotic twin pregnancy in a patient with history of preterm delivery
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Lejeune C et al., IJGC 2022

Extraperitoneal lymphadenectomy (0/24 nodes)



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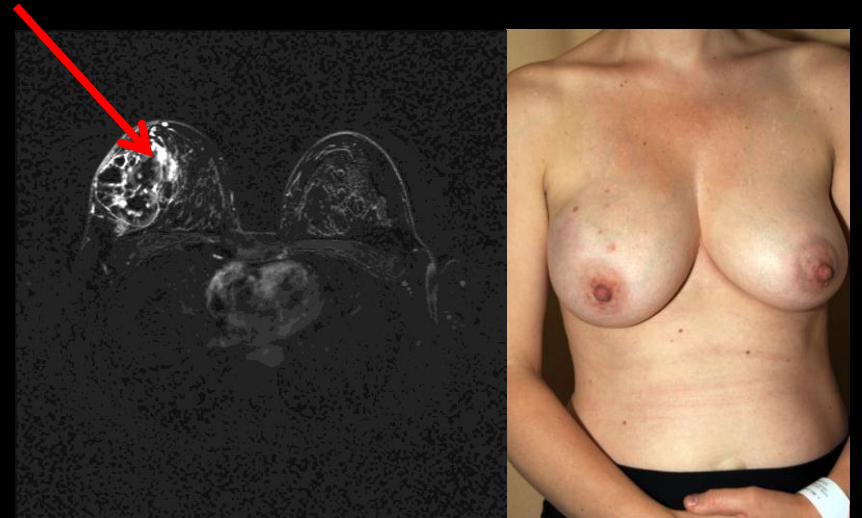
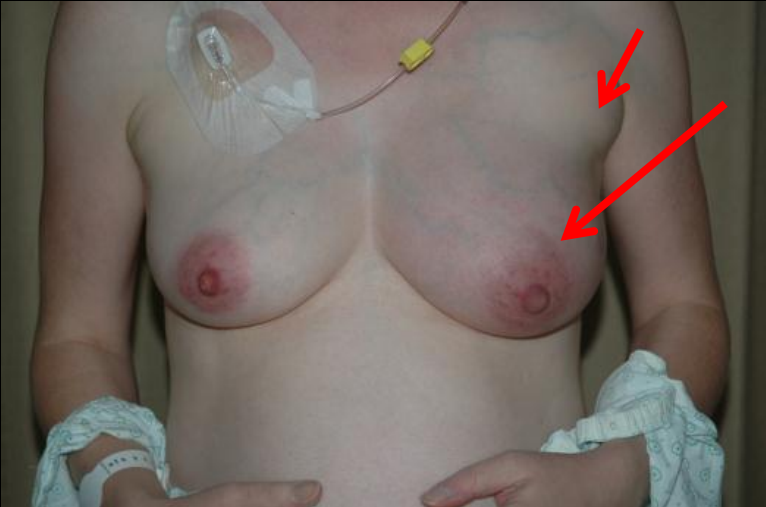
- ❖ **Breastfeeding**

- ❖ **Advisory Board Cancer Infertility Pregnancy (ABCIP)**

*Pregnancy may **mimic cancer symptoms***

Obstetric care is opportunity

- Physiological changes during pregnancy: blood loss, abdominal discomfort/pain, fatigue, change breast texture
 - > Low threshold for further investigations (timely diagnosis)
- Opportunity in obstetric follow-up
 - > Regular consultations and pelvic examinations, prenatal ultrasound, laboratory tests

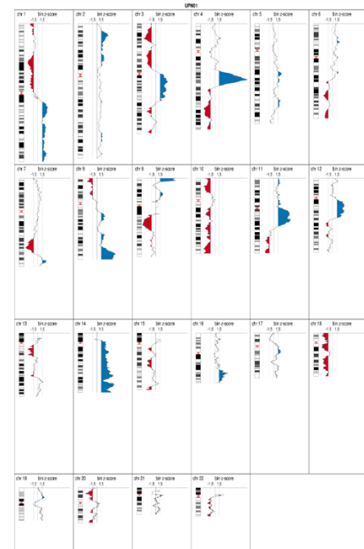


Clinical presentation

Asymptomatic 33-year-old patient, A0P1G2

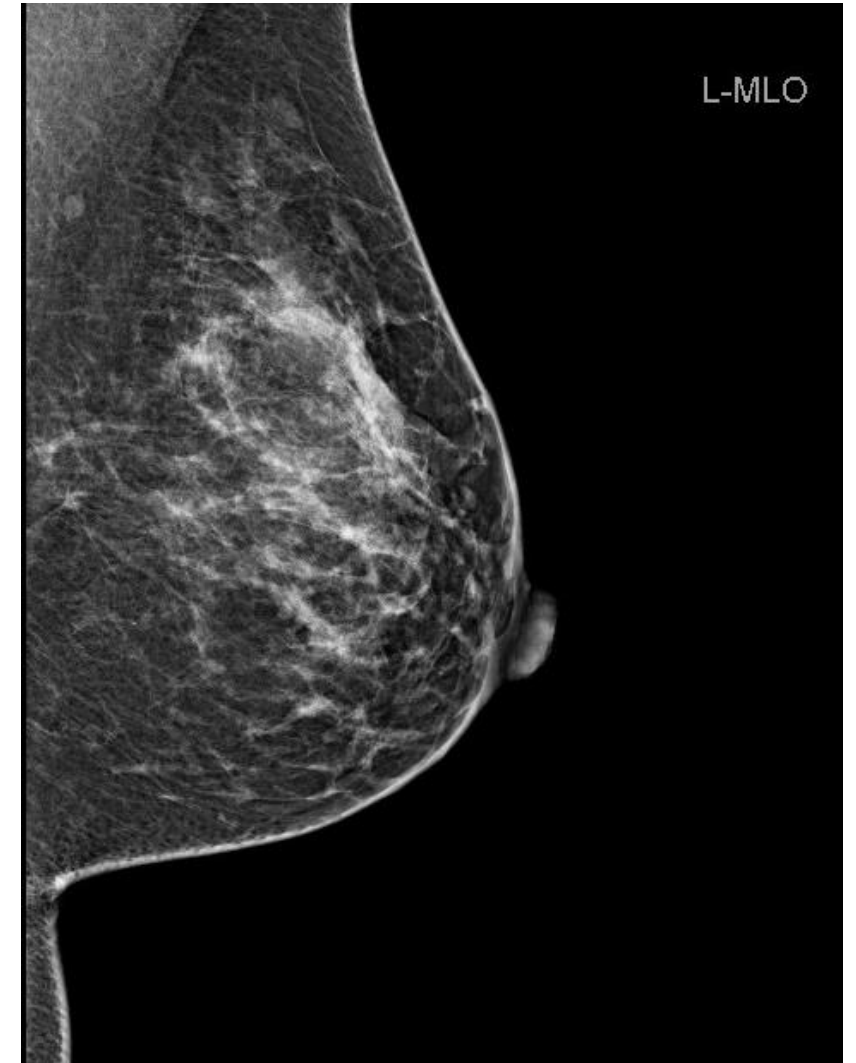
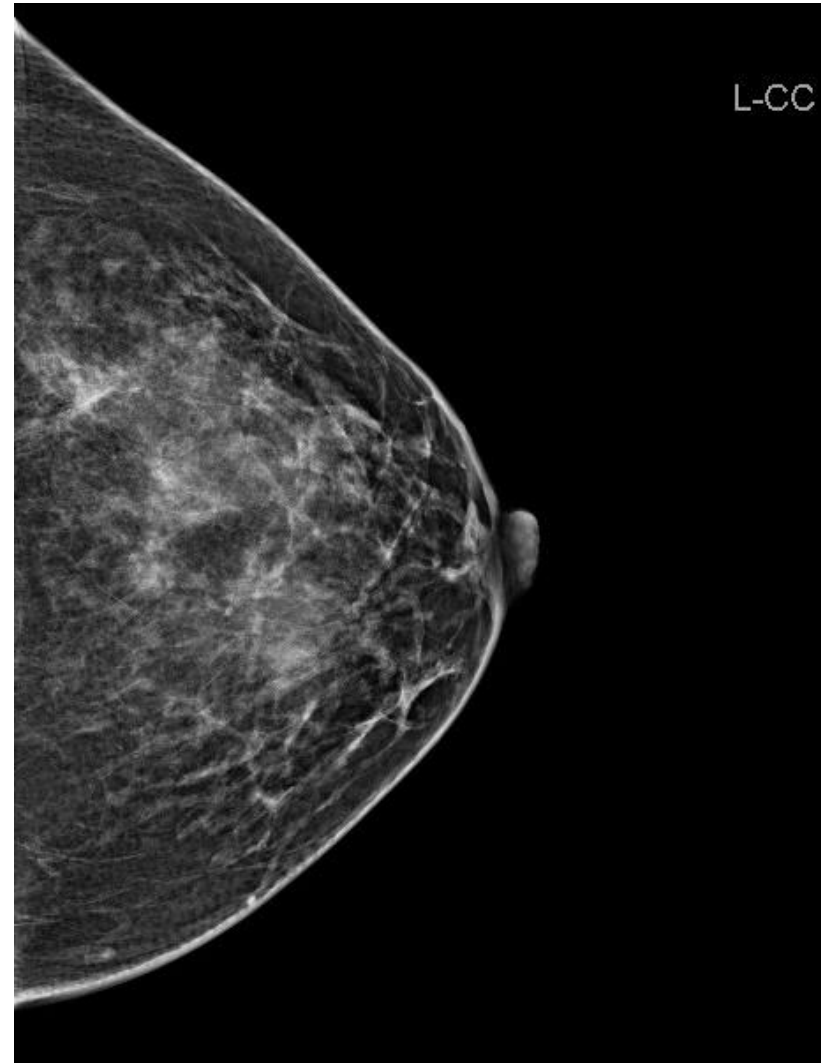
12w5d GA: ultrasound screening for fetal abnormalities + NIPS

- Non-conclusive NIPS with multiple chromosomal aberrations
 - Gain of ERBB2 (HER2), CDK12 and IKZF3
- Suggestive for maternal malignancy



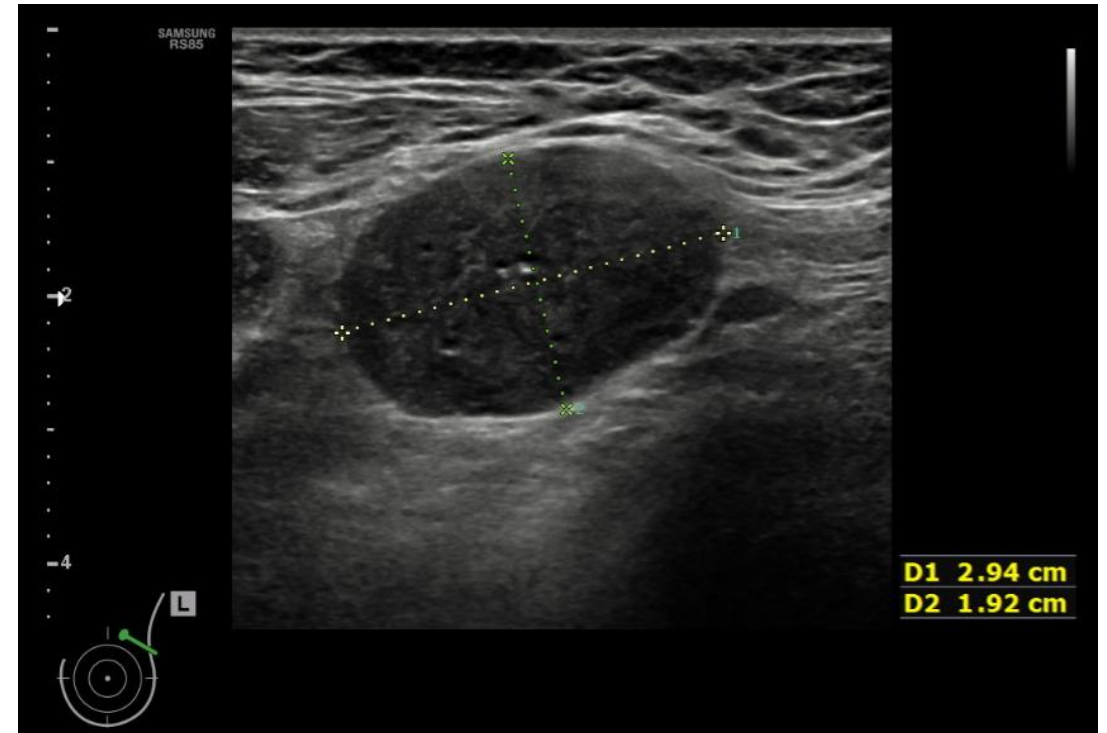
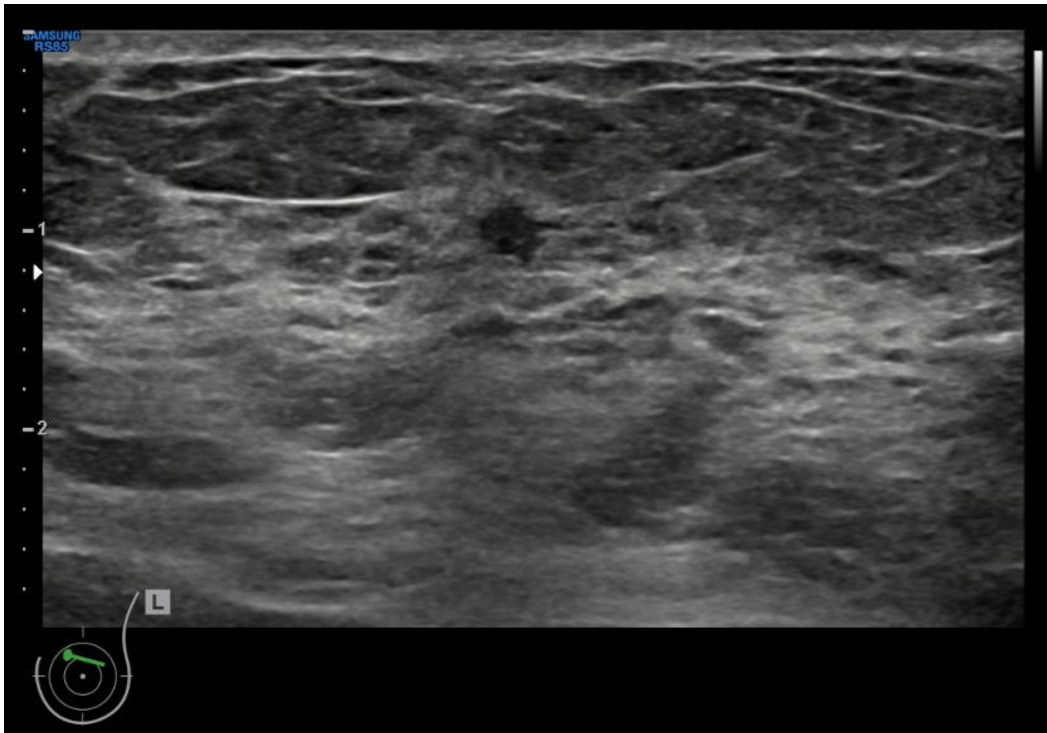
Mammography (1st) at arrival

- No obvious masses, asymmetries, architectural disturbances.
- No clustered pathological calcifications.



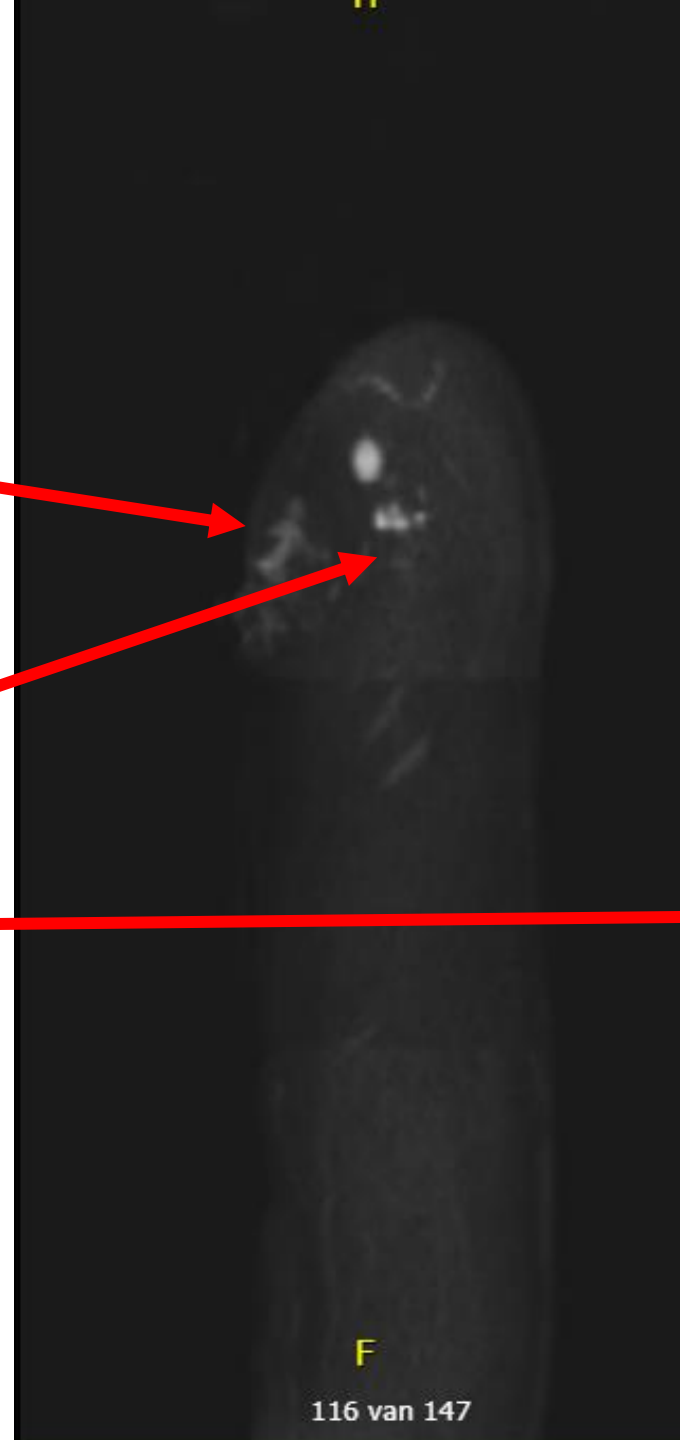
Second look ultrasound

- Multiple pathology-confirmed malignancy severely enlarged adenopathies axillary and infraclavicular left (over at least levels I-II-III).
- Visualization of three lesions (5-6 mm) at 1-2 o'clock



WB-DWI/MRI

- Malignant breast tumor, 29x25x20mm at 1-2 o'clock
- Multiple axillary and infraclavicular diffusion-restrictive adenopathies.
- No distant metastases.
- Foetus in situ



Multidisciplinary team

→ Indication for neo-adjuvant chemotherapy

- Deviation from standard-of-care

- 4x EC dose dense q2w → 12x Paclitaxel q1w
- Association of Herceptine/Perjeta q3w after delivery
→ Not possible during pregnancy

General Rules for Safe Application of Chemotherapy During Pregnancy

Loibl & Amant et al., JAMA Oncol 2015

Table 2. General Rules for Safe Application of Chemotherapy During Pregnancy

Rule	Comment
Maintain dose intensity	Important to discuss timing of the chemotherapy start in relation to delivery
Use published standard protocols	Neither decrease nor increase the dose. Do not increase treatment intervals
Dose according to actual body weight	Important to avoid underdosing, which is a risk factor during pregnancy, due to physiologic variation in drug pharmacokinetics. We do not recommend dose adaptation in overweight nonpregnant women
Do not increase the dose	Some data show a lower area under the concentration-time curve and maximum serum concentration in women treated with taxanes during pregnancy vs nonpregnant women. On the basis of 11 cases without outcome data, dose increase cannot be recommended
Recommended to discontinue chemotherapy at approximately week 35 to 37 of gestation	To allow the bone marrow to recover and prevent hematologic toxicity to mother and child

Targeted treatment during pregnancy

- **Herceptin: not recommended** due to an increased risk of **oligo/anhydramnios**
 - effect on renal epithelium in which HER2/neu is strongly expressed (Press *et al.*, 1990)
 - inhibition of the VEGF, which regulates production and reabsorption of the amniotic fluid (Pant *et al.*, 2008)
- **Tamoxifen: not recommended** due to **birth defects**
 - Goldenhar syndrome (Cullins *et al.*, 1994)
 - Ambiguous genitalia (Tewari *et al.*, 1997)
 - Pierre Robin sequence (Berger and Clericuzio, 2008)

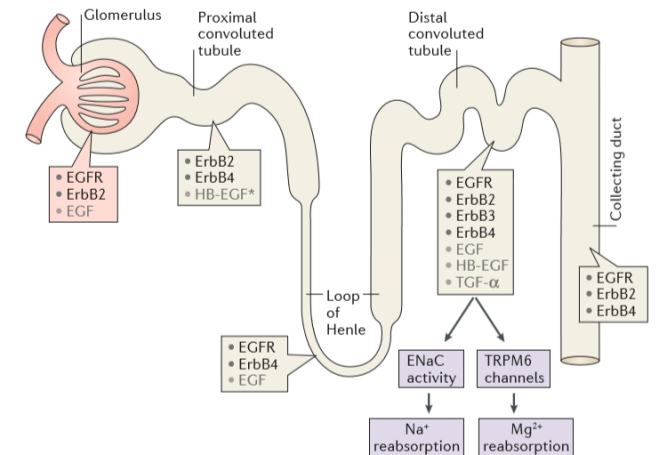


Figure 3 | Localization of ErbB receptors and ligands within the nephron. ErbB

Harskamp *et al.*, Nat Rev Nephrology 2016

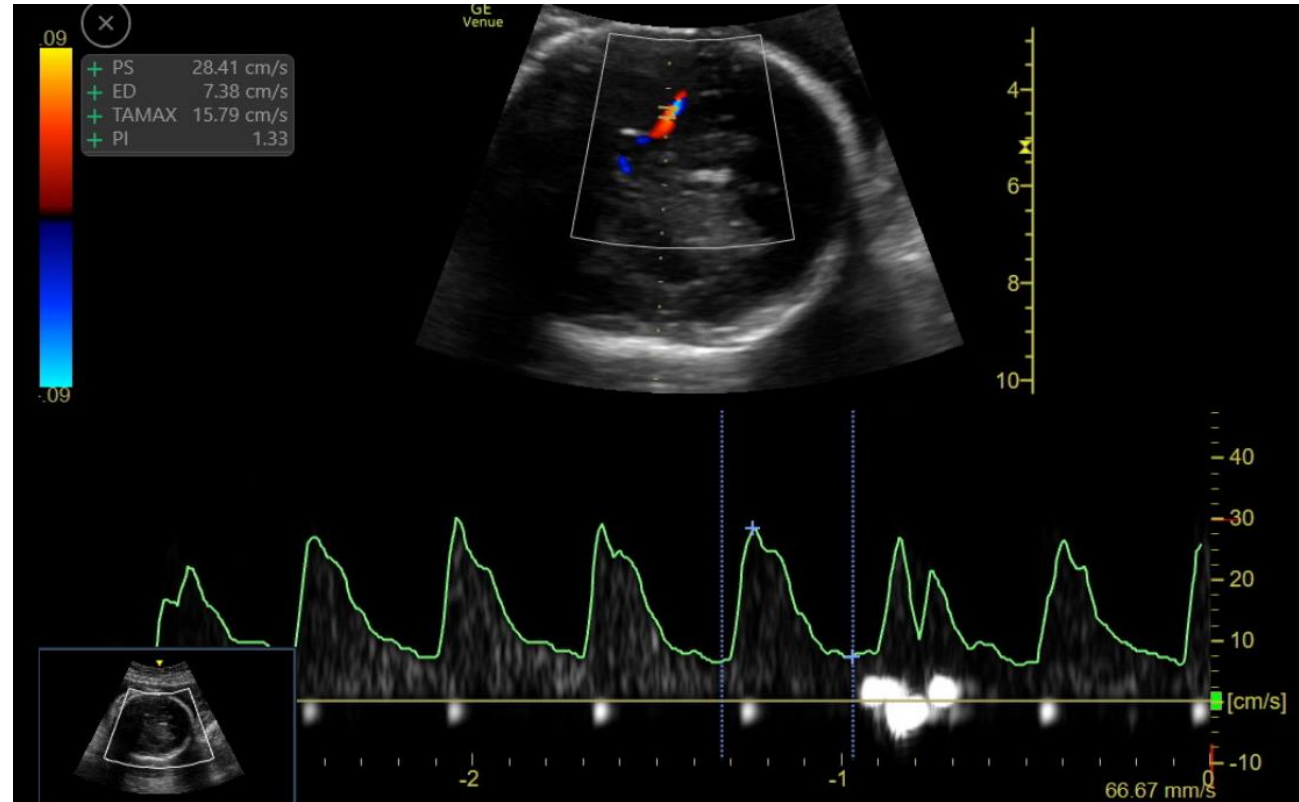
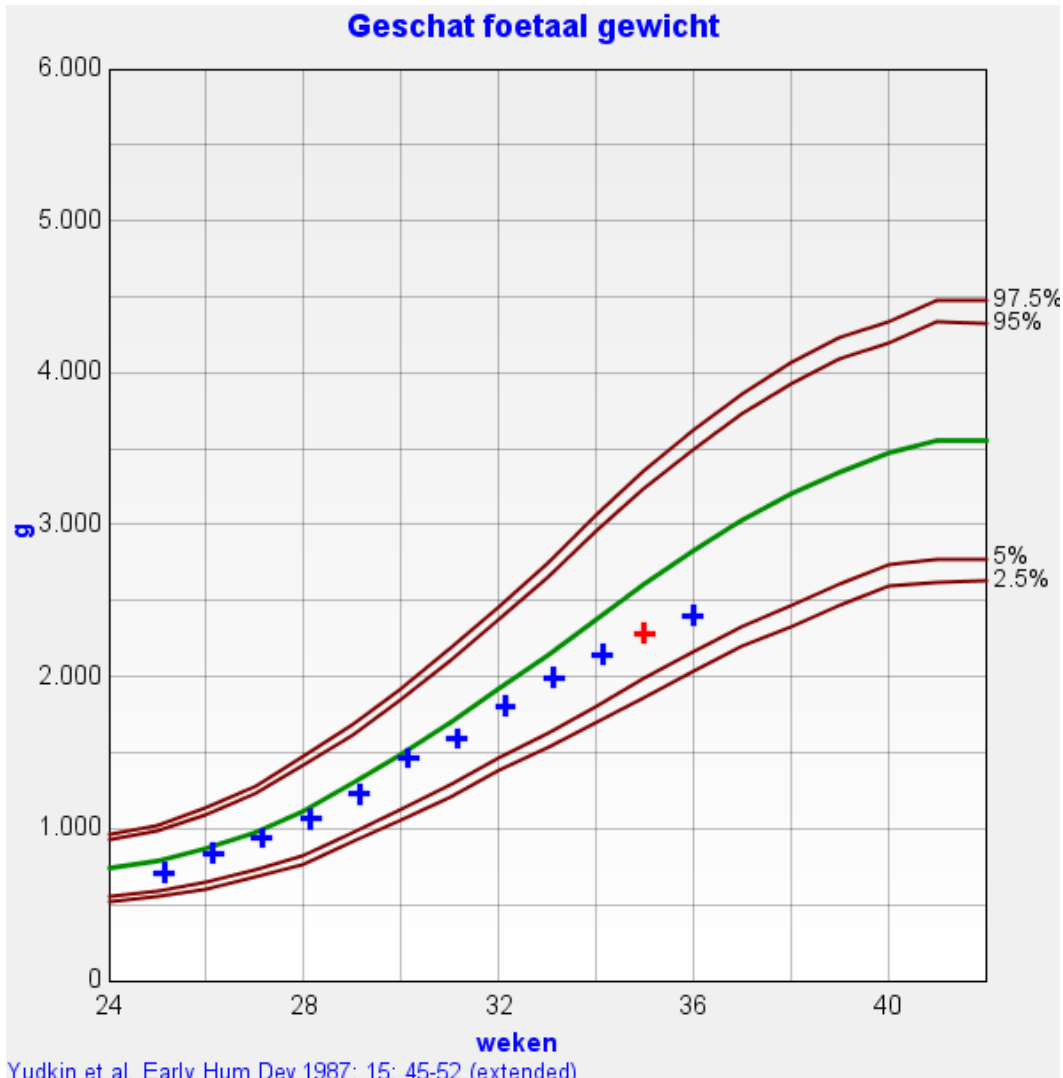
Supportive therapy for chemotherapy during pregnancy

Loibl & Amant et al., JAMA Oncol 2015

Table 3. Supportive Therapy for Chemotherapy During Pregnancy

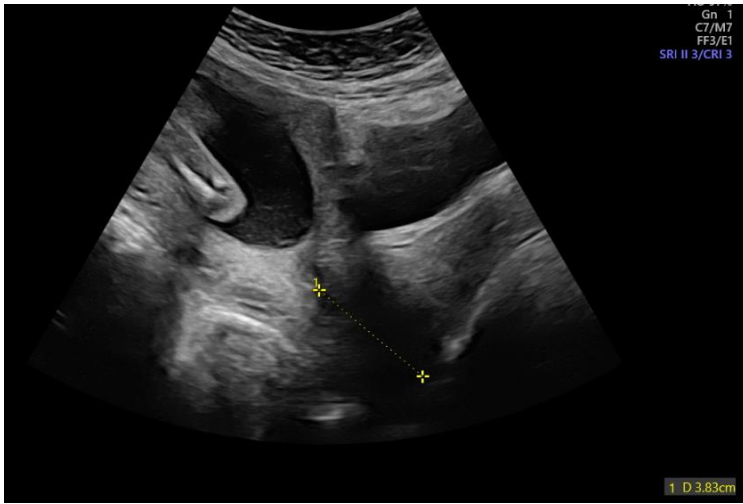
Drug Class	Examples	Recommendation
Antiemetics		
5-HT3 antagonists	Ondansetron, palonosetron, granisetron, tropisetron, dolasetron	Ondansetron therapy during pregnancy not associated with significantly increased risk of adverse fetal outcomes. Other 5-HT3 antagonists are less well investigated. Granisetron does not appear to cross the placenta
Neurokinin 1 inhibitors	Aprepitant, fosaprepitant	No data available; single reports with no adverse outcome—can be given if necessary
Corticosteroids	Dexamethasone, betamethasone, methylprednisolone	Dexamethasone therapy contraindicated in first trimester (risk of cleft palate). Attention deficit disorder reported with dexamethasone and betamethasone use. Methylprednisolone is the preferred option
H1 antagonists		Seem to be safe
H2 antagonists	Ranitidine, cimetidine	No increased incidence of malformations with H2 blocker. Can be used to prevent allergic reaction
Proton pump inhibitors	Omeprazole, pantoprazole	Seems to have muscle-relaxant effects in vitro
Colony-Stimulating Factors		
G-CSF	Daily use (filgrastim, lenograstim) or long acting (pegfilgrastim, lipegfilgrastim)	Information about the use of G-CSF during pregnancy is limited. In a series of 34 children exposed to daily G-CSF therapy, no splenomegaly and no increased rate of opportunistic infections was reported

Serial growth measurements

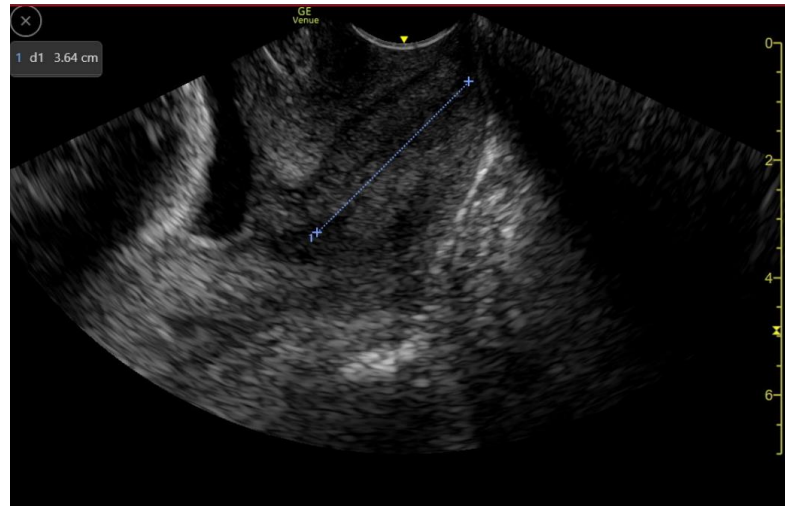


Gradual deflection of the growth curve: p35 → p14
Normal dopplers

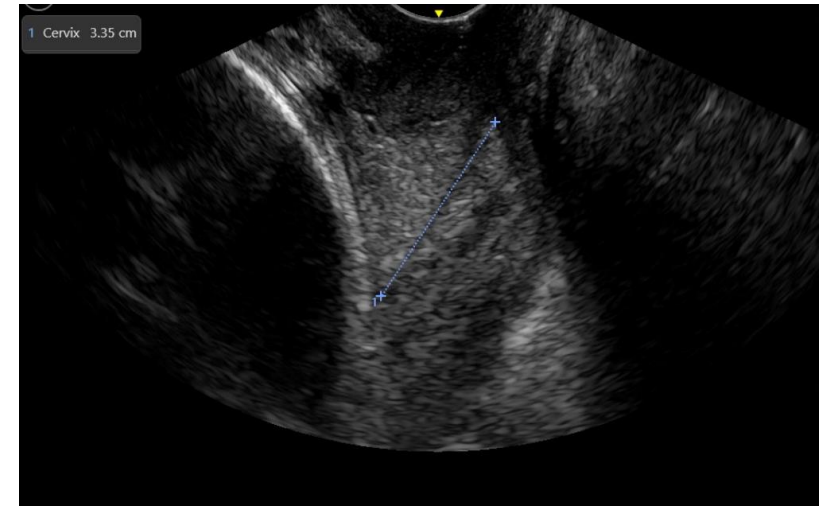
Serial cervical length measurements



16 weeks GA – 38 mm
Before start therapy



25 weeks GA – 38 mm
After 4 cycles ECdd



34 weeks GA – 33 mm
After 10 cycles paclitaxel q1w

Delivery

→ Induction planned at 37w0d

BUT: Spontaneous labour at 36w4d (< 3 weeks after last chemo)

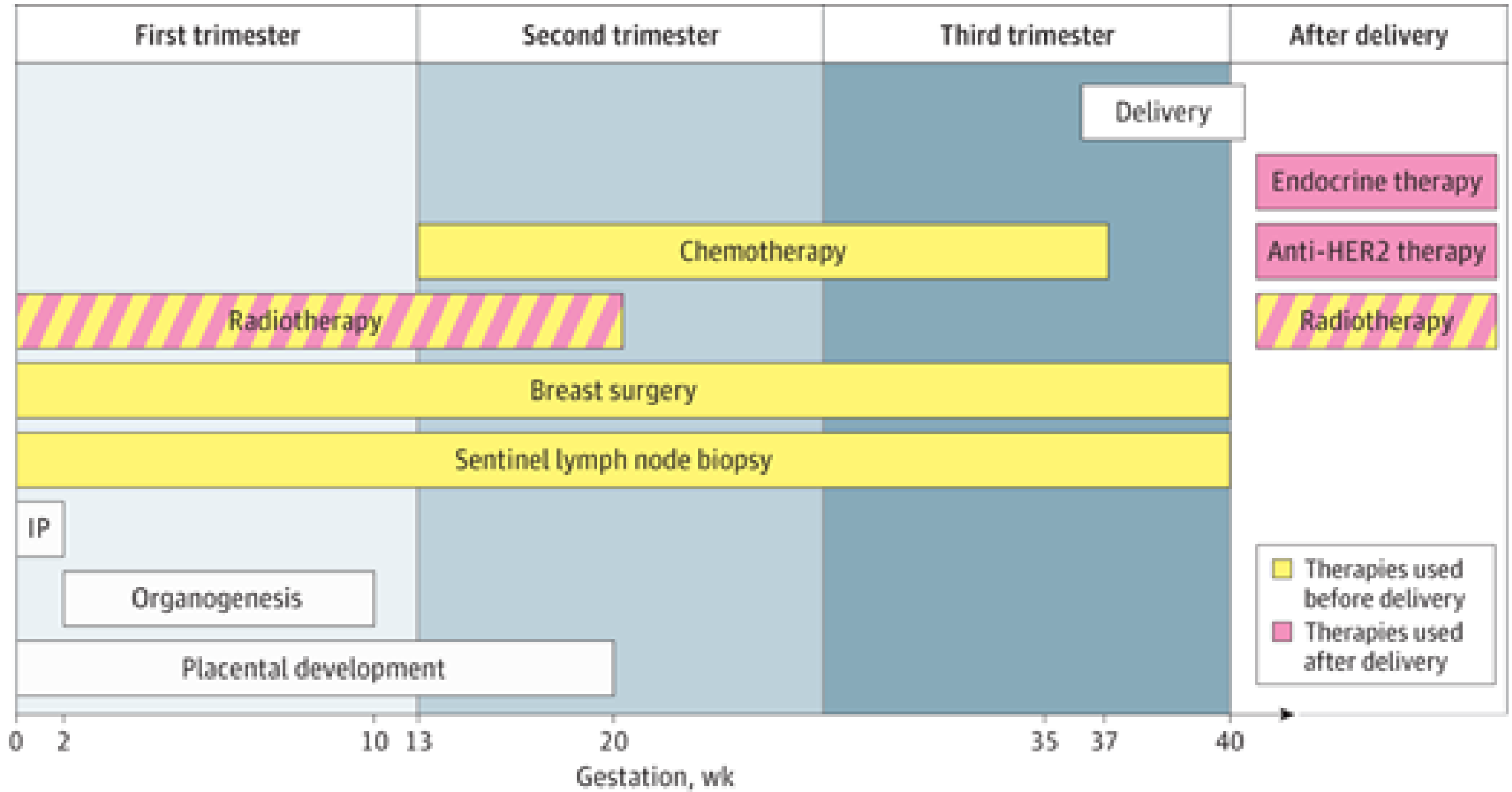
- Uncomplicated vaginal delivery, Girl, 2545 gram

→ Neonatal blood sampling: normal

- Placental histology: Normal umbilical cord, normal membranes, normal placenta. No evidence of malignancy.

Overview of therapeutic options during pregnancy

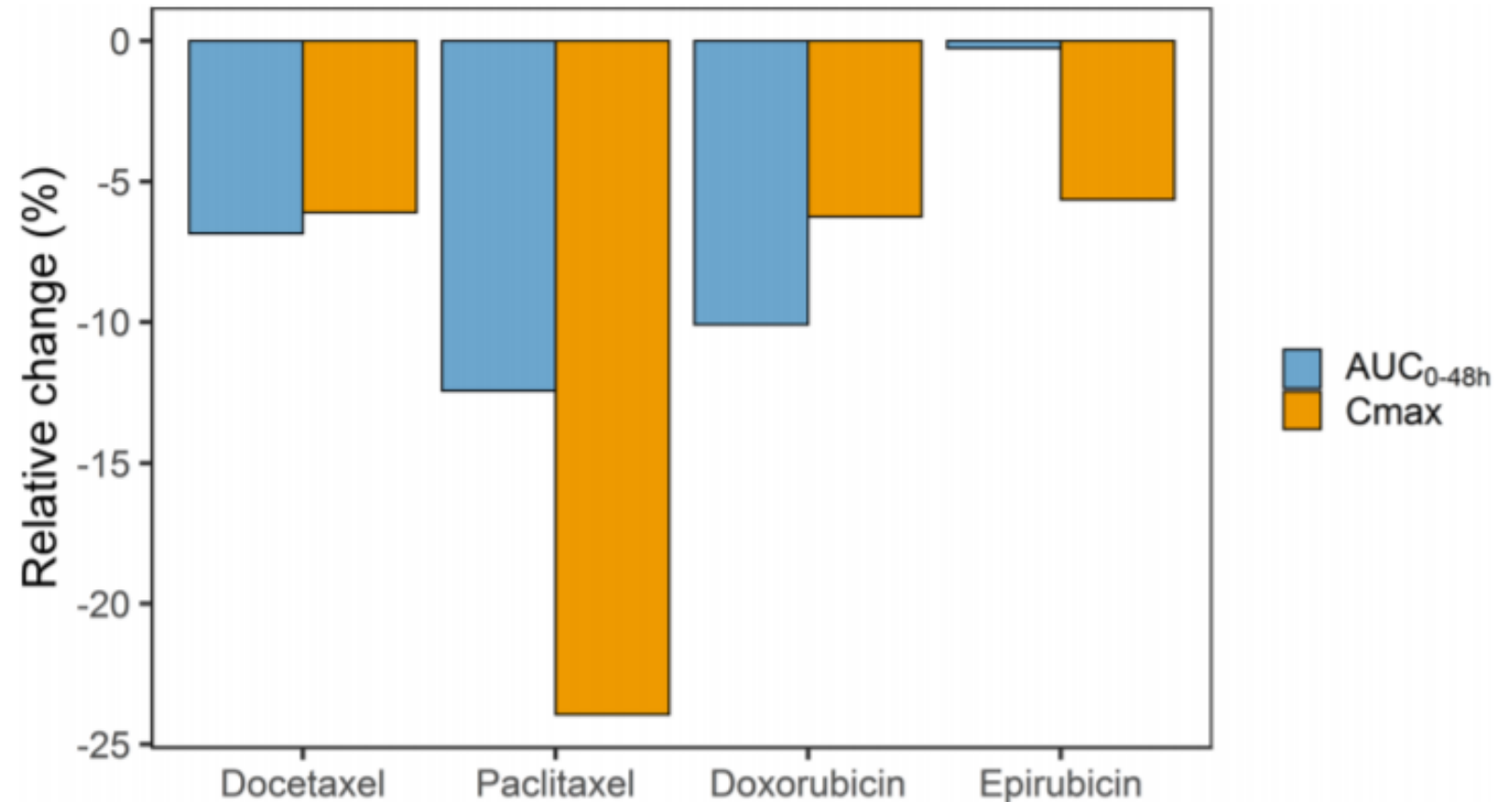
Loibl & Amant, 2015 JAMA Oncol



Population Pharmacokinetics of Docetaxel, Paclitaxel, Doxorubicin and Epirubicin in Pregnant Women with Cancer: A Study from the International Network of Cancer, Infertility and Pregnancy (INCIP)

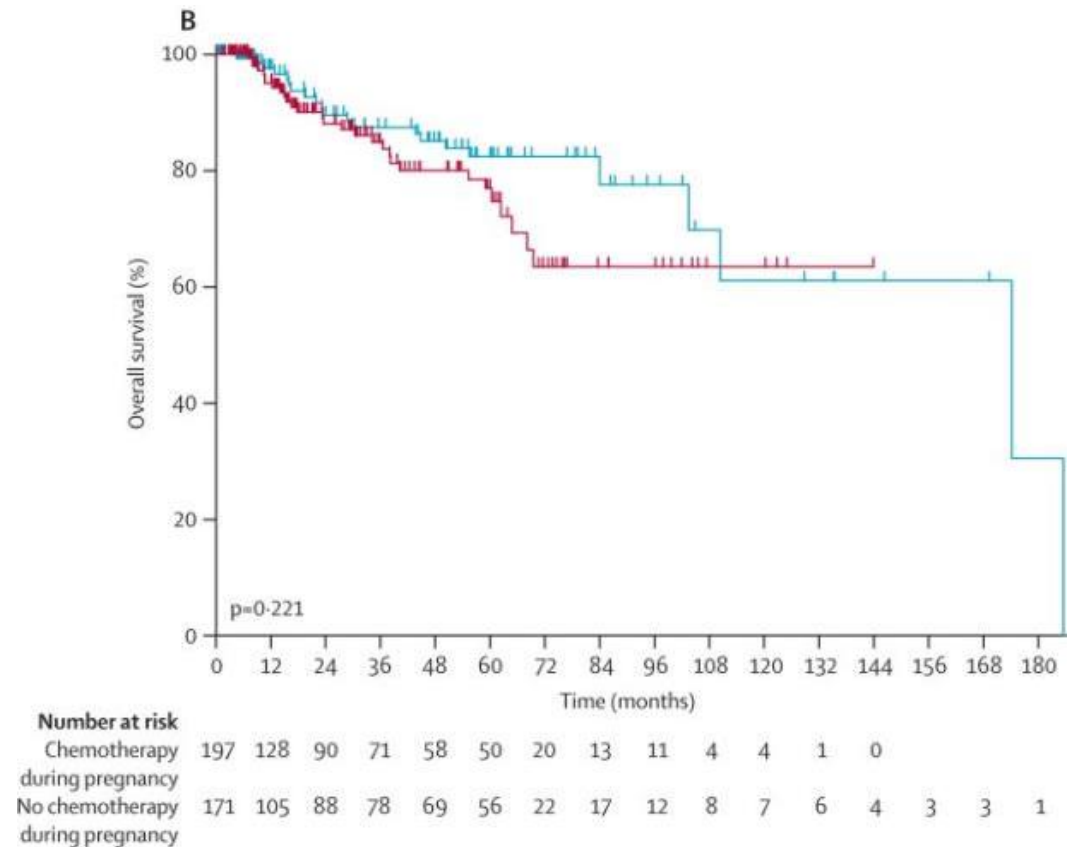
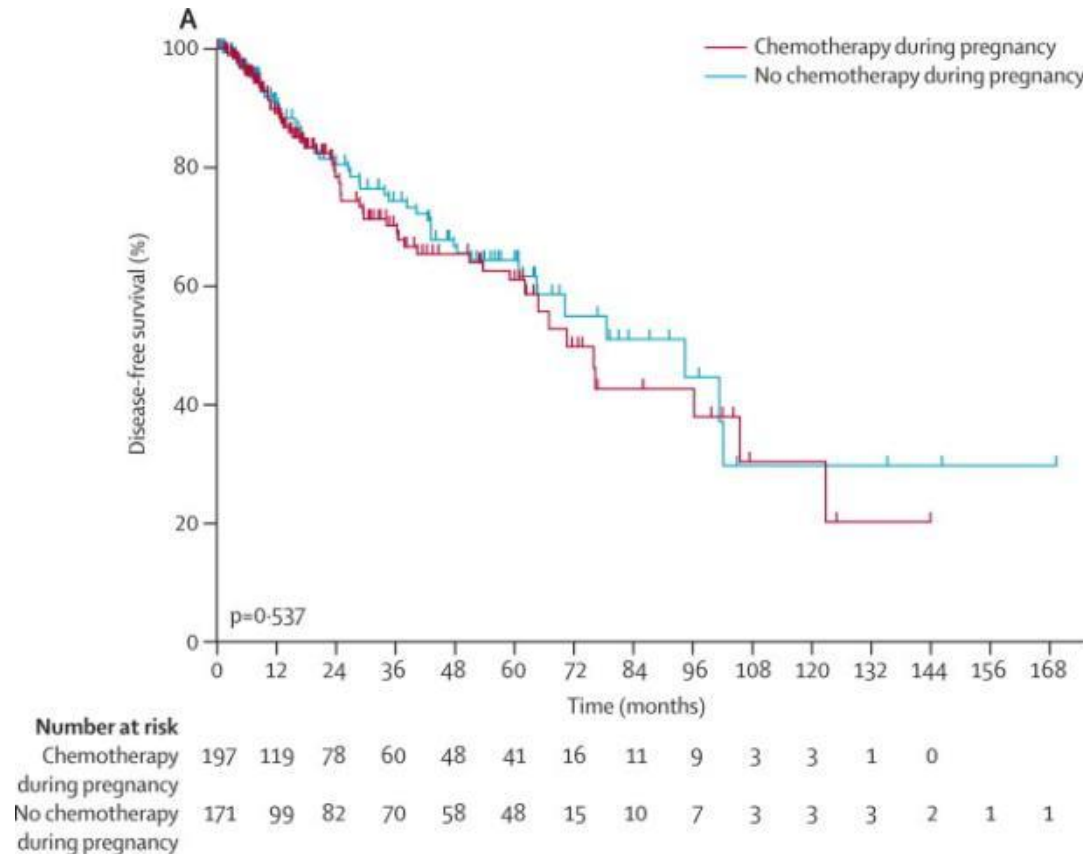
Janssen et al., Clin Pharmacokinetics 2021

Fig. 2 Relative change in AUC_{48} and C_{max} for docetaxel, paclitaxel, doxorubicin and epirubicin in pregnant patients compared with non-pregnant patients using the final pharmacokinetic models ($n = 1000$; relative change (%) = ((pregnant – non-pregnant)/non-pregnant) $\times 100\%$). AUC_{48} area under the plasma concentration-time curve from time zero to 48 h, C_{max} maximum plasma concentration



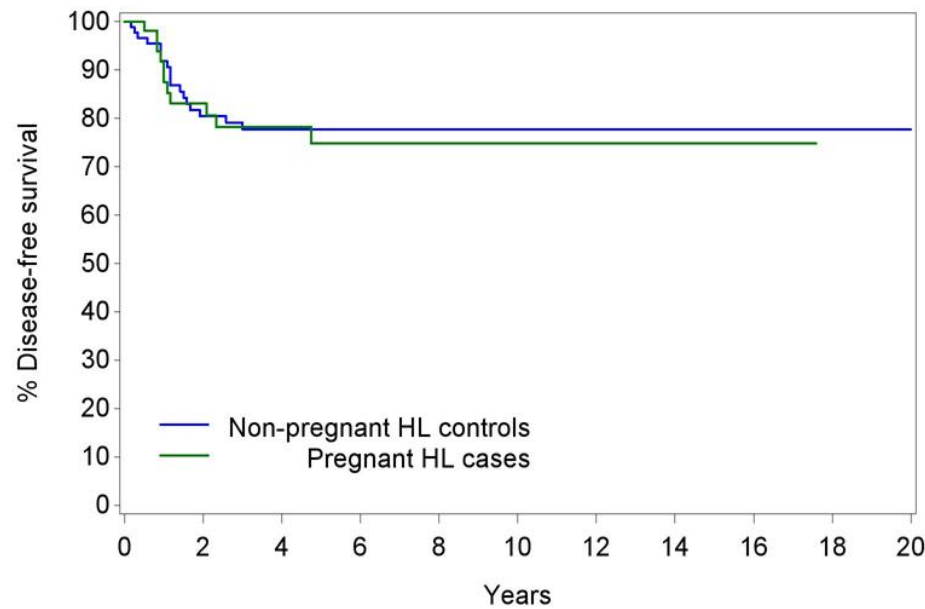
Disease free (A) and overall (B) survival curves for patients with early breast cancer.

Loibl et al., Lancet Oncol 2012

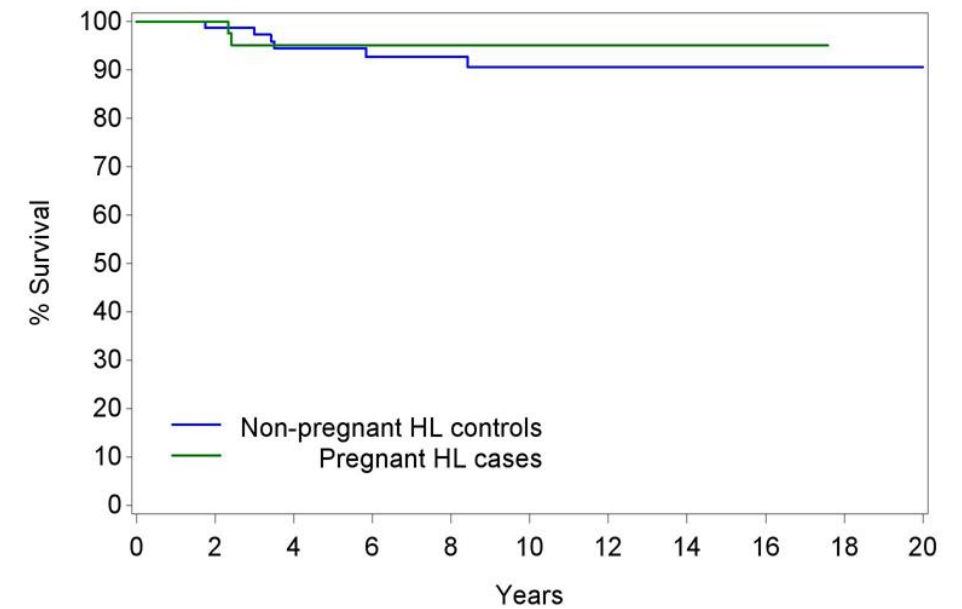


Disease-free and Overall survival of patients initiated **with chemotherapy** for Hodgkin Lymphoma during pregnancy compared to non-pregnant patients, matched for age, stage and year at diagnosis.

Maggen et al., Lancet Haematol, 2019



Number at risk											
Non-pregnant HL controls	89	63	54	43	39	33	25	16	12	12	9
Pregnant HL cases	55	35	26	14	10	7	6	2	2	0	0



Number at risk											
Non-pregnant HL controls	89	76	64	50	44	36	27	18	13	13	10
Pregnant HL cases	55	42	31	18	13	9	7	3	3	0	0

OBSTETRICS

Thromboprophylaxis during and after pregnancy

- For women with gynaecological cancer, thromboprophylaxis **should be considered** during and after pregnancy [III, A]. The risk assessment should be based on Royal College of Obstetricians and Gynaecologists guidelines (see figures 1 & 2) [V, A].
- Thromboprophylaxis is **recommended after all major procedures** including compression devices and low-molecular-weight heparin [I, A].

Obstetrics operative care

- If the ovary containing the corpus luteum gravidarum has been removed prior to 10-12 weeks, supplementation with exogenous progesterone should be initiated [IV, A].
- When uterine manipulations are expected during surgery beyond 12th week gestational age, prophylactic use of tocolytic agents can be considered [IV, B].

Abdominal shielding not recommended for diagnostic imaging with ionising radiation during pregnancy

LeJeune et al., Lancet Oncol 2025

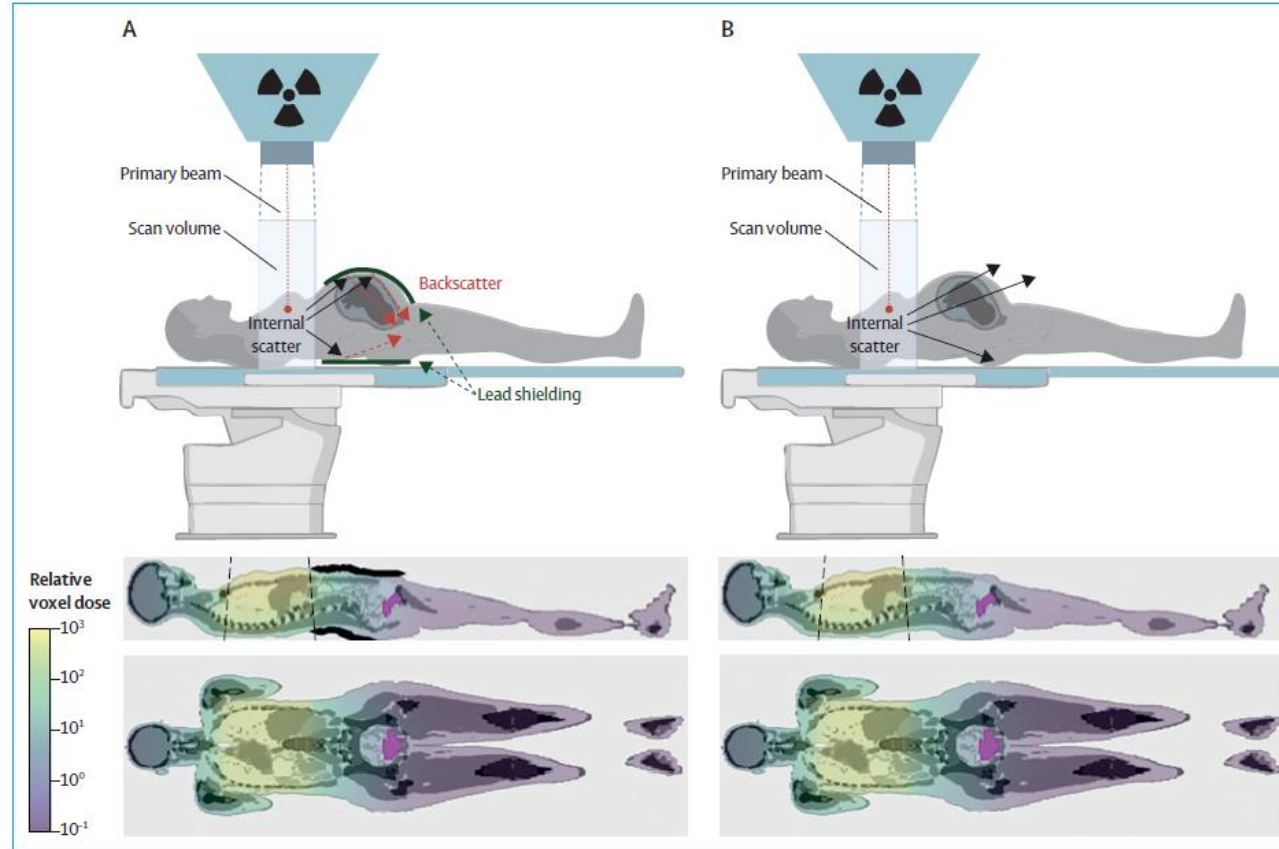


Figure: Dose distributions obtained from Monte Carlo simulations for a typical x-ray exposure for a chest—upper abdomen x-ray examination of an anthropomorphic phantom representing a pregnant individual (approximately 0–4 weeks of gestation). The dose distributions are presented with lead shielding (A) and without lead shielding (B). The dose values were normalised to the average dose in the uterus (shown in pink) without lead shielding. The doses scored in the uterus are between 100-times and 1000-times lower than the doses recorded in the region of the primary beam, for both cases with and without the additional lead protection.

Cancer and pregnancy: Agenda

- ❖ **Case studies**

 - **Cervical cancer**

 - **Breast cancer**

 - **Pushing the boundaries**

- ❖ **When preservation of the pregnancy is not possible**

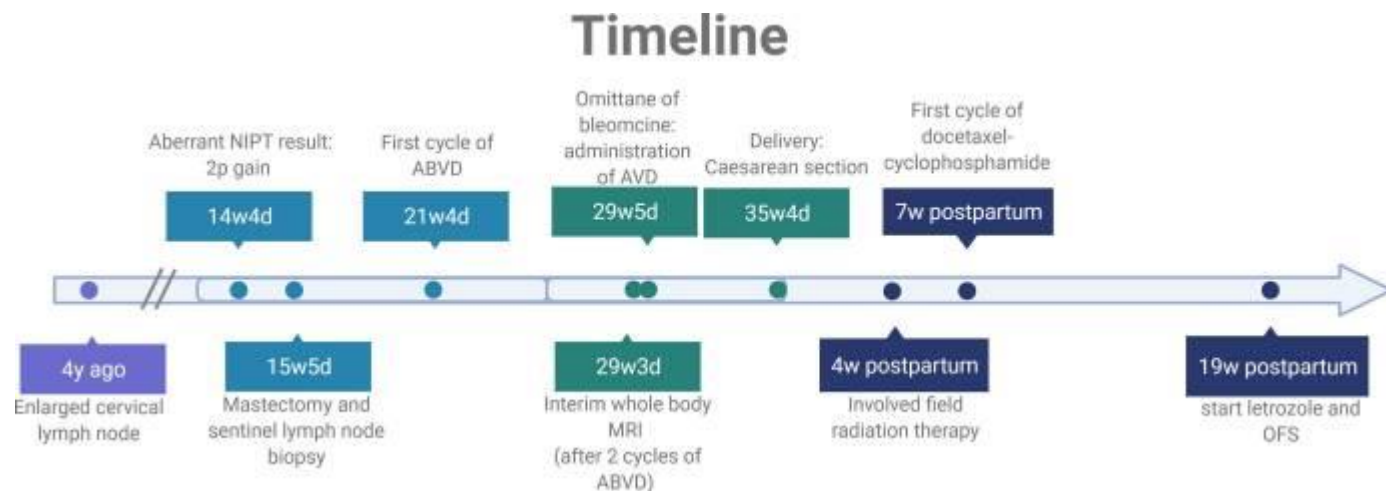
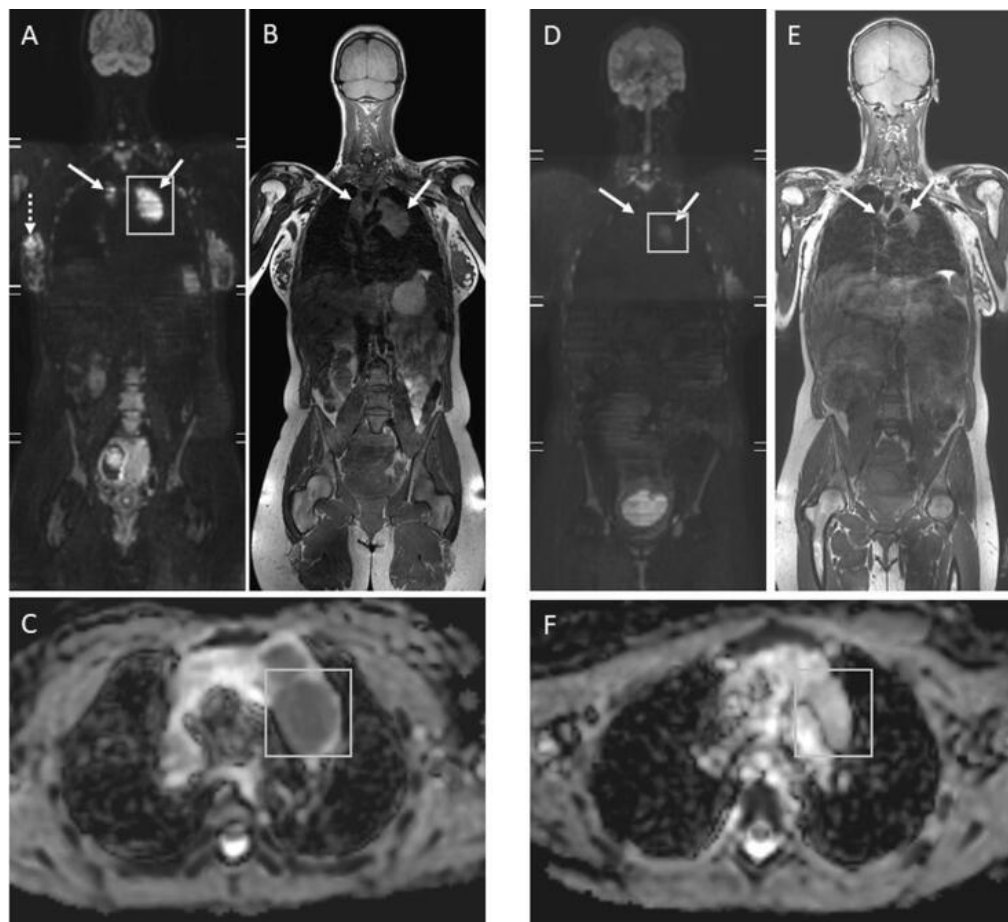
- ❖ **Follow up of children**

- ❖ **Breastfeeding**

- ❖ **Advisory Board Cancer Infertility Pregnancy (ABCIP)**

Pushing the boundaries. Concurrent Hodgkin lymphoma and breast cancer treatment with preservation of pregnancy: A case report

Lejeune et al., Gynecol Oncol Rep 2022

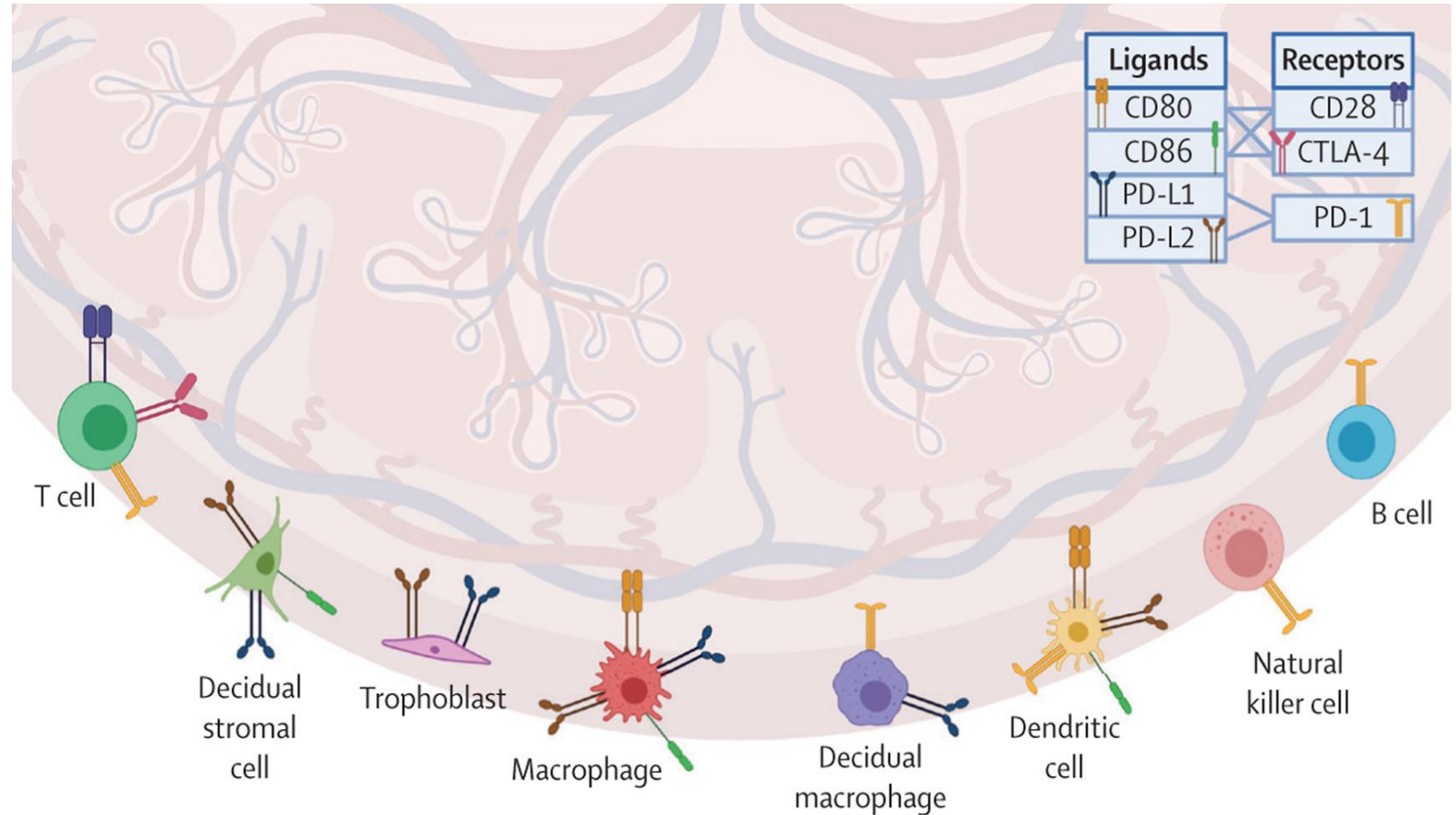


Fetomaternal interface and tolerance

Borgers & Heimovaara et al. Lancet Oncology 2021

Uterine decidua:

- Trophoblasts
- Decidual stromal cells
- Immune cells:
 - NK cells (70%)
 - Macrophages
 - Lymphocytes

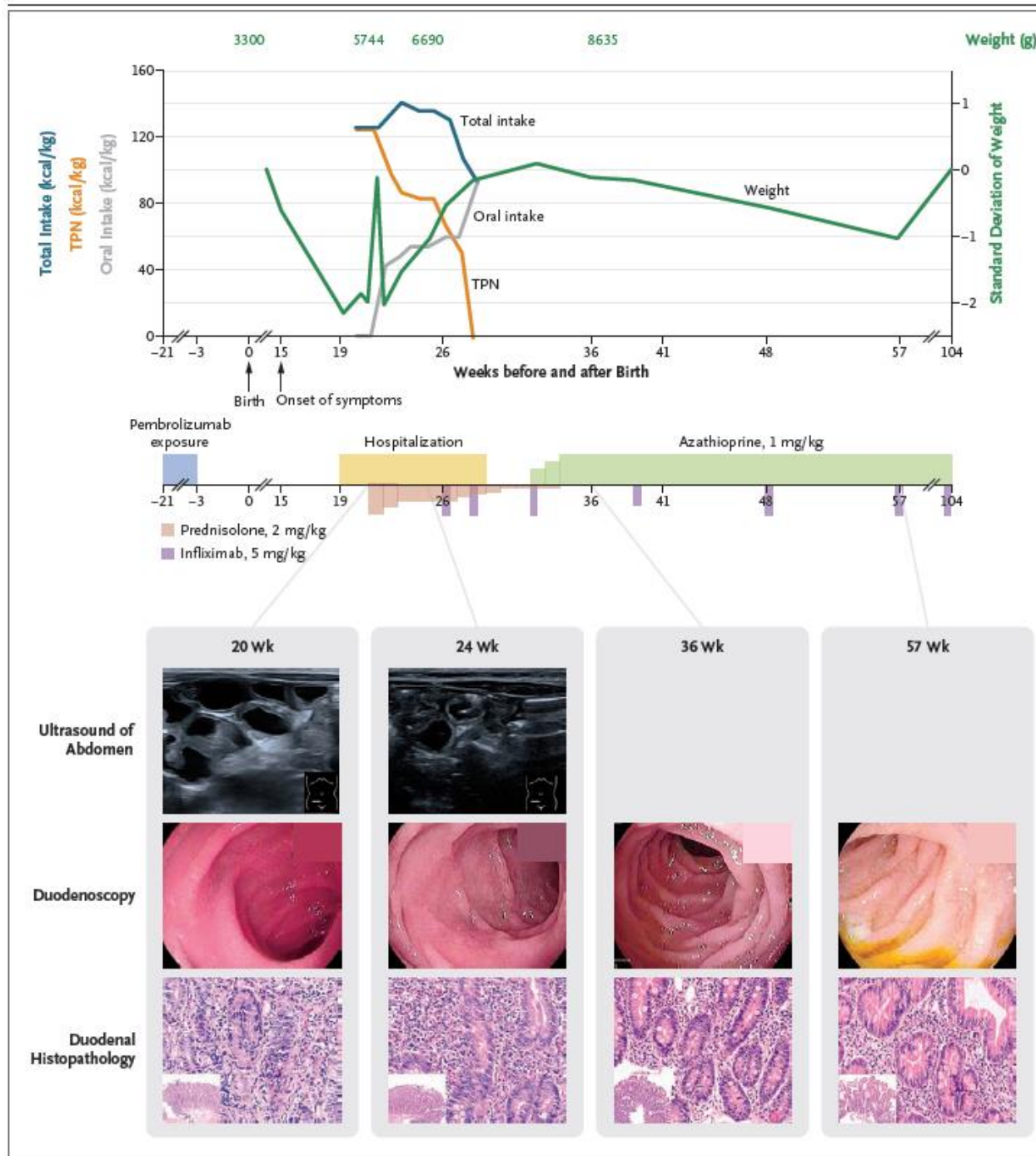


key for the regulation of trophoblast invasion, placental development, and fetomaternal tolerance

BRIEF REPORT

Severe Immune-Related Enteritis after In Utero Exposure to Pembrolizumab

Manuel A. Baarslag, M.D., Ph.D., Joosje H. Heimovaara, M.D., Jessica S.W. Borgers, M.D., Koen J. van Aerde, M.D., Hans J.P.M. Koenen, Ph.D., Ruben L. Smeets, Ph.D., Pauline L.M. Buitelaar, Pharm.D., Dick Pluim, Ph.D., Shoko Vos, M.D., Ph.D., Stefanie S.V. Henriët, M.D., Ph.D., Jan Willem B. de Groot, M.D., Ph.D., Martine van Grotel, M.D., Ph.D., Hilde Rosing, Ph.D., Jos H. Beijnen, Ph.D., Alwin D.R. Huitema, Ph.D., John B.A.G. Haanen, M.D., Ph.D., Frédéric Amant, M.D., Ph.D., and Nicole Gierenz, M.D.



Cancer and pregnancy: Agenda

❖ Case studies

- Cervical cancer
- Breast cancer
- Pushing the boundaries

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❖ Advisory Board Cancer Infertility Pregnancy (ABCIP)

Undifferentiated high grade sarcoma during pregnancy: a mutual ominous combination

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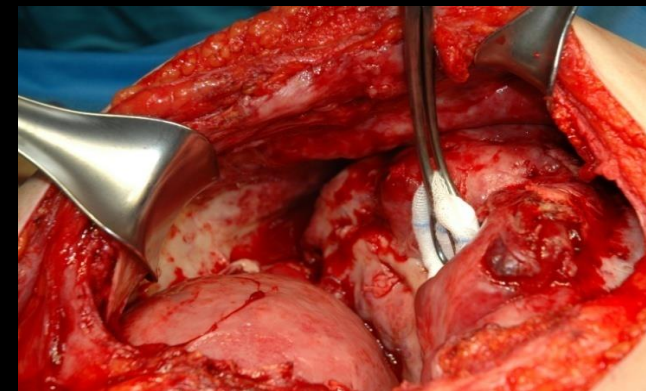
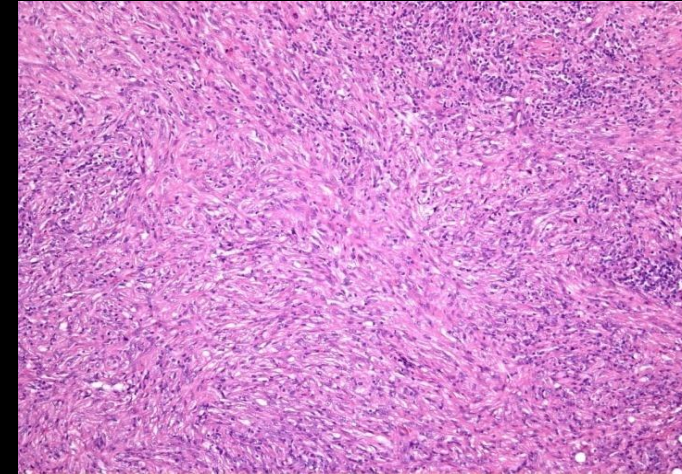
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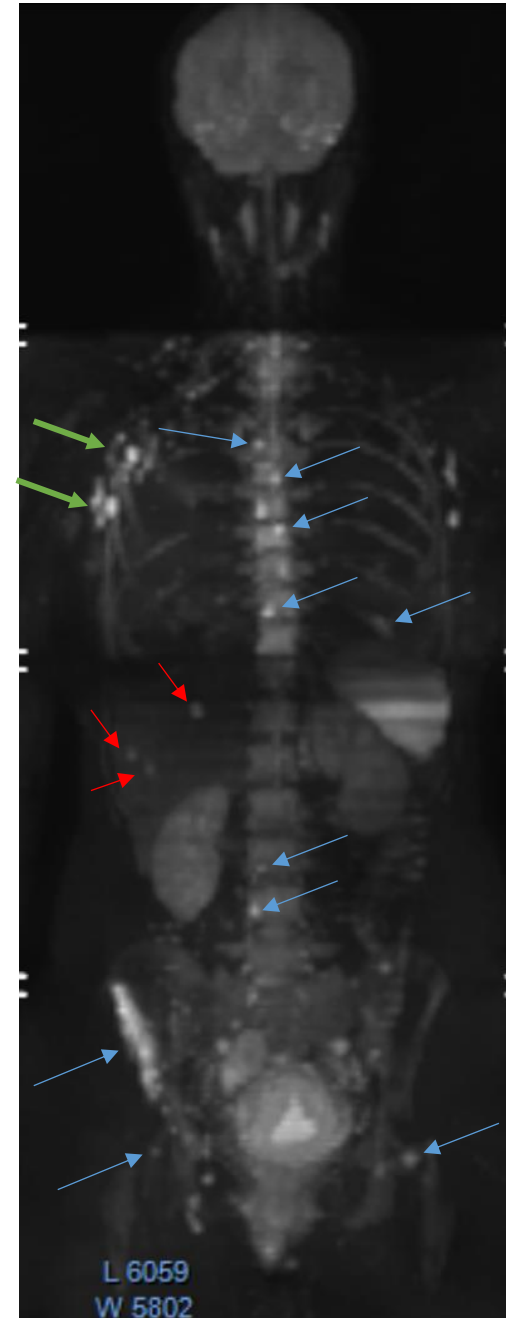


(mixed blastic-lytic) Bone metastases in invasive ductal breast cancer (9/2019)



Bone scintigraphy
Solitary bone metastasis C4

Courtesy V Vandecaveye



- Axillar lymphadenopathies
- Multifocal bone metastases
- Liver metastases

B1000 DWI 3D MIP volume image

**Termination of pregnancy does not improve
the maternal oncological outcome**

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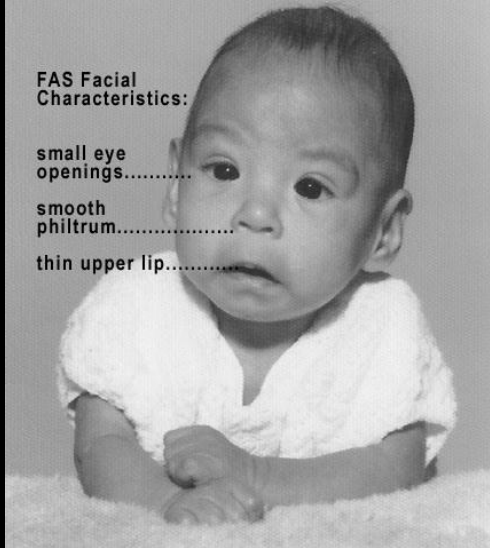
Baby with Fetal Alcohol Syndrome

FAS Facial
Characteristics:

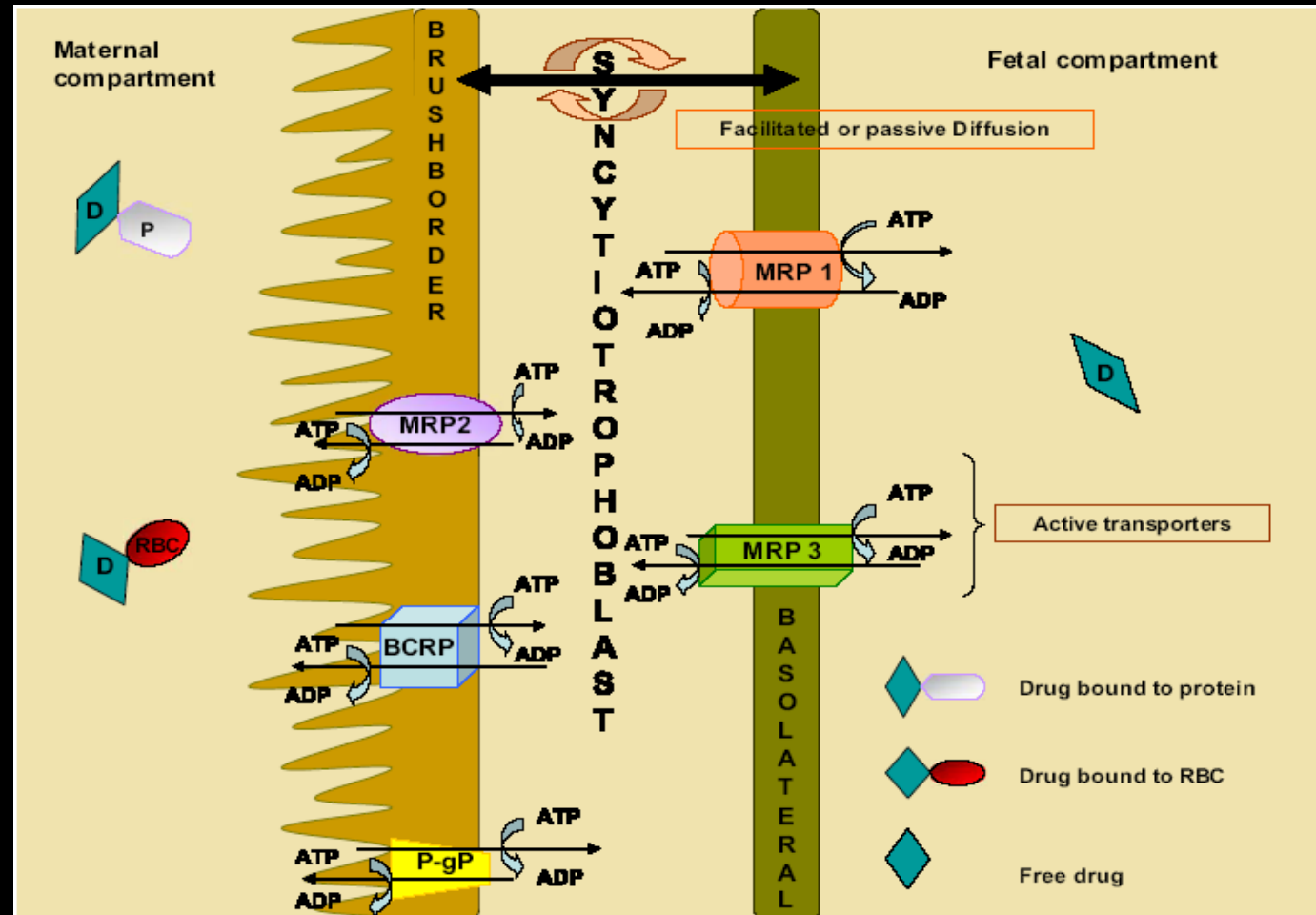
small eye
openings.....

smooth
philtrum.....

thin upper lip.....



Transplacental transport mechanisms





Transplacental transfer

Van Calsteren K (Reprod Sci 2010; Gynecol Oncol 2010; IJGC 2010)



Drug	MOUSE	BABOON	RAT	PERFUSION MODEL
	% transfer (mean+ SD)	% transfer (mean + SD)	% transfer (mean + SD)	% transfer (mean + SD)
Daunorubicine	13,3 ± 3,5	-	-	-
Epirubicine	4,8 ± 3,8	4,0 ± 1,6	15': 3,93 ± 0,74 30': 7,01 ± 1,93	3,66 ± 1,07
Doxorubicine	5,1 ± 0,6	7,5 ± 3,2	15': 2,36 ± 1,02 30 ': 4,72 ± 0,82	2,96 ± 0,75
Paclitaxel	/	1,6 ± 0,8	To be done	-
Docetaxel	-	/	-	-
Vinblastine	13,8 ± 5,8	18,5 ± 15,5	To be done	-
Carboplatinum	117,0 ± 38,9	57,5 ± 14,2	To be done	-
Cytarabine	56,7 ± 22,6		-	-
(4-OH)CP	-	25,1 ± 3,6	-	-

- : not done

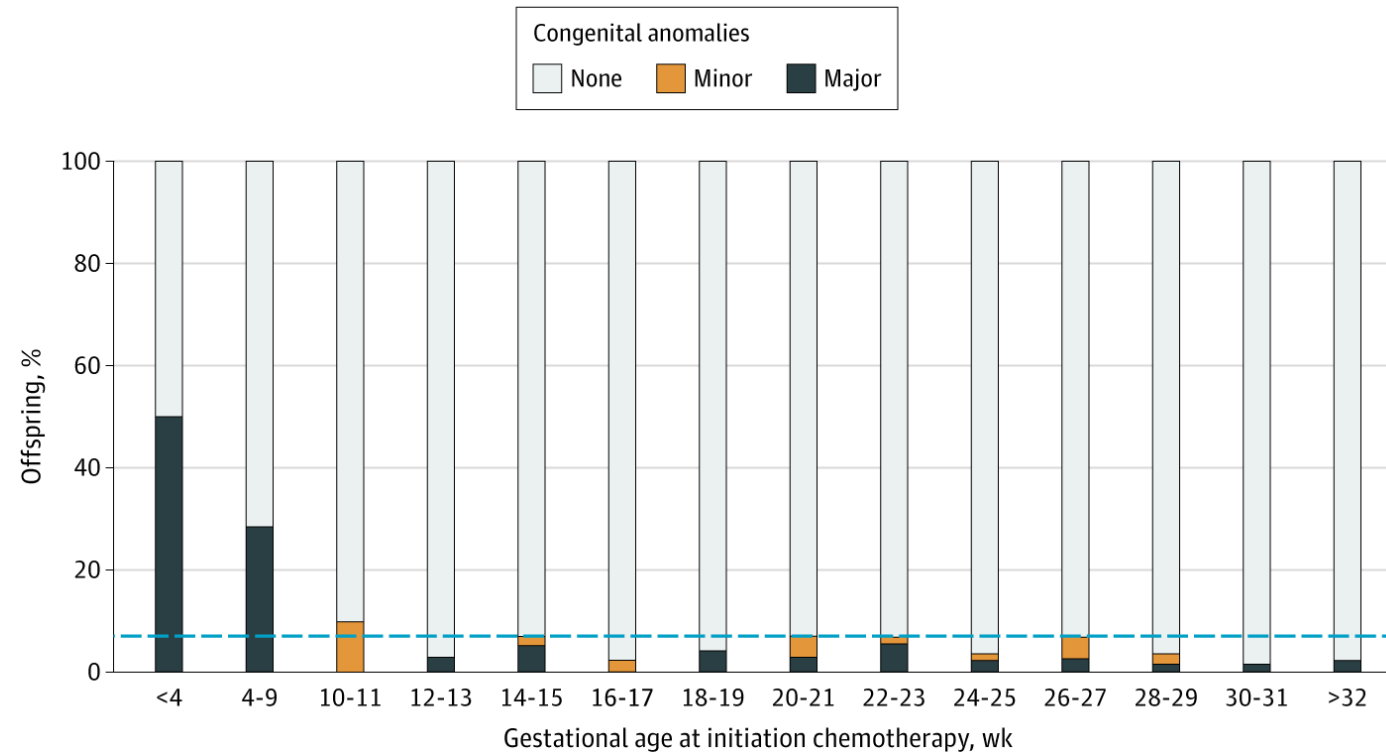
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Placenta reduces foetal exposure of most of the chemotherapeutic drugs



Association of chemotherapy timing in pregnancy with congenital malformations

van Gerwen & Maggen, et al. JAMA Netw Open 2021



Frequency of Congenital Malformations According to Gestational Age at First Chemotherapy Exposure.

The dotted line indicates 7%, the maximum percentage of congenital malformations (minor and major) according to gestational age at initiation of chemotherapy, from 12 weeks onward.

Systematic follow-up of the children

Children born from mothers
who received cancer
treatment during pregnancy

Children born from mothers
with a normal pregnancy

1,5Y

3Y

6Y

9Y

12Y

15Y

18Y

- General health
- Cognitive functions (IQ, Attention, Memory, Executive functions)
- Behaviour
- Cardiac functions

 The Lancet Oncology
Volume 13, Issue 3, March 2012, Pages 256-264

Articles

Long-term cognitive and cardiac outcomes after prenatal exposure to chemotherapy in children aged 18 months or older: an observational study

Dr Frédéric Amant PhD^a, Kristel Van Calsteren PhD^b, Michael J Halaska PhD^c, Mina Mhallem Gziri MD^b, Wei Hui MD^k, Lieven Lagae PhD^c, Michèl A Willemsen PhD^f, Livia Kapusta PhD^g, Ben Van Calster PhD^{a,b}, Heidi Wouters MSc^c, Liesbeth Heyns MSc^a, Sileny N Han MD^a, Viktor Tomek MD^j, Luc Mertens PhD^{d,k}, Petronella B Ottevanger PhD^h



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE **3-year-old**

Pediatric Outcome after Maternal Cancer Diagnosed during Pregnancy

F. Amant, T. Vandenbroucke, M. Verheecke, M. Fumagalli, M.J. Halaska, I. Boere, S. Han, M.M. Gziri, F. Peccatori, L. Rob, C. Lok, P. Witteveen, J.-U. Voigt, G. Naulaers, L. Vallaes, F. Van den Heuvel, L. Lagae, L. Mertens, L. Claes, and K. Van Calsteren, for the International Network on Cancer, Infertility, and Pregnancy (INCIP)

 European Journal of Cancer
Volume 138, October 2020, Pages 57-67

Original Research

Child development at 6 years after maternal cancer diagnosis and treatment during pregnancy

Tineke Vandenbroucke^{a,b,1}, Magali Verheecke^{a,b,1}, Mathilde van Gerwen^{c,d,1}, Kristel Van Calsteren^{a,e}, Michael J. Halaska^{f,g}, Monica Fumagalli^{h,i}, Robert Fruscio^j, Amarendra Gandhi^{k,l}, Margreet Veening^d, Lieven Lagae^m, Petronella B. Ottevangerⁿ, Jens-Uwe Voigt^o, Jorine de Haan^p, Mina M. Gziri^q, Charlotte Maggen^{a,b}, Luc Mertens^r, Gunnar Naulaers^s, Laurence Claes^t, Frédéric Amant^{b,c,u,v}

The International Network on Cancer, Infertility and Pregnancy (INCIP)²

Journal of Clinical Oncology
An American Society of Clinical Oncology Journal

► J Clin Oncol. 2023 Jan 12;41(8):1527-1532. doi: [10.1200/JCO.22.02005](https://doi.org/10.1200/JCO.22.02005)

Cognitive and Behavioral Development of 9-Year-Old Children After Maternal Cancer During Pregnancy: A Prospective Multicenter Cohort Study

Indra A Van Assche¹, Evangeline A Huis in 't Veld^{2,3}, Kristel Van Calsteren^{1,4}, Mathilde van Gerwen^{2,3,5}, Jeroen Blommaert^{6,7,8}, Elyce Cardonick⁹, Michael J Halaska¹⁰, Robert Fruscio¹¹, Monica Fumagalli^{12,13}, Jurgen Lemiere^{6,14}, Elisabeth M van Dijk-Lokkart^{5,15}, Camilla Fontana¹³, Harm van Tinteren², Jessie De Ridder^{16,17}, Martine van Grotel², Marry M van den Heuvel-Eibrink^{2,18}, Lieven Lagae^{1,16}, Frédéric Amant^{3,7,19}

 Annals of Oncology
Volume 36, Issue 9, September 2025, Pages 1025-1034

Original article

Long-term development of 12- and 15-year-old offspring after maternal cancer diagnosis during pregnancy: a prospective multicentre cohort study

E.A. Huis in 't Veld^{1,2,3,†}, I.A. Van Assche^{4,†}, K. Van Calsteren^{4,5}, T. Salaets⁶, M.G. Sliker⁷, E. Cardonick⁸, M. van Grotel², M.J. Halaska⁹, C. Fontana¹⁰, R. Fruscio^{11,12}, J. Lemiere^{13,14}, M. van Gerwen^{12,15}, E.M. van Dijk-Lokkart^{15,16}, C.L. Lejeune^{5,17}, H. van Tinteren², L. Mertens¹⁸, V. Tomek¹⁹, S. Posthouwer⁷, J.U. Voigt^{20,21}, M.M. van den Heuvel-Eibrink^{2,22}... F. Amant^{1,16,17,24}

 eClinicalMedicine
Volume 78, December 2024, 102922

Articles

Child outcomes after prenatal exposure to platinum and taxane-based chemotherapy: an unplanned interim analysis of the international network on cancer, infertility, and pregnancy study

Indra A. Van Assche^a, Kristel Van Calsteren^{a,b}, Evangeline A. Huis in 't Veld^{c,d}, Mathilde van Gerwen^{c,d,e}, Laura Heylen^f, Charlotte L. Lejeune^{b,g}, Elyce Cardonick^h, Michael J. Halaskaⁱ, Robert Fruscio^j, Monica Fumagalli^{k,l}, Elisabeth M. van Dijk-Lokkart^{e,m}, Jurgen Lemiere^{n,o}, Martine van Grotel^d, Lieven Lagae^{a,p,q}, Marry M. van den Heuvel-Eibrink^{d,q,s}, Frédéric Amant^{c,g,r,s}

 The Lancet Child & Adolescent Health
Volume 8, Issue 6, June 2024, Pages 433-442

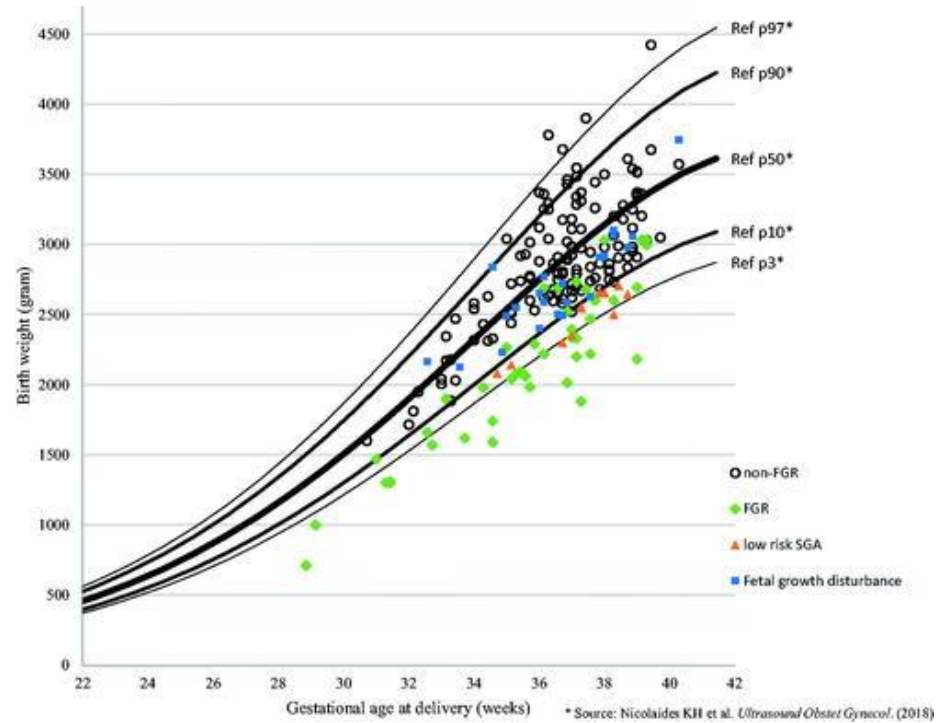
Articles

Long-term neurocognitive, psychosocial, and physical outcomes after prenatal exposure to radiotherapy: a multicentre cohort study of the International Network on Cancer, Infertility, and Pregnancy

Indra A Van Assche MSc^a, Kristel Van Calsteren PhD^{a,b}, Jurgen Lemiere PhD^{d,g}, Jana Hohmann MSc^a, Jeroen Blommaert PhD^{e,f}, Evangeline A Huis in 't Veld MSc^{j,k}, Elyce Cardonick MD^l, Charlotte Lejeune MD^{b,f}, Nelleke P B Ottevanger PhD^m, Prof Els P O Witteveen PhDⁿ, Martine van Grotel PhD^j, Prof Marry M van den Heuvel-Eibrink PhD^{j,o}, Prof Lieven Lagae PhD^{a,h}, Maarten Lambrecht PhD^{e,i}, Prof Frédéric Amant PhD^{c,f,k}

Impact of chemotherapy during pregnancy on fetal growth (n=201, retrospective)

Maggen et al., J MFNM 2022



Fetal growth restriction is associated with chemotherapy and its duration
Obstetrical high care unit/perinatologist

HEARING ASSESMENT IN CHILDREN AFTER INTRAUTERINE EXPOSURE TO PLATINUM-BASED TREATMENT OF PREGNANT CANCER PATIENTS. A study from the International Network on Cancer, Infertility and Pregnancy.

Huis in 't Veld et al. BMC Pediatrics 2025



Veld et al. BMC Pediatrics (2025) 25:703
https://doi.org/10.1186/s12887-025-09902-z

BMC Pediatrics

Table 2: Characteristics and audiological results of the included subjects.

Platinol	Country	P I D	S e x	G A at bir th	Maternal cancer	TCD platinol (mg)	TCD platinol (mg/m2)	Cyel es	GA at start treatme nt	NHS availabl e?	NHS norm al?	Ag e at F U in ye ars	SI O P rig ht	Muen ster right	SI O P lef t	Muen ster left	Tympanome try right	Tympanometr y left	No HL	Mild HL*	Overt HL**
cisplatin	NL	0 1	F	33 +1	Cervical	425	227	3	20+6	Yes	Yes	12	0	1	0	1	B	B	√		
		0 2	F	37 +4	Cervical	351	200	3	30+1	No	-	9	1	2C	1	2A	C	A		√	
		0 3	F	32 +0	Osteosarcoma	392	200	2	22+5	Yes	Yes	6	0	1	1	2A	A	A		?	
		0 4	F	36 +0	Cervical	525	300	3	27+3	Yes	Yes	7	3	3A	3	3B	A	A			√
		0 5	F	39 +0	Ovarian	555	300	3	21+0	Yes	Yes	6	1	2A	1	2A	A	A		√	
		0 6	F	36 +2	Cervical	748	420	6	25+3	Unknown	-	6	3	3B	3	3B	Inconclusiv e	Inconclusive			√
		0 7	M	34 +4	Cervical	620	350	5	26+3	Unknown	-	8	4	3C	4	3C	A	A			√
	CZE	0 8	F	36 +0	Ovarian	240	150	2	29+1	No	-	28	0	0	0	0	A	C	√		
		0 9	F	36 +6	Ovarian	720	450	6	16+6	No	-	12	1	2A	0	1	A	A		?	
		1 0	F	35 +6	Ovarian	720	450	6	16+6	No	-	6	1	2B	1	2B	-	-			√
		1 1	F	34 +5	Ovarian	610	400	4	23+0	No	-	17	1	2C	1	2C	A	A			√
	BEL	1 2	M	36 +4	Cervical	500	375	5	27+3	No	-	6	1	2A	0	1	A	A		?	
		1 3	F	31 +1	Ovarian	324	180	3	20+0	Yes	Yes	5	0	1	0	1	-	-	√		
		1 4	M	31 +1	Ovarian	324	180	3	20+0	Yes	Yes	5	0	1	1	2A	-	-		?	
		1 5	F	38 +5	Oral cavity	387	239	6	13+6	Unknown	-	6	2	2A	0	1	-	-	√		
		1 6	M	32 +0	Cervical	719	450	6	17+2	Unknown	-	6	1	2A	0	1	-	-		?	
carboplatin	NL	1 7	F	34 +4	Nasopharyngeal	?	100	2	30+2	Unknown	-	6	3	3A	3	3A	-	-			√
		1 8	F	33 +4	Cervical	3438	1800	6	22+1	Yes	Yes	6	0	0	0	0	A	A	√		
		1 9	M	36 +4	Cervical	3384	1800	2	31+1	Unknown	-	4	1	2A	1	2A	C	C		√	
		2 0	M	35 +1	Ovarian	3640	2079	4	23+2	Yes	Yes	12	0	0	0	0	As	As	√		
		2 1	M	36 +1	Cervical	2694	1308	3	27+1	Yes	Yes	6	0	1	1	2A	A	A		?	
		2 2	M	34 +4	Cervical	2494	1569	3	18+4	Yes	Yes	6	0	1	0	1	C	As	√		
		2 3	F	31 +0	Cervical	4785	2627	5	27+5	Unknown	-	6	1	2A	0	1	Inconclusiv e	A		?	
	BEL	2 4	F	36 +4	Oral cavity	390	210	3	14+5	Unknown	-	6	0	0	1	2A	-	-	√		
		2 5	M	36 +4	Oral cavity	390	210	3	14+5	Unknown	-	6	0	0	1	2A	-	-	√		

RESEARCH Open Access

Hearing assesment in children after intrauterine exposure to platinum-based treatment of pregnant cancer patients: A study from the International Network on Cancer, Infertility and Pregnancy

Hearing assesment in children after intrauterine exposure to platinum-based treatment of pregnant cancer patients: A study from the International Network on Cancer, Infertility and Pregnancy

Evangeline A. Huis in 't Veld^{1,2†}, Anna Babkova^{3†}, Ludmila Verespejova^{4†}, Franciscus A. Diepstraten¹, Annelot J.M. Meijer¹, Martine van Grootel¹, Mathilde van Gerwen^{1,2,3}, Indra A. Van Assche⁵, Kristel Van Calsteren^{1,2}, Harm van Tinteren¹, Mary M. van den Heuvel-Eibrink^{1,5}, Frédéric Amant^{2,6†}, Michael Halaska⁷ and Alexander E. Hoetnik^{1,10†}

Cisplatin exposed: 17 children
Carboplatin exposed: 8 children

25 pure tone audiometry
17 tympanometry

Median age children is 6 years

Cisplatin

Carboplatin



Future

High need to continue this kind of studies especially taking into consideration the tsunami of new cancer drugs that enter the clinic.

Cancer and pregnancy: Agenda

❖ Case studies

- Cervical cancer
- Breast cancer
- Pushing the boundaries

❖ When preservation of the pregnancy is not possible

❖ Follow up of children

❖ Breast feeding

❖ Advisory Board Cancer Infertility Pregnancy (ABCIP)

Problem is acknowledged in the field



The NEW ENGLAND JOURNAL of MEDICINE

PERSPECTIVE

"IS IT SAFE?"

"Is It Safe?" — The Many Unanswered Questions about Medications and Breast-Feeding

John J. Byrne, M.D., M.P.H., and Catherine Y. Spong, M.D.

An estimated 83% of new mothers in the United States breast-feed at some time during the postpartum period.¹ Globally, more than half of women take one or more medications in the months after delivery — and the figure may be much higher in the United States.² Using the more conservative estimate of 50%, up to 1.5

view the scientific literature about individual medications; the panel then makes educated decisions regarding which medications may be safe during lactation, which medications require lactating women to discard their breast milk, and which medications may be suitable alternatives to those currently used.

fore the agency sponsored national meetings on the safety of drugs used during lactation. Finally, in 2017, the 21st Century Cures Act established the Task Force on Research Specific to Pregnant Women and Lactating Women to evaluate the safety of medications and biologic products used during pregnancy and lactation and

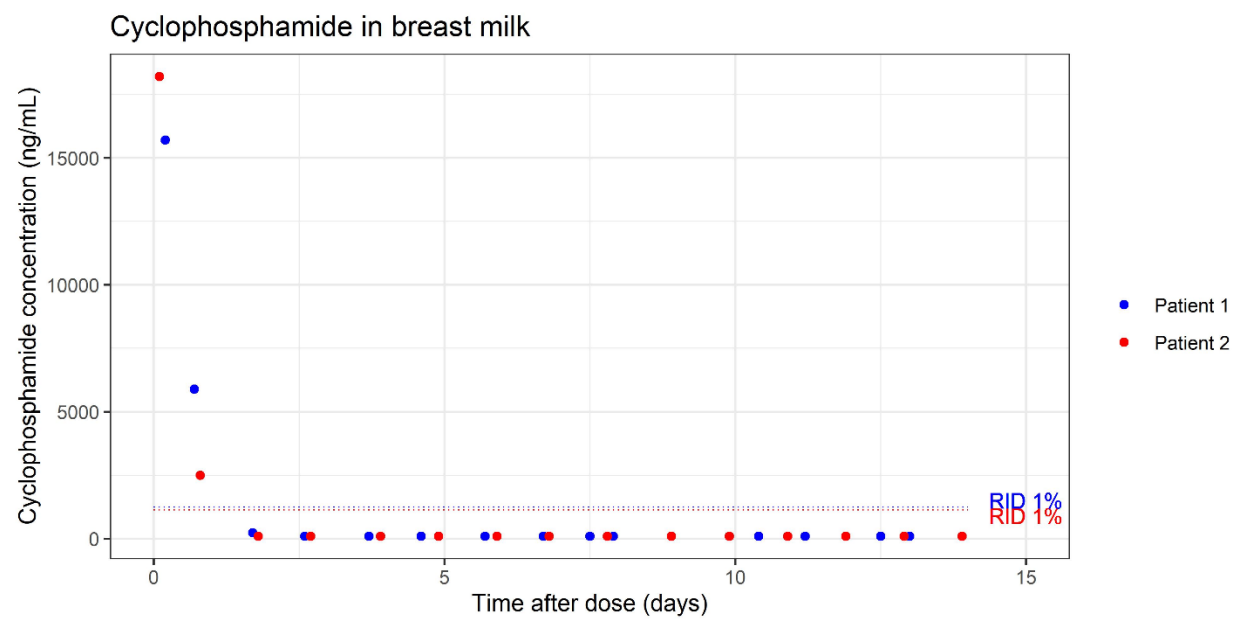
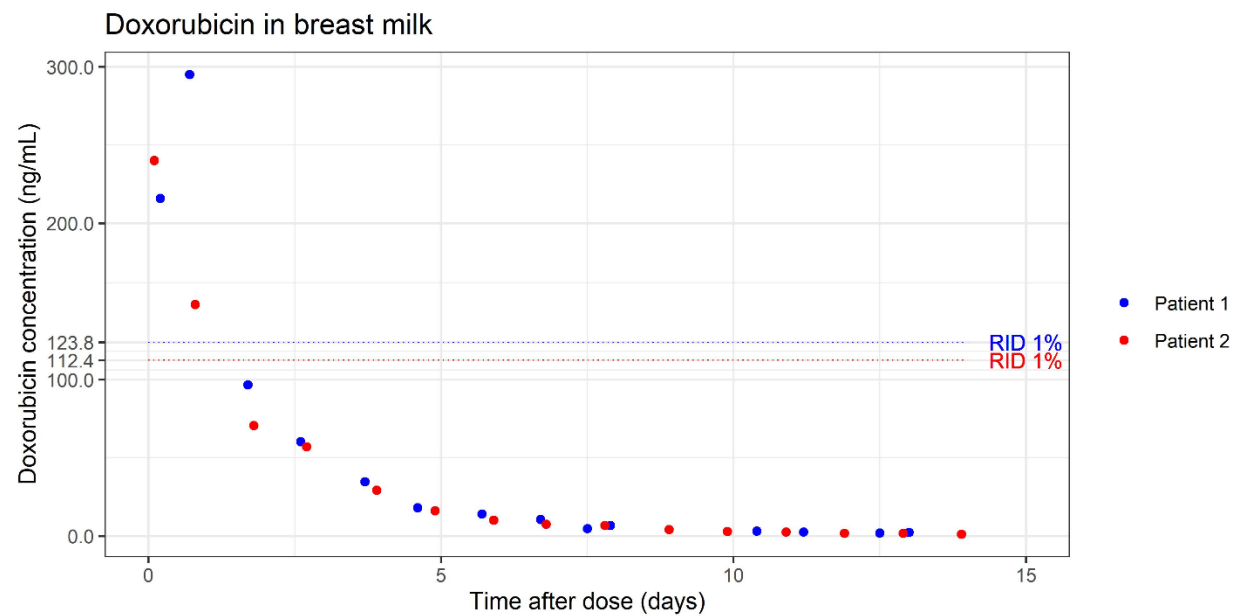
Perspective
APRIL 4, 2019

Pharmacologic Research in Pregnant Women — Time to Get It Right

Ahizechukwu C. Eke, M.D., M.P.H., Kelly E. Dooley, M.D., Ph.D., and Jeanne S. Sheffield, M.D.

Approximately 6 million women in the United States become pregnant every year, and 4 million of them will have a live birth. Many pregnant women (70 to 80%) take at least one prescrip-

nancy and for improving the development of safe and effective therapies for pregnant and lactating women. It also includes a discussion of the practical and ethical issues surrounding the inclusion



	Patient	Cycle	Days until cumulative RID <5%	Days until cumulative RID <1%	Days until cumulative RID <0.1%
Doxorubicin	1	1	0	3	8
	2	1	0	3	9
Cyclophosphamide	1	1	1	2	<LLOQ
	2	1	1	2	<LLOQ
Paclitaxel	1	1	0	0	0
	1	2	0	0	1
	1	3	0	0	1
Carboplatin	1	1	0	0	10
	1	2	0	0	14
	1	3	0	0	3*
Cisplatin	3	1	1	14	<i>Not reached (21)</i>
	3	2	6	14	<i>Not reached (21)</i>

Practical implementation

These results indicate that breastfeeding might be possible in between cycles, provided milks is discarded the first few days

BUT

More research on drug concentrations in breast milk are highly needed

Cancer and pregnancy: Agenda

❖ Case studies

- Cervical cancer
- Breast cancer
- Pushing the boundaries

❖ When preservation of the pregnancy is not possible

❖ Follow up of children

❖ Breastfeeding

❖ Advisory Board Cancer Infertility Pregnancy (ABCIP)

**Cancer during pregnancy is not an emergency,
there is time for deliberation and second opinion**

The exception confirms the rule....



The Advisory Board on Cancer, Infertility and Pregnancy: a virtual on-demand multidisciplinary tumour board



Ground Picture/
Shutterstock.com

Published Online
November 7, 2022
[https://doi.org/10.1016/
S1470-2045\(22\)00631-3](https://doi.org/10.1016/S1470-2045(22)00631-3)

ABCIP



Advisory Board on Cancer,
Infertility and Pregnancy

Multidisciplinary consultations are part of standard oncological care. These consultations ensure that patients' cases are discussed by all involved specialists and that a consensus is reached on the most appropriate treatment course.¹ The multidisciplinary consultation model is adequate for most patients with cancer, but teams might have insufficient expertise for people with rare cancers or conditions. Cancer during pregnancy is an example of such a rare condition, for which the traditional single-centre multidisciplinary team might not have the expertise to provide a recommendation. Annually in Europe, only 2000–4000 pregnant women are diagnosed with cancer.² Although this number might slowly increase because of increasing maternal age and non-invasive prenatal testing, the incidence is expected to stay low and individual expertise will be difficult to develop.

Substantial evidence exists that cancer staging and treatment are possible during pregnancy under some conditions,^{3,4} but many physicians treating these patients have insufficient knowledge of the detailed

information on treatment and outcome that is available. Complexity is further fuelled by the continuous development of new treatment methods that are used earlier and earlier in the course of cancer treatment. As part of the success of these methods, questions have emerged regarding the safety of targeted therapies and immunotherapies during pregnancy.⁵ Moreover, ethical issues arise for some individual patients when there is no optimal treatment plan for both mother and fetus during pregnancy or when an optimal treatment for one would be the opposite of the optimal treatment for the other.

Based on this complexity and scarcity of individual experience, experts in the field are frequently consulted by mail or phone for advice on individual patients. However, because of the varied cancer types occurring at different gestational ages, it is very likely that even this individual expertise cannot sufficiently deal with all situations. Additionally, although available consensus papers are helpful and provide general indications, they do not give specific advice at an individual level.^{6–8}



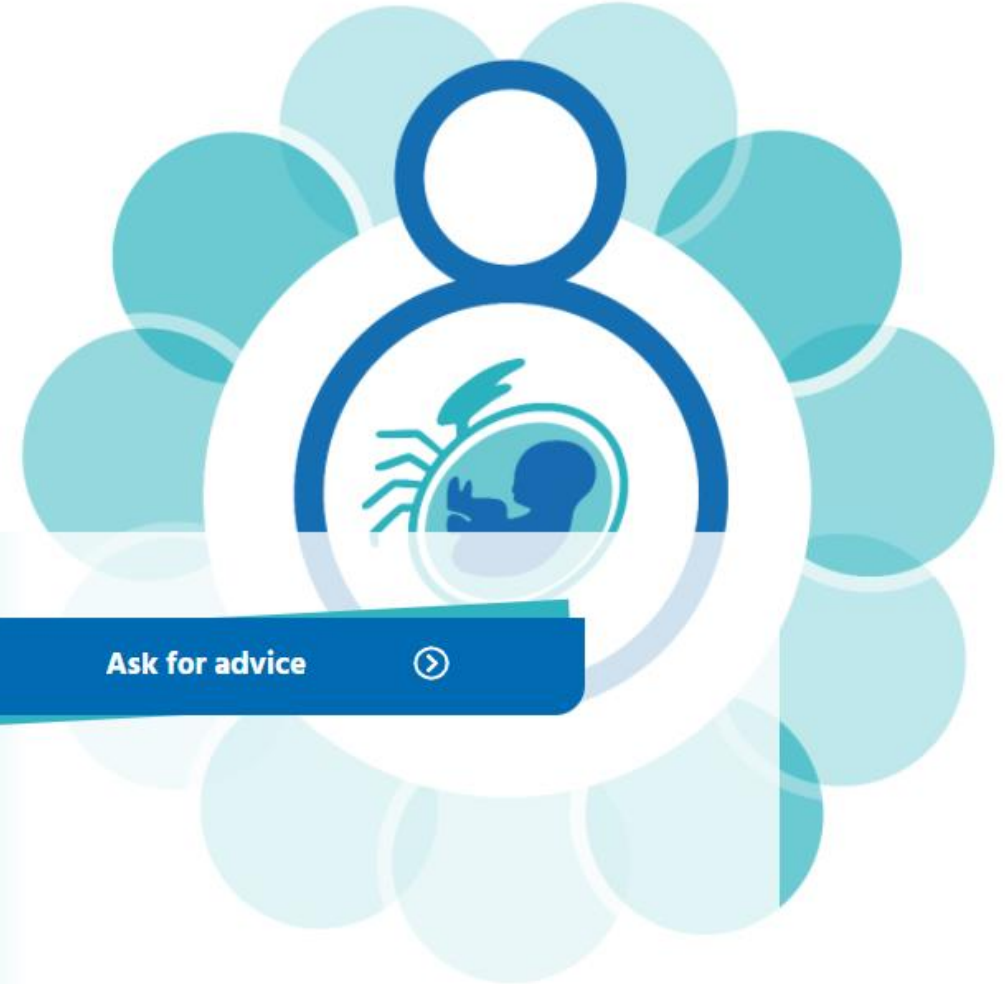
ABCIP

Advisory Board on Cancer, Infertility and Pregnancy

The ABCIP provides a platform where physicians from all over the world can request recommendations regarding the medical care of pregnant women diagnosed with cancer or regarding fertility preservation. Your requests will be sent to the national advisory board of your country or to the overarching international board.

Your request can only consist of **anonymous** patient information. We try to send the recommendations back to you within **4-7 days**.

Ask for advice



ABCIP

International



ABCIP
Belgium



ABCIP
The Netherlands



ABCIP
Spain-Iberoamerica



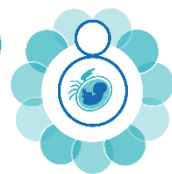
ABCIP
Italy



ABCIP
Poland



ABCIP
Denmark



ABCIP
United Kingdom



Advisory Board on Cancer, Infertility and Pregnancy (ABCIP)

- Do you have a question about your pregnant patient with cancer or a fertility-related question about your patient with a history of cancer?
→ Visit www.ab-cip.org – fill out a free request form – receive advice within 7 days!
- Do you want to become a board member?
→ Contact us!

We offer free recommendation letters for anonymized cases — prepared with expert input from our board members.

info@ab-cip.org

e.v.empel@nki.nl / a.koning@nki.nl

ABCIP



Advisory Board on Cancer,
Infertility and Pregnancy

Take home message

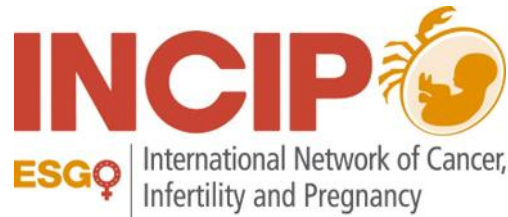
- **Most cancer treatment options are possible during pregnancy**
- **Multidisciplinary setting in referral centres**
- **More pharmacological studies in pregnant women are needed**



European Research Council



SAVE THE DATE



INCIP conference

April 20th & 21st 2026

Thessaloniki, Greece



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