SUPPLEMENTARY MATERIAL

Table A. List of the main countries where progestogens of interest are authorized (2022)

Product	Main countries where the product is authorized*
Progesterone	Europe (Austria, Belgium, Bosnia, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Monaco, Poland, Portugal, Netherlands, Norway, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom) Africa (Algeria, Egypt, Morocco, South Africa, Tunisia) Asia (Bangladesh, China, India, Indonesia, Israel, Japan, Kuwait, Lebanon, Malaysia, Myanmar, Oman, Pakistan, Philippines, Saudi Arabia, Singapore, South Korea, Taiwan, Vietnam) North America (Canada, Mexico, USA) South America and Central America (Argentina, Belize, Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela) Oceania (Australia, New Zealand)
Hydroxyprogesterone	Europe (Austria, Bosnia, Czech Republic, France, Georgia, Italy, Serbia, Turkey) Africa (Egypt) Asia (Bhutan, Brunei, China, India, Japan, Lebanon, Oman, Singapore, Taiwan, Thailand) North America (Mexico, USA) South America and Central America (Argentina, Belize, Brazil, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama)
Dydrogesterone	Europe (Austria, Belgium, Bosnia, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Poland, Portugal, Netherlands, Romania, Serbia, Slovakia, Switzerland, Turkey, United Kingdom) Africa (Egypt, South Africa, Tunisia) Asia (China, India, Indonesia, Israel, Japan, Kuwait, Lebanon, Malaysia, Oman, Pakistan, Philippines, Russia, Singapore, Taiwan) North America (Mexico) South America and Central America (Brazil, Chile, Colombia, Venezuela) Oceania (Australia)
Medrogestone	Europe (France, Germany)

	Africa (Tunisa, Egypt)
Medroxyprogesterone acetate 150 mg/ml injection	Europe (Austria, Belgium, Bosnia, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia (withdrawn in 2017), Finland (withdrawn in 2018), France, Georgia (withdrawn in 2010), Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia (withdrawn in 2018), Malta, Monaco, Poland, Portugal, Netherlands, Norway, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom) Africa (Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Egypt, Ethiopia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe) Asia (Bangladesh, Bahrain, China (withdrawn in 2015), India, Indonesia, Iraq, Israel, Japan, Jordan, Kuwait, Lebanon, Macao, Malaysia, Mauritius, Mongolia, Myanmar, Nepal, Oman, Pakistan, Palestine, Philippines, Qatar, Russia, Saudi Arabia, Singapore (withdrawn in 2015), Sri Lanka, Taiwan, Uzbekistan (withdrawn in 2017), Vietnam, United Arab Emirates, Yemen) North America (Canada, Mexico, USA) South America and Central America (Argentina, Bahamas, Belize, Bolivia, Brazil, Chile (withdrawn in 2022), Costa Rica, Curacao, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela) Oceania (Australia, New Zealand)
Promegestone	Europe (France)
Dienogest	Europe (Austria, Belgium, Bosnia, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Poland, Portugal, Netherlands, Norway, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom) Africa (South Africa, Tunisia) Asia (Israel, Malaysia, Oman, Philippines, Russia, Singapore, Thailand) North America (Canada, USA) South America and Central America (Argentina, Brazil, Chile, Colombia, Dominican republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Peru, Uruguay) Oceania (Australia)
Levonorgestrel intra-uterine systems	Europe (Albania, Austria, Belarus, Belgium, Bosnia, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Kosovo, Hungary, Iceland, Ireland, Italy, Latvia, Lichtenstein, Lithuania, Luxembourg, Macedonia, Malta, Moldavia, Montenegro, Poland, Portugal, Netherlands, Norway, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom)

	Africa (Algeria, Botswana, Cameroun, Côte d'Ivoire, Egypt, Ethiopia, Gabon, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Morocco, Namibia, Nigeria, Rwanda, Saudi Arabia, Senegal, Sierra Leone, South Africa, Syria, Togo, Tunisia, Uganda,) Asia (Afghanistan, Azerbaijan, Bahrain, Brunei, Cambodia, China, India, Indonesia, Japan, Kazakhstan, Kirghizstan, Kuwait, Iraq, Iran, Israel, Jordan, Lebanon, Malaysia, Mongolia, Myanmar, Oman, , Palestine, Pakistan Philippines, Qatar, Russia, Singapore, South Korea, Sri Lanka, Tajikistan, Taiwan, Thailand, Turkmenistan, United Arab Emirates, Uzbekistan, Vietnam) North America (Canada, Mexico, USA) South America and Central America (Argentina, Aruba, Brazil, Chile, Colombia, Costa Rica, Cuba, Curacao, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, , Surinam, Uruguay, Venezuela) Oceania (Australia, New Zealand)

* approved, but not necessarily marketed

Sources: French National Agency for Medicines and Health Products Safety

Table B. List of procedures related to intracranial meningioma excision surgery

CCAM label/meningioma localisation	CCAM code
Anterior skull base	
Excision of a tumor from the anterior skull base, by unilateral frontal craniotomy	ACFA001
Excision of tumors from the anterior part of the skull base, by bilateral frontal craniotomy	ACFA015
Excision of tumors from the optochiasmatic and/or hypothalamic region, by craniotomy	ACFA022
Excision of tumors from the anterior skull base, by bilateral frontal craniotomy and ethmoidal approach	ACFA026
Middle of the skull base	
Excision of tumors from the middle part of the skull base, by craniotomy	ACFA011
Excision of a tumor from the tip of the rock, using a translabyrinthine approach	ACFA003
Excision of a tumor from the tip of the rock, without rerouting the facial nerve, by transpetrous approach	ACFA006
Excision of rock tip tumor, using suprapetrous approach	ACFA009
Excision of a tumor of the tip of the rock with diversion of the facial nerve, using the transpetrous approach	ACFA029
Excision of a tumor from the inner third of the middle layer of the skull involving the sphenoorbital angle, by craniotomy	ACFA013
Excision of a lesion from the orbit, by a lateral approach	BKFA001
Excision of a lesion from the orbit, by a conjunctivopalpebral approach	BKFA002
Excision of a lesion from the orbit, by a coronal approach	BKFA003
Excision of a lesion from the pituitary space (sella turcica), by a transsphenoidal approach	KAFA001
Excision of a lesion of the pituitary space (sella turcica), by craniotomy	KAFA001
Excision of a lesion of the pituitary space (sella turcica), by transsphenoidal videosurgery	KAFE900
Posterior skull base	
Excision of a tumor of the pontocerebellar angle and/or internal acoustic meatus [internal auditory canal], using a presigmoid retrolabyrinthine approach	ACFA005
Excision of a tumor from the pontocerebellar angle and/or internal acoustic meatus [internal auditory canal], using a translabyrinthine approach	ACFA007
Excision of a tumor from the pontocerebellar angle and/or internal acoustic meatus [internal auditory meatus], via the retrosigmoid infraoccipital approach	ACFA010
Excision of a tumor in the pontocerebellar angle and/or internal acoustic meatus [internal auditory canal], via supraperitoneal approach	ACFA012
Excision of a tumor from the pontocerebellar angle and/or internal acoustic meatus [internal auditory meatus], via two approaches	ACFA014
Excision of a tumor from the cerebellum tenta, by subtentorial craniotomy	ACFA008
Excision of an extraparenchymal tumor of the convexity of the cerebellum invading a dural venous sinus, by craniotomy	ACFA018
Excision of a tumor of the clivus, by craniotomy	ACFA004
Excision of a tumor of the clivus, by transoral or nasosphenoidal approach	ACFA020
Excision of a tumor from the jugular foramen, by craniotomy	ACFA023
Excision of a tumor from the foramen magnum without rerouting the vertebral artery, by craniotomy	ACFA024
Excision of a tumor from the petroclival region without rerouting the facial nerve, via transpetrous approach	ACFA016
Excision of a tumor in the petroclival region with facial nerve diversion, using a transpetrous approach	ACFA025
Excision of a tumor from the petroclival region with diversion of the facial nerve, by craniotomy	ACFA019
Excision of a tumor from the pontocerebellar angle and/or the internal acoustic meatus [internal auditory meatus], using a transotic approach	ACFA027
Convexity	
Excision of an extraparenchymal tumor of the convexity of the brain invading a dural venous sinus, by craniotomy	ACFA028
Excision of an extraparenchymal tumor of the convexity of the brain without dural venous sinus involvement, by craniotomy	ACFA002
Falx and tentorium	
Excision of a tumor from the tentorium cerebelli, by infratentorial craniotomy	ABFA008
Excision of a tumor from the notch of the tentorium, by supratentorial craniotomy	ABFA009
Excision of a falx cerebri tumor by craniotomy	ABFA010
Other sites	
Resection of a tumor in the 3rd ventricle, by craniotomy	ABFA002
Resection of a tumor in the lateral ventricle, by craniotomy	ABFA005
Resection of a tumor in the 4th ventricle, by craniotomy	ABFA006
Resection of a tumor in the 3rd ventricle, by intracranial videosurgery	ABFC001
Resection of a tumor in the lateral ventricle by intracranial video surgery	ABFC002
Decompression of the optic nerve, by craniotomy	ADPA001
Decompression of the optic nerve, by an orbital approach	ADPA020
Decompression of the optic nerve, by a transsinus approach (transethmoidal)	ADPA023
Decompression of the infraorbital nerve, by a direct approach	ADPA016
Decompression of the facial nerve, by a transmastoid approach	ADPA008
Decompression of the facial nerve, by a suprapetrous approach	ADPA011
Decompression of the facial nerve, by a transmastoid and suprapetrous approach	ADPA021

Abbreviations: CCAM, *Classification Commune des Actes Médicaux* (common classification for medical acts)

Table C. Classification of progestogens and doses involved in the study

Progesterone derivatives	Testosterone derivatives	Spironolactone derivatives
Progesterone - Progesterone (oral and intra-vaginal: 100, 200 mg; percutaneous: 25 mg) **Dydrogesterone** - Dydrogesterone (alone : 10 mg; combined with oestrogen : 5,10 mg) **17-OH-progesterone** - Hydroxyprogesterone (500 mg) - Medrogestone (5 mg) - Chlormadinone acetate (5, 10 mg) - Cyproterone acetate (50, 100 mg) - Medroxyprogesterone acetate (150 mg) - *Megestrol acetate (palliative treatment)* **19-nor-progesterone** - Nomegestrol acetate (3.75, 5 mg) - Promegestone (0.125, 0.25, 0.5 mg) - *Demegestone (not marketed)* - *Trimegestone (not marketed)* - *Nestorone (not marketed)*	**Estranes** - Dienogest (alone: not reimbursed/data not available; combined with oestrogen: 2 mg) - *Norethisterone (not reimbursed)* - *Norgestrienone (not marketed)* **Gonanes** - Levonorgestrel IUS (13.5 , 52 mg,) - *Desogestrel (not covered by the study)* - *Etonogestrel (not covered by the study)* - *Gestodene (not reimbursed)* - *Norgestimate (not reimbursed)* - *Norgestrel (not reimbursed)*	**Spironolactone** - Spironolactone (25, 50, 75 mg) ***Drospirenone*** - *Not reimbursed*

Abbreviations: IUS, intra-uterine system; mg, milligram

All names in *italics* refer to products that have not been studied for a reason specified in brackets corresponding to the situation of the drug in France

Table D. List of ATC and CIP codes for the progestogens

CIP label	CIP code	ATC class	ATC code
COLPRONE 5MG TAB 20	3130861	MEDROGESTONE	G03DB03
PROGESTOGEL 1% GEL 1	3131412	PROGESTERONE	G03DA04
UTROGESTAN 100MG CAPSULE 30	3232751	PROGESTERONE	G03DA04
ESTIMA 200MG CAPSULE 15	3567138	PROGESTERONE	G03DA04
EVAPAUSE 100MG CAPSULE GE 0	3559251	PROGESTERONE	G03DA04
ESTIMA 100MG CAPSULE 30	3521828	PROGESTERONE	G03DA04
UTROGESTAN 200MG CAPSULE 15	3483996	PROGESTERONE	G03DA04
PROGESTERONE BGA 100MG CAPSULE 30	3580498	PROGESTERONE	G03DA04
PROGESTERONE BGA 200MG CAPSULE 15	3582505	PROGESTERONE	G03DA04
PROGESTERONE RATIOPHARM 100 MG 1 BOX OF 30 CAPSULES	3436896	PROGESTERONE	G03DA04
MENAELLE 100MG CAPSULE 30	3521751	PROGESTERONE	G03DA04
PROGESTERONE SDZ 100MG CAPSULE 30	3680739	PROGESTERONE	G03DA04
ESTIMA 100MG CAPSULE 90	3741501	PROGESTERONE	G03DA04
ESTIMA 200MG CAPSULE 45	3741487	PROGESTERONE	G03DA04
PROGESTERONE TVC 100MG CAPSULE 30	3603733	PROGESTERONE	G03DA04
PROGESTERONE GNR 100MG CAPSULE 30	3613720	PROGESTERONE	G03DA04
PROGESTERONE RATIOPHARM 200 MG 1 BOX OF 15 CAPSULES	3620915	PROGESTERONE	G03DA04
PROGESTAN 100MG CAPSULE 30	3620884	PROGESTERONE	G03DA04
PROGESTAN 200MG CAPSULE 15	3620849	PROGESTERONE	G03DA04
PROGESTERONE VIATRIS 100 MG CAPSULE 30	3617899	PROGESTERONE	G03DA04
UTROGESTAN 200MG CAPSULE 45	3587684	PROGESTERONE	G03DA04
UTROGESTAN 100MG CAPSULE 60	3587678	PROGESTERONE	G03DA04
PROGESTAN 200MG CAPSULE 45	3587632	PROGESTERONE	G03DA04
PROGESTAN 100MG CAPSULE 90	3581138	PROGESTERONE	G03DA04
MENAELLE 100MG CAPSULE 90	3878602	PROGESTERONE	G03DA04
PROGESTERONE BGA 200MG CAPSULE 45	3979332	PROGESTERONE	G03DA04
PROGESTERONE SDZ 100MG CAPSULE 90	3008223	PROGESTERONE	G03DA04
PROGESTERONE VIATRIS 100 MG CAPSULE 90	3002452	PROGESTERONE	G03DA04
DUPHASTON 10MG TAB 10	3219294	DYDROGESTERONE	G03DB01
CLIMASTON 1 MG/5 MG TAB 28	3566038	DYDROGESTERONE + ESTROGEN	G03FA14
CLIMASTON 1 MG/10 MG TAB 28	3526435	DYDROGESTERONE + ESTROGEN	G03FB08
CLIMASTON 2MG/10MG TAB 28	3438524	DYDROGESTERONE + ESTROGEN	G03FB08
SAWIS 2MG TAB 28	3018636	DIENOGEST	G03DB08
DIMETRUM 2MG TAB 28	3016968	DIENOGEST	G03DB08
ENDOVELA 2MG TAB 28	3019872	DIENOGEST	G03DB08
DIMETRUM 2MG TAB 84	3021127	DIENOGEST	G03DB08
ENDOVELA 2MG TAB 84	3022086	DIENOGEST	G03DB08
SAWIS 2MG TAB 84	3021939	DIENOGEST	G03DB08
CLIMODIENE 2MG/2MG TAB 28	3576232	DIENOGEST + ESTROGEN	G03FA15
SURGESTONE 0.5MG TAB 10	3313314	PROMEGESTONE	G03DB07
SURGESTONE 0.5MG TAB 12	3364286	PROMEGESTONE	G03DB07
SURGESTONE 0.25MG TAB 10	3249183	PROMEGESTONE	G03DB07
SURGESTONE 0.125MG TAB 10	3249154	PROMEGESTONE	G03DB07
LUTENYL 5MG TAB 10	3266112	NOMEGESTROL	G03DB04
NOMEGESTROL ARW 5MG TAB 10	3869187	NOMEGESTROL	G03DB04
NOMEGESTROL TVC 5MG TAB 10	3828024	NOMEGESTROL	G03DB04
NOMEGESTROL SDZ 5MG TAB 10	3901620	NOMEGESTROL	G03DB04
NOMEGESTROL ZEN 5MG TAB 10	3869253	NOMEGESTROL	G03DB04
NOMEGESTROL BGA 5MG TAB 10	3817345	NOMEGESTROL	G03DB04
NOMEGESTROL RTP 5MG TAB 10	3832391	NOMEGESTROL	G03DB04
LUTENYL 3.75MG TAB 14	3655724	NOMEGESTROL	G03DB04
NOMEGESTROL VIATRIS 5MG TAB 10	3645370	NOMEGESTROL	G03DB04
NOMEGESTROL EG 5MG TAB 10	3817279	NOMEGESTROL	G03DB04
NAEMIS TAB 24	3584622	NOMEGESTROL + ESTROGEN	G03FB12
LUTERAN 5MG TAB 10	3063320	CHLORMADINONE	G03DB06
LUTERAN 2 MG	3063314	CHLORMADINONE	G03DB06
LUTERAN 10MG TAB 12	3394330	CHLORMADINONE	G03DB06
CHLORMADINONE TVC 10MG TAB 12	3656184	CHLORMADINONE	G03DB06
CHLORMADINONE TVC 5MG TAB 10	3652631	CHLORMADINONE	G03DB06

CHLORMADINONE SDZ 5MG TAB 10	3656014	CHLORMADINONE	G03DB06
CHLORMADINONE SANDOZ 2MG TAB 10	3652660	CHLORMADINONE	G03DB06
CHLORMADINONE VIATRIS 10MG TAB 12	3664746	CHLORMADINONE	G03DB06
CHLORMADINONE SDZ 10MG TAB 12	3664752	CHLORMADINONE	G03DB06
CHLORMADINONE SANDOZ 2MG TAB 10	3652660	CHLORMADINONE	G03DB06
CHLORMADINONE VIATRIS 10MG TAB 12	3664746	CHLORMADINONE	G03DB06
CHLORMADINONE SDZ 10MG TAB 12	3664752	CHLORMADINONE	G03DB06
CHLORMADINONE THERAMEX 5 MG TAB 10	3666774	CHLORMADINONE	G03DB06
CHLORMADINONE THERAMEX 10MG TAB 12	3664723	CHLORMADINONE	G03DB06
CHLORMADINONE MYLAN GENERIQUES 10MG TAB 12	3735216	CHLORMADINONE	G03DB06
CHLORMADINONE MYLAN GENERIQUES 5 MG 1 BOITE DE 10,	3735222	CHLORMADINONE	G03DB06
CHLORMADINONE QUALIMED 5MG TAB 10	3632858	CHLORMADINONE	G03DB06
CHLORMADINONE VIATRIS 5MG TAB 10	3632798	CHLORMADINONE	G03DB06
ANDROCUR 50MG TAB 20	3235100	CYPROTERONE	G03HA01
ANDROCUR 100MG TAB 60	3404175	CYPROTERONE	G03HA01
CYPROTERONE TVC 50MG TAB 20	3820525	CYPROTERONE	G03HA01
CYPROTERONE ARW 100MG TAB 60	3884459	CYPROTERONE	G03HA01
CYPROTERONE ARW 50MG TAB 20	3884436	CYPROTERONE	G03HA01
CYPROTERONE MYL 100MG TAB 60	3693529	CYPROTERONE	G03HA01
CYPROTERONE ZEN 50MG TAB 20	3746651	CYPROTERONE	G03HA01
CYPROTERONE TVC 100MG TAB 60	3820620	CYPROTERONE	G03HA01
CYPROTERONE BGA 100MG TAB 60	3420168	CYPROTERONE	G03HA01
CYPROTERONE ZEN 100MG TAB 60	4160752	CYPROTERONE	G03HA01
KALIALE 50 MG GE SCORED TAB 20	3668158	CYPROTERONE	G03HA01
CYPROTERONE SDZ 50MG TAB 20	3766599	CYPROTERONE	G03HA01
CYPROTERONE EG 100MG TAB 60	3694581	CYPROTERONE	G03HA01
CYPROTERONE SDZ 100MG TAB 60	3750612	CYPROTERONE	G03HA01
CYPROTERONE EG 50MG TAB 20	3626970	CYPROTERONE	G03HA01
CYPROTERONE G GAM 50MG TAB 20	3621889	CYPROTERONE	G03HA01
CYPROTERONE BGA 50MG TAB 20	3423273	CYPROTERONE	G03HA01
CYPROTERONE MYL 50MG TAB 20	3409014	CYPROTERONE	G03HA01
ERAPYL 50MG TAB 20	2675920	CYPROTERONE	G03HA01
DEPO PROVERA 150 MG INJ SUSP 1	3238699	MEDROXYPROGESTERONE	G03AC06
MIRENA 52MG IUD 1	3392928	IUD WITH PROGESTOGEN	G02BA03
LEVONORGESTREL PG 52MG IUD 1	3014875	IUD WITH PROGESTOGEN	G02BA03
KYLEENA 19.5 MG IUD 1	3009475	IUD WITH PROGESTOGEN	G02BA03
JAYDESS 13.5 MG IUD 1	2741947	IUD WITH PROGESTOGEN	G02BA03
PROGESTERONE RETARD PHARLON 250MG/1ML 3/1 ML	3086580	HYDROXYPROGESTERONE	G03DA03
PROGESTERONE RETARD PHAR 500MG INJ 3	3086597	HYDROXYPROGESTERONE	G03DA03
PROGESTERONE RETARD PHAR 500MG INJ 1	3086605	HYDROXYPROGESTERONE	G03DA03
PROGESTERONE RETARD PHARLON 250MG/1ML 1/1 ML	3086628	HYDROXYPROGESTERONE	G03DA03
ALDACTONE 75MG CPR 90	3729606	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RPG 50 MG 1 BOITE DE 90, COMPRIMES	3737152	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE EG 75MG CPR 90	3739131	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE G GAM 75 MG 1 BOITE DE 90, COMPRIME	3738910	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE SDZ 75MG CPR 30	3680834	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE PFZ 75MG CPR 90	3729687	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZEN 75MG CPR 30	3673828	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE SDZ 75MG CPR 90	3729204	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE TVC 50MG CPR 90	3729061	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RATIOPHARM 75 MG 1 BOITE DE 90, COM	3743466	SPIRONOLACTONE	C03DA01

SPIRONOLACTONE EG 50MG CPR 90	3739125	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BGA 75 MG CPR 90	3784723	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZEN 50MG CPR 30	3673805	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RPG 75 MG 1 BOITE DE 90, COMPRIMÉ	3737139	SPIRONOLACTONE	C03DA01
ALDACTONE 25MG CPR 90	3729598	SPIRONOLACTONE	C03DA01
ALDACTONE 50MG CPR 90	3723354	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RTP 50MG CPR 0	3722260	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE TVC 75MG CPR 90	3729078	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE VIATRIS 75MG CPR 90	3738338	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE PFZ 50MG CPR 90	3729670	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BGA 50 MG CPR 90	3784746	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE VIATRIS 25MG CPR 90	3974257	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ARW 50MG CPR 30	3830765	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RTP 25MG CPR 30	3967783	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE CRISTERS 75 MG 1 BOITE DE 90, COMPRIMÉ	3723271	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ACT 25MG CPR 90	3974406	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ACTAVIS 25 MG 1 BOITE DE 30, COMPRIMÉ	3974388	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE EG 25MG CPR 90	3961527	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZYD 25MG CPR 30	3967820	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BGA 25MG CPR 90	3962774	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE SDZ 50MG CPR 90	3691134	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE VIATRIS 50MG CPR 90	3690258	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE VIATRIS 50MG CPR 30	3690229	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE SDZ 50MG CPR 30	3691074	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZYDUS 75 MG 1 BOITE DE 90, COMPRIMÉ	3709147	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZYD 50MG CPR 30	3708596	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ARL 50 MG CPR 90	3696491	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ARL 50 MG CPR 30	3696485	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ARL 75 MG CPR 90	3601444	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE CRT 50MG CPR 30	3603383	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE CRISTERS 50 MG 1 BOITE DE 90, COMPRIMÉ	3603408	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RTP 25MG CPR 90	3967808	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZYDUS 50 MG 1 BOITE DE 90, COMPRIMÉ	3709104	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE SDZ 25MG CPR 90	3961680	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE SDZ 25MG CPR 30	3961674	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE CRT 25MG CPR 30	3961473	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE PFZ 25MG CPR 30	3485050	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZEN 25MG CPR 30	3967949	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ARW 25MG CPR 90	3968216	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ARW 25MG CPR 30	3968191	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE VIATRIS 25MG CPR 30	3974240	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE EG 25MG CPR 30	3961510	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BGA 25MG CPR 30	3485073	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE TVC 25MG CPR 90	3959890	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE CRT 75MG CPR 30	3709182	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZYDUS 25 MG 1 BOITE DE 90, COMPRIMÉ	3967837	SPIRONOLACTONE	C03DA01

SPIRONOLACTONE ARW 50MG CPR 90	3736457	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ARL 75 MG CPR 30	3601438	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE PFZ 25MG CPR 90	3962797	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZYD 75MG CPR 30	3709124	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE TVC 25MG CPR 30	3959884	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ARW 75MG CPR 90	3739705	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE VIATRIS 25MG CPR 30	3021159	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BGA 25MG CPR 30	3013649	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZEN 50MG CPR 90	3787495	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BGA 50 MG CPR 30	3013650	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZEN 75MG CPR 90	3787503	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ZEN 25MG CPR 90	3967955	SPIRONOLACTONE	C03DA01
ALDACTONE 75MG CPR 20	3260799	SPIRONOLACTONE	C03DA01
ALDACTONE 50MG CPR 20	3272503	SPIRONOLACTONE	C03DA01
PRACTON 50MG CPR GE 20	3237671	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RATIOPHARM 50MG CPR 20	3262574	SPIRONOLACTONE	C03DA01
SPIROCTAN MICRONISE 50MG GELULE 20	3245618	SPIRONOLACTONE	C03DA01
SPIROCTAN MICRONISE 75MG GELULE 20	3265124	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE EG 50MG CPR 20	3403170	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE GNR 75MG CPR 30	3496786	SPIRONOLACTONE	C03DA01
SPIROPHAR 50MG CPR Gé 20	3403193	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BAYER 75MG CPR 30	3467336	SPIRONOLACTONE	C03DA01
FLUMACH 75MG CPR 30	3360288	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE GNR 75MG CPR 20	3432042	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE PFZ 50MG CPR 30	3467052	SPIRONOLACTONE	C03DA01
ALDACTONE 25MG CPR 30	3446630	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE EG 50MG CPR 30	3506059	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE TVC 50MG CPR 30	3611626	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE EG 75MG CPR 30	3526843	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RPG 75MG CPR 20	3401455	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE GNR 50MG CPR 30	3567517	SPIRONOLACTONE	C03DA01
SPIROPHAR 75MG CPR Gé 20	3403201	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE PFZ 75MG CPR 30	3431806	SPIRONOLACTONE	C03DA01
PRACTON 75 MG Gé CPR 20	3403187	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE MSD 50MG CPR 20	3392012	SPIRONOLACTONE	C03DA01
FLUMACH 50MG CPR 30	3359635	SPIRONOLACTONE	C03DA01
ALDACTONE 50MG CPR 30	3512539	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE TVC 75MG CPR 30	3611632	SPIRONOLACTONE	C03DA01
SPIROCTAN 75MG GELULE 30	3522408	SPIRONOLACTONE	C03DA01
SPIROCTAN 50MG GELULE 30	3522383	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE IVAX 75MG CPR 30	3604046	SPIRONOLACTONE	C03DA01
SPIROPHAR 75MG CPR Gé 30	3496941	SPIRONOLACTONE	C03DA01
SPIROPHAR 50MG CPR Gé 30	3496935	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BIOGARAN 75MG CPR 20	3479262	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BIOGARAN 50MG CPR 20	3479256	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE VIATRIS 75MG CPR 30	3496817	SPIRONOLACTONE	C03DA01

SPIRONOLACTONE BGA 75 MG CPR 30	3484748	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE IREX 50MG CPR 30	3570749	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE MYLAN 75MG CPR 20	3430959	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE MSD 50MG CPR 30	3409787	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RTP 75MG CPR 30	3484961	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE GNR 50MG CAPSULE 20	3248982	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE MSD 75MG CPR 20	3392029	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE G GAM 75 MG 1 BOITE DE 30, CONDITIONNEMENT	3481885	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BGA 50 MG CPR 30	3496591	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE GNR 50MG CAPSULE 30	3248999	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RTP 50MG CPR 30	3506065	SPIRONOLACTONE	C03DA01
SPIRONONE 75 MG (SPIRONOLACTONE MICROFINE) 30, 42	3506042	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RPG 50MG CPR 30	3506013	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE BAYER 50MG CPR 30	3467307	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE IREX 75MG CPR 30	3570726	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE IVAX 50MG CPR 30	3604052	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RPG 75MG CPR 30	3496958	SPIRONOLACTONE	C03DA01
ALDACTONE 75MG CPR 30	3512545	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE ARW 75MG CPR 30	3605784	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE MSD 75MG CPR 30	3409770	SPIRONOLACTONE	C03DA01
SPIRONONE 75MG CPR Gé 20	3260836	SPIRONOLACTONE	C03DA01
SPIRONOLACTONE RPG 50MG CPR 20	3401449	SPIRONOLACTONE	C03DA01

Abbreviations: ATC, WHO Anatomical, Therapeutic, and Chemical classification; CIP, *Code Identifiant de Présentation* (code describing the presentation and packaging of a medicine)

Table E. WHO classification of intracranial meningiomas

WHO grade	Title	Morphological codes	ICD-10 codes used in this study to identify grades
Grade I - Benign	Meningothelial	9530/0	D32
	Fibrous (fibroblastic)	9531/0	
	Transitional (mixed)	9532/0	
	Psammomatous	9537/0	
	Angiomatous	9533/0	
	Microcystic	9534/0	
	Secretory	9530/0	
	Lymphoplasmacyte-rich	9530/0	
Grade II - Atypical	Choroid	9538/1	D42
	Clear cell	9538/1	
	Atypical	9539/1	
Grade II – Malignant	Papillary	9538/3	C70
	Rhabdoid	9538/3	
	Anaplastic	9530/3	

Abbreviations: ICD-10, 10th version of the International Classification of Diseases

Table F. CIM-10 and CCAM codes used to identify radiotherapy procedures

ICD-10 codes were sought for the main or linked diagnoses in the PMSI Medicine-Surgery-Obstetrics data.

CCAM codes were sought in the PMSI and reimbursement data. It should be noted that radiotherapy does not lie within the scope of the PMSI, but the information concerning this treatment is entered into the SNDS via the reimbursement data.

ICD-10 code	ICD-10 label
Z510	Radiotherapy session
Z5100	Preparation session for irradiation
Z5101	Irradiation session

Codes after May 2020:

CCAM code	CCAM label
ZZMK014	Preparation for external irradiation without dosimetry, with simulation under the treatment device
ZZMK002	Preparation for external irradiation without dosimetry, with simulation using a simulator, a simulator-scanner, or a scanner with integrated simulator function
ZZMK013	Preparation for external irradiation without dosimetry, with simulation using a simulator, a simulator-scanograph, or scanner with integrated simulator function and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK026	Preparation for external irradiation with localization by simulator-scanograph, two-dimensional dosimetry, and simulation with a simulator-scanograph
ZZMK028	Preparation for external irradiation with localization by simulator-scanograph, two-dimensional dosimetry, simulation with a simulator-scanograph, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK001	Preparation for external irradiation with scanner tracking, two-dimensional dosimetry, and simulation with a simulator or scanner with integrated simulator function
ZZMK017	Preparation for external irradiation with localization by scanner, two-dimensional dosimetry, simulation with a simulator or scanner with integrated simulator function, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK016	Preparation for external irradiation with localization by scanner, three-dimensional dosimetry without HDV, simulation with a simulator or scanner with integrated simulator function, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK011	Preparation for external irradiation with localization by scanner, three-dimensional dosimetry without HDV, virtual simulation with the "source view" function [beam eye view] [BEV] and three-dimensional restitution, and custom manufacture of a personalized mask and/or parameterization of a multi-blade collimator
ZZMK018	Preparation for external irradiation with scanner tracking, three-dimensional dosimetry with HDV, virtual simulation with beam eye view [BEV] and three-dimensional rendering, and custom manufacture of a compensating filter or personalized mask and/or configuration of a multi-leaf collimator
ZZMK024	Preparation for external irradiation with localization by scanner, three-dimensional dosimetry with HDV, virtual simulation with the "source view" function [beam eye view] [BEV] and three-dimensional restitution, and configuration of a multi-blade collimator for intensity modulation
ZZMP001	Preparation for whole-body irradiation
QZMP003	Preparation for total skin irradiation
AGMP001	Preparation for external nerve irradiation [craniospinal irradiation]
ZZMP018	Preparation for intracavitary contact radiotherapy
ZZMP012	Preparation for intracranial irradiation under stereotaxic conditions in a single dose, with placement of an invasive frame
ZZMP016	Preparation for external irradiation under stereotactic conditions without synchronization, with respiration, with three-dimensional dosimetry with HDV after tracking by multimodal digital fusion and virtual simulation with the "source view" function [beam eye view] [BEV] and three-dimensional restitution
ZZMP013	Preparation for external irradiation under stereotactic conditions with synchronization, with respiration, with three-dimensional dosimetry with HDV after tracking by multimodal digital fusion and virtual simulation with the "source view" function [beam eye view] [BEV] and three-dimensional restitution
ZZMK019	Resumption of preparation for external irradiation without dosimetry, with simulation under the treatment device
ZZMK027	Resumption of preparation for external irradiation, two-dimensional dosimetry, simulation with a simulator, a simulator-scanner or a scanner with an integrated simulator function, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator

ZZMK022	Resumption of preparation for external irradiation with localization by scanner, three-dimensional dosimetry without HDV, simulation with a simulator or a scanner with integrated simulator function, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK020	Resumption of preparation for external irradiation with scanner tracking, three-dimensional dosimetry with HDV, virtual simulation with the "source view" function [beam eye view] [BEV] and three-dimensional restitution, and custom manufacture of a personalized compensating filter or personalized mask and/or configuration of a multi-blade collimator
ZZMK025	Resumption of preparation for external irradiation with localization by scanner, three-dimensional dosimetry with HDV, virtual simulation with the function "source view" [beam eye view] [BEV] and three-dimensional restitution, and configuration of a multi-blade collimator for intensity modulation

Codes before May 2010:

CCAM code	CCAM label
ZZMK014	Preparation for external irradiation without dosimetry, with simulation under the treatment device
ZZMK002	Preparation for external irradiation without dosimetry, with simulation with a simulator, a simulator-scanner, or a scanner with integrated simulator function
ZZMK013	Preparation for external irradiation without dosimetry, with simulation with a simulator, a simulator-scanograph, or a scanner with integrated simulator function and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK006	Preparation for external irradiation with identification by conformer, two-dimensional dosimetry on 1 or 2 slices, and simulation with a simulator, simulator-scanner, or scanner with integrated simulator function
ZZMK012	Preparation for external irradiation with identification by conformer, two-dimensional dosimetry on 1 or 2 slices, simulation with a simulator, simulator-scanograph, or scanner with integrated simulator function, and custom manufacture of a personalized mask and /or configuration of a multi-blade collimator
ZZMK010	Preparation for external irradiation with identification by conformer, two-dimensional dosimetry on 3 or more slices and simulation with a simulator, simulator-scanner, or scanner with integrated simulator function
ZZMK004	Preparation for external irradiation with identification by conformer, two-dimensional dosimetry on 3 or more slices, simulation with a simulator, simulator-scanograph, or scanner with integrated simulator function, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK015	Preparation for external irradiation with tracking by conformer and analysis of data acquired by ultrasound, two-dimensional dosimetry on 3 or more slices, and simulation with a simulator, simulator-scanograph, or scanner with integrated simulator function
ZZMK005	Preparation for external irradiation with tracking by conformer and analysis of data acquired by ultrasound, two-dimensional dosimetry on 3 or more slices, simulation with a simulator, simulator-scanograph, or scanner with integrated simulator function, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK003	Preparation for external irradiation with identification by simulator-scanograph, two-dimensional dosimetry on 3 or more slices, and simulation with a simulator-scanograph
ZZMK007	Preparation for external irradiation with identification by simulator-scanograph, two-dimensional dosimetry on 3 or more slices, simulation with a simulator-scanograph, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK001	Preparation for external irradiation with localization by scanner, two-dimensional dosimetry on 3 or more slices, and simulation with a simulator or a scanner with integrated simulator function
ZZMK017	Preparation for external irradiation with localization by scanner, two-dimensional dosimetry on 3 or more slices, simulation with a simulator or a scanner with integrated simulator function, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK016	Preparation for external irradiation with localization by scanner, three-dimensional dosimetry without HDV, simulation with a simulator or a scanner with integrated simulator function, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK011	Preparation for external irradiation with localization by scanner, three-dimensional dosimetry without HDV, virtual simulation with the "source view" function [beam eye view] [BEV] and three-dimensional restitution, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMP008	Preparation for external irradiation with three-dimensional dosimetry without HDV after localization by renography [MRI], virtual simulation with the "source view" function [beam eye view] [BEV] and three-dimensional restitution, and custom manufacture of a personalized mask and/or or configuration of a multi-blade collimator
ZZMK018	Preparation for external irradiation with scanner tracking, three-dimensional dosimetry with HDV, virtual simulation with beam eye view [BEV] and three-dimensional rendering, and custom manufacture of a compensating filter or personalized mask and/or configuration of a multi-blade collimator

ZZMK900	Preparation for external irradiation with localization by scanner, three-dimensional dosimetry with HDV, virtual simulation with the "source view" [beam eye view] [BEV] function and three-dimensional restitution, and configuration of a multi-blade collimator for dynamic use
ZZMP010	Preparation for external irradiation with three-dimensional dosimetry with HDV after localization by renography [MRI], virtual simulation using the "source view" function [beam's eye view] [BEV] and three-dimensional restitution, and manufacture of a personalized compensating filter or personalized custom mask and/or configuration of multi-blade collimator
ZZMP900	Preparation for external irradiation with three-dimensional dosimetry with HDV after localization by renography [MRI], virtual simulation with the "source view" function [beam eye view] [BEV] and three-dimensional restitution, and configuration of a multi-blade collimator for dynamic use
ZZMP001	Preparing for whole-body irradiation
ZZMP012	Preparation for brain irradiation under single-dose stereotactic conditions
ZZMP011	Preparation for brain irradiation under stereotactic conditions with a fractionated-dose
QZMP003	Preparation for fractionated-dose total skin irradiation
AZMP001	Preparation for external nerve irradiation [craniospinal irradiation]
ZZMK019	Resumption of preparation for external irradiation without dosimetry, with simulation under the treatment device
ZZMK021	Resumption of preparation for external irradiation with identification by conformer, two-dimensional dosimetry on 1 or 2 slices, simulation with a simulator, simulator-scanograph, or scanner with integrated simulator function, and custom manufacture of a personalized mask and/or parametrization of a multi-blade collimator
ZZMK023	Resumption of preparation for external irradiation with identification by conformer and analysis of data acquired by ultrasound, two-dimensional dosimetry on 3 or more slices, simulation with a simulator, simulator-scanograph, or a scanner with integrated simulator function, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK022	Resumption of preparation for external irradiation with localization by scanner, three-dimensional dosimetry without HDV, simulation with a simulator or a scanner with integrated simulator function, and custom manufacture of a personalized mask and/or configuration of a multi-blade collimator
ZZMK020	Resumption of preparation for external irradiation with scanner tracking, three-dimensional dosimetry with HDV, virtual simulation with the "source view" function [beam eye view] [BEV] and three-dimensional restitution, and custom manufacture of a personalized compensating filter or personalized mask and/or configuration of a multi-blade collimator

Abbreviations: CCAM, *Classification Commune des Actes Médicaux* (common classification for medical acts); ICD-10, 10th version of the International Classification of Diseases; PMSI, *Programme de Médicalisation des Systèmes dInformation* (information systems medicalisation program); SNDS, *Système National des Données de Santé* (French national healthcare database)

Table G. List of ATC codes used to identify antiepileptic drugs

ATC code	ATC class
N03AA	BARBITURATES AND DERIVATIVES
N03AA02	PHENOBARBITAL
N03AA03	PRIMIDONE
N03AB02	PHENYTOIN
N03AD01	ETHOSUXIMIDE
N03AE01	CLONAZEPAM
N03AF01	CARBAMAZEPINE
N03AF02	OXCARBAZEPINE
N03AF03	RUFINAMIDE
N03AF04	ESLICARBAZEPINE
N03AG01	VALPROIC ACID
N03AG02	VALPROMIDE
N03AG04	VIGABATRIN
N03AG05	PROGABIDE
N03AG06	TIAGABINE
N03AX09	LAMOTRIGINE
N03AX11	TOPIRAMATE
N03AX12	GABAPENTIN
N03AX14	LEVETIRACETAM
N03AX15	ZONISAMIDE
N03AX17	STIRIPENTOL
N03AX18	LACOSAMIDE
N03AX21	RETIGABINE
N03AX22	PERAMPANEL
N03AX23	BRIVARACETAM
N03AX24	CANNABIDIOL
N02BF01	GABAPENTIN
N02BF02	PREGABALINE
N05CD08	MIDAZOLAM
N05BA01	DIAZEPAM

Abbreviations: ATC, WHO Anatomical, Therapeutic, and Chemical classification

Table H. List of LPP codes for copper intrauterine devices

LPP label	LPP code
CONTRACEPTIVE OBJECT, COPPER IUD WITH INSERTER.	1158536
CONTRACEPTIVE OBJECT, COPPER IUD WITH INSERTER, LABO 7 MED	6186566
CONTRACEPTIVE OBJECT, COPPER IUD WITH INSERTER, LABO GYNEAS	6186572
CONTRACEPTIVE OBJECT, COPPER IUD WITH INSERTER, HRA PHARMA	6172819
CONTRACEPTIVE OBJECT, COPPER IUD WITH INSERTER, LABORATOIRE CCD	6184840
CONTRACEPTIVE OBJECT, COPPER IUD WITH INSERTER, EUROMEDIAL	1135890
CONTRACEPTIVE OBJECT, COPPER IUD WITH INSERTER, CEMAG CARE	1173062
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, CONTREL, GYNEFIX	1187615
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, MONA LISA NV, MONA LISA CUT-380A	1106752
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, MONA LISA NV, MONA LISA CU375-RO	1121125
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, MONA LISA NV, MONA LISA CU375 SL RO	1171407
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, MONA LISA NV, MONA LISA NT CU380	1132519
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, MULTILAN, CU 250 STANDARD	1111760
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, MULTILAN, CU 250 SHORT	1167363
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, MULTILAN, CU 375 STANDARD	1152960
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, MULTILAN, CU 375 SL	1101938
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, PRODIMED, GYNELLE 375	1134760
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, 7 MED, UT N 380 STANDARD	1128370
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, 7 MED, UT S 380 SHORT	1122283
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, 7 MED, TT 380	1103848
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, 7 MED, NT 380, SHORT OU STANDARD	1120717
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, SHERING SA, NOVA T	1132531
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, SHERING SA, NOVA T 380	1146770
CONTRACEPTIVE OBJECT, IUD WITH INSERTER, THERAMEX, SERTALIA	1125749

Abbreviations: LPP, *Liste des Produits et Prestations* (list of products and services)

Table I. Description of cases and controls for the analyses of 52 mg levonorgestrel and copper intrauterine devices (inclusion period restricted to 2011-2018)

Characteristics	Cases *N* = 15,162 *n* (%)	Controls *N* = 75,810 *n* (%)
Age (years) at inclusion		
Mean age [standard deviation]	57.8 [12.9]	57.8 [12.9]
≤ 19	44 (0.3%)	220 (0.3%)
20-34	440 (2.9%)	2,200 (2.9%)
35-44	1,801 (11.9%)	9,005 (11.9%)
45-54	4,042 (26.7%)	20,210 (26.7%)
55-64	3,904 (25.7%)	19,520 (25.7%)
65-74	3,341 (22.0%)	16,705 (22.0%)
75-84	1,434 (9.5%)	7,170 (9.5%)
≥ 85	156 (1.0%)	780 (1.0%)
Region of residence*		
Paris Ile-de-France	2,676 (17.6%)	13,380 (17.6%)
North East	2,900 (19.1%)	14,500 (19.1%)
North West	3,009 (19.8%)	15,045 (19.8%)
South East	3,409 (22.5%)	17,045 (22.5%)
South West	2,886 (19.0%)	14,430 (19.0%)
DOM	282 (1.9%)	1,410 (1.9%)
Year of surgery for meningioma		
2011	1,711 (11.3%)	N/A
2012	1,774 (11.7%)	N/A
2013	1,783 (11.8%)	N/A
2014	1,910 (12.6%)	N/A
2015	1,928 (12.7%)	N/A
2016	2,008 (13.2%)	N/A
2017	1,979 (13.1%)	N/A
2018	2,069 (13.6%)	N/A
Location of the meningioma †		
Anterior base of the skull	3,356 (22.1%)	N/A
Mid-base of the skull	3,266 (21.5%)	N/A
Posterior base of the skull	1,792 (11.8%)	N/A
Convexity	5,458 (36.0%)	N/A
Falx cerebri and tentorium cerebelli	1,635 (10.8%)	N/A
Other	221 (1.5%)	N/A
Grade of the meningioma		
Benign	14,029 (92.5%)	N/A
Atypical	823 (5.4%)	N/A
Malignant	310 (2.0%)	N/A
Adjuvant radiotherapy		
All grades	716 (4.7%)	N/A
Benign	584 (4.2%)	N/A
Atypical	51 (6.2%)	N/A

Malignant	81 (26.1%)	N/A
Use of antiepileptic drugs 3 years later		
All grades	4,279 (28.2%)	4,482 (5.9%)
Benign	3,905 (27.8%)	N/A
Atypical	255 (31.0%)	N/A
Malignant	119 (38.4%)	N/A
2-year mortality		
All grades	486 (3.2%)	964 (1.3%)
Benign	406 (2.9%)	N/A
Atypical	38 (4.6%)	N/A
Malignant	42 (13.5%)	N/A
5-year mortality ‡		
All grades	862 (6.6%)	2,295 (3.5%)
Benign	729 (6.0%)	N/A
Atypical	65 (9.5%)	N/A
Malignant	68 (25.2%)	N/A

Abbreviations: DOM, *département d'outre-mer* (overseas *département*); N/A, not applicable

*North East: Grand-Est, Bourgogne Franche-Comté, Hauts-de-France. Paris Ile-de-France: city of Paris and Ile-de-France. North West: Bretagne, Centre Val de Loire, Normandie, Pays de la Loire. South East: Auvergne-Rhône-Alpes, Provence-Alpes-Côte d'Azur, Corse. South East: Nouvelle-Aquitaine, Occitanie. DOM: Guadeloupe, Martinique, Guyane, la Réunion

†Tumours may occur at multiple sites in the same individual

‡ Restricted inclusion period: 2008-2017

Table J. Description of cases and controls for analyses of levonorgestrel 13.5 mg intrauterine devices (inclusion period restricted to 2017-2018)

Characteristics	Cases *N* = 4,048 *n* (%)	Controls *N* = 20,240 *n* (%)
Age (years) at inclusion		
Mean age [standard deviation]	58.4 [13.1]	58.4 [13.1]
≤ 19	14 (0.3%)	70 (0.3%)
20-34	105 (2.6%)	525 (2.6%)
35-44	459 (11.3%)	2,295 (11.3%)
45-54	1,040 (25.7%)	5,200 (25.7%)
55-64	1,000 (24.7%)	5,000 (24.7%)
65-74	976 (24.1%)	4,880 (24.1%)
75-84	407 (10.1%)	2,035 (10.1%)
≥ 85	47 (1.2%)	235 (1.2%)
Region of residence*		
Paris Ile-de-France	705 (17.4%)	3,525 (17.4%)
North East	797 (19.7%)	3,985 (19.7%)
North West	819 (20.2%)	4,095 (20.2%)
South East	887 (21.9%)	4,435 (21.9%)
South West	752 (18.6%)	3,760 (18.6%)
DOM	88 (2.2%)	440 (2.2%)
Year of surgery for meningioma		
2017	1,979 (48.9%)	N/A
2018	2,069 (51.1%)	N/A
Location of the meningioma†		
Anterior base of the skull	948 (23.4%)	N/A
Mid-base of the skull	851 (21.0%)	N/A
Posterior base of the skull	503 (12.4%)	N/A
Convexity	1,436 (35.5%)	N/A
Falx cerebri and tentorium cerebelli	413 (10.2%)	N/A
Other	46 (1.1%)	N/A
Grade of the meningioma		
Benign	3,737 (92.3%)	N/A
Atypical	219 (5.4%)	N/A
Malignant	92 (2.3%)	N/A
Adjuvant radiotherapy		
All grades	211 (5.2%)	N/A
Benign	173 (4.6%)	N/A
Atypical	16 (7.3%)	N/A
Malignant	22 (23.9%)	N/A
Use of antiepileptic drugs 3 years later		
All grades	1,098 (27.1%)	1,243 (6.1%)
Benign	999 (26.7%)	N/A
Atypical	62 (28.3%)	N/A
Malignant	37 (40.2%)	N/A

2-year mortality		
All grades	144 (3.6%)	270 (1.3%)
Benign	125 (3.3%)	N/A
Atypical	10 (4.6%)	N/A
Malignant	9 (9.8%)	N/A
5-year mortality‡		
All grades	139 (7.0%)	355 (3.6%)
Benign	116 (6.3%)	N/A
Atypical	9 (11.0%)	N/A
Malignant	14 (26.9%)	N/A

Abbreviations: DOM, *département d'outre-mer* (overseas *département*); N/A, not applicable

*North East: Grand-Est, Bourgogne Franche-Comté, Hauts-de-France. Paris Ile-de-France: city of Paris and Ile-de-France. North West: Bretagne, Centre Val de Loire, Normandie, Pays de la Loire. South East: Auvergne-Rhône-Alpes, Provence-Alpes-Côte d'Azur, Corse. South East: Nouvelle-Aquitaine, Occitanie. DOM: Guadeloupe, Martinique, Guyane, la Réunion

†Tumors may occur at multiple sites in the same individual

‡ Restricted inclusion period:2008-2017

Table K. Cumulative dose exposure for each progestogen in cases and controls

	Cumulative dose Median (Q3) (mg)*	
Progestogen	**Cases**	**Controls**
Progesterone (oral/vaginal)	27,000 (93,000)	30,054 (99,000)
Progesterone (percutaneous)	30,800 (7,760)	7,800 (106,200)
Dydrogesterone	1,500 (11,160)	904 (6,280)
Hydroxyprogesterone	N/A	6,000 (6,750)
Medrogestone	8,350 (21,157.5)	2,600 (9,950)
Medroxyprogesterone acetate	3,609 (5,100)	1,575 (2,951)
Promegestone	200.4 (1,322)	129.5 (679)
Spironolactone	9,000 (45,000)	9,750 (47,250)
Chlormadinone acetate	9,000 (18,810)	1,720 (7,800)
Nomegestrol acetate	4,750 (9,450)	600 (2,417.5)
Cyproterone acetate	56,000 (87,000)	12,200 (35,000)

Abbreviations: mg, milligram

*from 2006 on, according to the Define Daily Dose (DDD)

Table L. Duration of exposure to medrogestone, medroxyprogesterone acetate, promegestone, chlormadinone acetate, nomegestrol acetate and cyproterone acetate in exposed cases (N = 18,061) and controls (N=90,305)

	Duration of observed exposure* (years)	Cases		Controls	
		N	%	N	%
Medrogestone	< 1	2	4.8	16	20.3
	[1; 2[	1	2.4	6	7.6
	[2; 3[	0	0.0	8	11.4
	≥ 3	39	92.8	49	62.0
	All	*42*	*100.0*	*79*	*100.0*
Medroxyprogesterone acetate	< 1	1	11.1	1	9.1
	[1; 2[	0	0.0	1	9.1
	[2; 3[	1	11.1	3	27.3
	≥ 3	7	77.8	6	54.5
	All	*9*	*100.0*	*11*	*100.0*
Promegestone	< 1	17	20.5	73	32.4
	[1; 2[	9	10.8	29	12.9
	[2; 3[	3	3.6	10	4.0
	≥ 3	54	65.1	114	50.7
	All	*83*	*100.0*	*225*	*100.0*
Chlormadinone acetate	< 1	*101*	*16.1*	*392*	*41.3*
	[1; 2[	*58*	*9.2*	*148*	*15.6*
	[2; 3[	*53*	*8.4*	*81*	*8.6*
	≥ 3	*416*	*66.2*	*325*	*34.5*
	All	*628*	*100.0*	*946*	*100.0*
Nomegestrol acetate	<1	*106*	*11.5*	*471*	*42.0*
	[1; 2[	*65*	*7.0*	*186*	*16.6*
	[2; 3[	*52*	*5.6*	*105*	*9.4*
	≥3	*702*	*75.9*	*359*	*32.0*
	All	*925*	*100.0*	*1,121*	*100.0*
Cyproterone acetate	< 1	*25*	*2.8*	*58*	*22.6*
	[1; 2[	*28*	*3.1*	*29*	*11.3*
	[2; 3[	*36*	*4.0*	*17*	*6.6*
	≥ 3	*802*	*90.1*	*152*	*59.3*
	All	*891*	*100.0*	*256*	*100.0*

*≥ 1 year and < 2 years" for example: at least one dispensation issued between d-1 and d-365 and at least one dispensation between d-366 and d-730 and no prescription issued between d-731 and d-1,095 (use in years y-1 and y-2 and no use in year y-3).

Table M. Association between exposure to medrogestone, medroxyprogesterone acetate, and promegestone and risk of surgically treated intracranial meningioma: analyses by age group, location, and severity grade

		TOTAL		Medrogestone (current exposure)			Medroxyprogesterone (current exposure)			Promegestone (current xposure)		
		Cases	Controls	Within cases	Within controls		Within cases	Within controls		Within cases	Within controls	
		N	N	n (%)	n(%)	OR (CI 95)*	n (%)	n (%)	OR (CI 95)*	n (%)	n (%)	OR (CI 95)*
	ALL N(%)	18,061	90,305	42 (0.2%)	79 (0.1%)	3.49 (2.38 to 5.10)	9 (0.0%)	11 (0.0%)	5.55 (2.27 to 13.56)	83 (0.5%)	225 (0.2%)	2.39 (1.85 to 3.09)
Analyses in	**Age (years)**											
	< 35	587	2,935	0	2 (0.1%)	N/A	1 (0.2%)	1 (0.0%)	N/A	0	2 (0.1%)	N/A
	35 to 44	2,181	10,905	3 (0.1%)	12 (0.1%)	N/A	2 (0.1%)	3 (0.0%)	N/A	10 (0.5%)	35 (0.3%)	1.88 (0.92 to 3.83)
	45 to 54	4,830	24,150	25 (0.5%)	40 (0.2%)	4.53 (2.73 to 7.53)	5 (0.1%)	6 (0.0%)	N/A	49 (1.0%)	135 (0.6%)	2.52 (1.81 to 3.51)
	55 to 64	4,760	23,800	9 (0.2%)	15 (0.1%)	3.56 (1.56 to 8.33)	1 (0.0%)	1 (0.0%)	N/A	15 (0.3%)	39 (0.2%)	2.10 (1.15 to 3.82)
	≥ 65	5,703	28,515	5 (0.1%)	10 (0.0%)	N/A	0	0	N/A	9 (0.2%)	14 (0.0%)	3.21 (1.39 to 7.43)
Analyses with refined events	**Anatomical location**											
	Anterior skull base	3,979	19,895	6 (0.1%)	17 (0.1%)	2.64 (1.02 to 6.82)	2 (0.1%)	3 (0.0%)	N/A	25 (0.6%)	56 (0.3%)	3.15 (1.95 to 5 .10)
	Middle skull base	3,911	19,555	13 (0.3%)	13 (0.1%)	8.30 (3.70 to 18.63)	4 (0.1%)	2 (0.0%)	N/A	22 (0.6%)	56 (0.3%)	3.03 (1.82 to 5.02)
	Posterior skull base	2,156	10,780	2 (0.1%)	8 (0.1%)	N/A	0	1 (0.0%)	N/A	9 (0.4%)	28 (0.3%)	1.80 (0.85 to 3.82)
	Convexity	6,468	32,340	19 (0.3%)	34 (0.1%)	3.55 (2.00 to 6.28)	1 (0%)	5 (0.0%)	N/A	25 (0.4%)	78 (0.2%)	1.96 (1.24 to 3.09)
	Falx and tentorium	1,963	9,815	2 (0.1%)	9 (0.1%)	N/A	3 (0.2%)	0	N/A	3 (0.2%)	10 (0.1%)	N/A
	Severity											
	Benign	16,662	83,310	37 (0.2%)	68 (0.1%)	3.57 (2.37 to 5.37)	9 (0.1%)	10 (0.0%)	6.21 (2.50 to 15.48)	81 (0.5%)	215 (0.3%)	2.43 (1.87 to 3.15)
	Atypical	1,047	5,235	5 (0.5%)	10 (0.2%)	N/A	0	1 (0.0%)	N/A	2 (0.2%)	9 (0.2%)	N/A
	Malignant	352	1,760	0	1 (0.1%)	N/A	0	0	N/A	0	1 (0.1%)	N/A

Abbreviations: CI 95, 95% confidence interval; N/A, Not Applicable; OR, odds ratio

Percentages for cases were calculated relative to the total number of cases in the analysis considered (e.g., for the 45-54 age group: relative to N=4,830). Same for controls.

Current exposure: at least one dispensation in the year prior to the index date and no exposure to chlormadinone, nomegestrol and cyproterone acetate in the 3 years prior to the index date.

Reading example 1 (analysis for women aged 45 to 54): 25 (0.5%) of the 4830 women who underwent surgery for meningioma were exposed to medrogestone; 40 (0.2%) of the 24,150 control women were exposed to medrogestone; the estimated OR for the risk of surgically treated meningioma following exposure to medrogestone versus no exposure was 4.53.

Reading example 2 (analysis of the risk of surgically treated meningioma in the mid-skull base): 13 (0.3%) of the 3,911 women with mid-skull base meningioma requiring surgery were exposed to medrogestone; 13 (0.1%) of the 19,555 control women were exposed to medrogestone; the estimated OR for the risk of meningioma in the mid-skull base requiring surgery following exposure to medrogestone versus no exposure was 8.30.

*Odds ratios involving less than 6 exposed cases are not shown.

Table N. Association between exposure to chlormadinone acetate, nomegestrol acetate, and cyproterone acetate and the risk of surgically treated intracranial meningioma : analyses by age group, location, and grade of severity

		Total number for the analysis		Chlormadinone acetate (current exposure)			Nomegestrol acetate (current exposure)			Cyproterone acetate (current exposure)		
		Cases	Controls	Within cases	Within controls		Within cases	Within controls		Witin cases	Within controls	
		N	*N*	*n* (%)	*n*(%)	OR [95% CI]*	*n* (%)	*n* (%)	OR 95% CI]*	*n*(%)	*n*(%)	OR [95% CI]*
	All *N* (%)	18 061	90 305	628 (3.5%)	946 (1.1%)	3.87 [3.48 to 4.30]	925 (5.1%)	1121 (1.2%)	4.93 [4.50 to 5.41]	891 (4.9%)	256 (0.3%)	19.21 [16.61 to 22.22]
	Age (years)											
Analyses in subgroups	< 35	587	2,935	9 (1.5%)	22 (0.7%)	2.19 [1.00 to 4.77]	14 (2.4%)	28 (1.0%)	2.71 [1.42 to 5.20]	62 (10.6%)	27 (0.9%)	13.03 [8.06 to 21.04]
	35-44	2,181	10,905	111 (5.1%)	231 (2.1%)	2.87 [2.27 to 3.63]	143 (6.6%)	208 (1.9%)	4.03 [3.23 to 5.03]	242 (11.1%)	59 (0.5%)	23.29 [17.22 to 31.51]
	45-54	4,830	24,150	428 (8.9%)	598 (2.5%)	4.27 [3.74 to 4.87]	556 (11.5%)	741 (3.1%)	4.60 [4.09 to 5.18]	371 (7.7%)	122 (0.5%)	16.84 [13.59 to 20.87]
	55-64	4,760	23,800	74 (1.6%)	80 (0.3%)	4.76 [3.46 to 6.55]	164 (3.4%)	122 (0.5%)	7.57 [5.94 to 9.66]	148 (3.1%)	33 (0.1%)	23.69 [16.08 to 34.90]
	≥ 65	5,703	28,515	6 (0.1%)	15 (0.1%)	2.00 [0.78 to 5.15]	48 (0.8%)	22 (0.1%)	10.91 [6.59 to 18.07]	68 (1.2%)	15 (0.1%)	22.67 [12.96 to 39.65]
	Anatomical location											
Analyses with refined events	Anterior base of the skull	3,979	19,895	149 (3.7%)	239 (1.2%)	3.78 [3.05 to 4.70]	281 (7.1%)	288 (1.4%)	6.41 [5.35 to 7.67]	335 (8.4%)	53 (0.3%)	35.28 [25.99 to 47.88]
	Mid-base of the skull	3,911	19,555	233 (6.0%)	252 (1.3%)	5.81 [4.80 to 7.04]	310 (7.9%)	279 (1.4%)	7.35 [6.15 to 8.78]	278 (7.1%)	50 (0.3%)	31.21 [22.70 to 42.90]
	Posterior base of the skull	2,156	10,780	47 (2.2%)	108 (1.0%)	2.33 [1.64 to 3.30]	64 (3.0%)	122 (1.1%)	2.76 [2.02 to 3.75]	40 (1.9%)	33 (0.3%)	6.62 [4.09 to 10.70]
	Convexity	6,468	32,340	193 (3.0%)	303 (0.9%)	3.66 [3.04 to 4.42]	249 (3.8%)	372 (1.1%)	3.79 [3.21 to 4.48]	247 (3.8%)	93 (0.3%)	14.86 [11.55 to 19.10]
	Falx cerebri and tentorium	1,963	9,815	33 (1.7%)	83 (0.8%)	2.13 [1.41 to 3.22]	56 (2.8%)	104 (1.1%)	3.05 [2.17 to 4.27]	53 (2.7%)	33 (0.3%)	8.03 [5.20 to 12.40]
	Severity											
	Benign	16,662	83,310	578 (3.5%)	879 (1.1%)	3.83 [3.43 to 4.27]	854 (5.1%)	1045 (1.3%)	4.89 [4.44 to 5.38]	817 (4.9%)	233 (0.3%)	19.15 [16.46 to 22.29]
	Atypical	1,047	5,235	39 (3.7%)	55 (1.1%)	4.14 [2.69 to 6.38]	58 (5.5%)	61 (1.2%)	5.72 [3.91 to 8.36]	56 (5.3)	19 (0.4%)	19.15 [10.64 to 34.44]
	Malignant	352	1,760	11 (3.1%)	12 (0.7%)	5.78 [2.39 to 14.00]	13 (3.7%)	15 (0.9%)	4.95 [2.29 to 10.68]	18 (5.1%)	4 (0.2%)	22.50 [7.61 to 66.48]

Abbreviations: 95% CI, 95% confidence interval; OR, odds ratio; N/A, not applicable

Percentages for cases were calculated relative to the total number of cases in the analysis considered (e.g., for the 45-54 age group: relative to N = 4,830). Same for controls.

Current exposure: at least one dispensation in the year prior to the index date and no exposure to cyproterone acetate in the 3 years prior to the index date (for the analyses of chlormadinone and nomegestrol acetate

Table O. Numbers and percentage of meningiomas located in the anterior base or the mid-base of the skull among exposed and non-exposed cases

		Numbers of meningiomas located in the anterior base or mid-base of the skull/number of meningiomas in total* n	Percentage of meningiomas located in the anterior base or mid-base of the skull % (95% CI)	OR (95% CI)**
Exposed cases	Medrogestone	19/42	45.2% (45.3% to 66.6%)	3.49 (2.38 to 5.10)
	Medroxyprogesterone acetate	6/10	60.0% (29.6% to 90.4%)	5.55 (2.27 to 13.56)
	Promegestone	47/84	56.0% (45.3% to 66.6%)	2.39 (1.85 to 3.09)
	Chlormadinone acetate	382/655	58.3% (54.5% to 62.1%)	3.87 (3.48 to 4.30)
	Nomegestrol acetate	591/960	61.6% (58.5% to 64.6%)	4.93 (4.50 to 5.41)
	Cyproterone acetate	613/953	64.3% (61.3% to 67.4%)	19.21 (16.61 to 22.22)
Non-exposed cases		6,232/15,773	39.5% (38.7% to 40.3%)	N/A

Abbreviations: CI 95, 95% confidence interval; N/A, non-applicable; OR, odds ratio
*Each case may have several meningioma locations
**OR of total meningioma risk (regardless of location) associated with each progestogen of interest
Abbreviations: CI 95, 95% confidence interval; OR, odds ratio
*Each case may have several meningioma locations
**OR of total meningioma risk (regardless of location) associated with each progestogen of interest

Table P. Associations between exposure to oral, intra-vaginal, intra-muscular, or percutaneous progestogens and the risk of surgically treated intracranial meningioma , with all the modes of exposure used

Analysis	Cases *N* = 18,061 *n* (%)	Controls *N* = 90,305 *n* (%)	OR* (95% CI)
Oral progesterone			
Isolated exposure to oral progesterone	329 (1.8%)	2,149 (2.4%)	0.88 (0.78 to 0.99)
CMA and/or NOMAC and/or CPA in the preceding 3 years	*2,999 (16.6%)*	*4,218 (4.7%)*	*4.67 (4.42 to 4.93)*
Percutaneous progesterone			
Isolated exposure to percutaneous progesterone	90 (0.5%)	503 (0.6%)	1.11 (0.89 to 1.40)
CMA and/or NOMAC and/or CPA in the preceding 3 years	*2,999 (16.6%)*	*4,218 (4.7%)*	*4.69 (4.44 to 4.95)*
Hydroxyprogesterone			
Isolated exposure to hydroxyprogesterone	0 (0.0%)	3 (0.0%)	N/A
CMA and/or NOMAC and/or CPA in the preceding 3 years	*2,999 (16.6%)*	*4,218 (4.7%)*	*4.68 (4.44 to 4.95)*
Medrogestone			
Isolated exposure to medrogestone	42 (0.2%)	79 (0.1%)	3.49 (2.38 to 5.10)
CMA and/or NOMAC and/or CPA in the preceding 3 years	*2,999 (16.6%)*	*4,218 (4.7%)*	*4.70 (4.45 to 4.97)*
Dydrogesterone			
Isolated exposure to dydrogesterone	156 (0.9%)	990 (1.1%)	0.96 (0.81 to 1.14)
CMA and/or NOMAC and/or CPA in the preceding 3 years	*2,999 (16.6%)*	*4,218 (4.7%)*	*4.68 (4.43 to 4.94)*
Medroxyprogesterone acetate			
Isolated exposure	9 (0.05%)	11 (0.01%)	5.55 (2.27 to 13.56)
CMA and/or NOMAC and/or CPA in the preceding 3 years	*2,999 (16.6%)*	*4,218 (4.7%)*	*4.69 (4.44 to 4.95)*
Promegestone			
Isolated exposure to promegestone	83 (0.5%)	225 (0.2%)	2.39 (1.85 to 3.09)
CMA and/or NOMAC and/or CPA in the preceding 3 years	*2,999 (16.6%)*	*4,218 (4.7%)*	*4.72 (4.46 to 4.98)*
Dienogest			
Isolated exposure	3 (0.02%)	11 (0.01%)	N/A
CMA and/or NOMAC and/or CPA in the preceding 3 years	*2,999 (16.6%)*	*4,218 (4.7%)*	*4.69 (4.44 to 4.95)*
Sprionolactone			
Isolated exposure to spironolactone	264 (1.5%)	1,473 (1.6%)	0.95 (0.84 to 1.09)
CMA and/or NOMAC and/or CPA in the preceding 3 years	*2,999 (16.6%)*	*4,218 (4.7%)*	*4.68 (4.43 to 4.95)*
Chlormadinone acetate			
Isolated exposure to chlormadinone acetate	628 (3.5%)	946 (1.0%)	3.87 (3.48 to 4.30)
CMA and/or NOMAC and/or CPA in the preceding 3 years	*1,012 (5.6%)*	*428 (0.5%)*	*13.81 (12.26 to 15.56)*
Nomegestrol acetate			
Isolated exposure to nomegestrol acetate	925 (5.1%)	1,121 (1.2%)	4.93 (4.50 to 5.41)
CMA and/or NOMAC and/or CPA in the preceding 3 years	*1,012 (5.6%)*	*428 (0.5%)*	*14.17 (12.57 to 15.97)*
Cyproterone acetate			
Exposure to cyproterone acetate	891 (4.9%)	256 (0.3%)	19.21 (16.61 to 22.22)

Abbreviations: 95% CI, 95% confidence interval; CMA, chlormadinone acetate; CPA, cyproterone acetate; NOMAC, nomegestrol acetate; OR, odds ratio

Table Q. Associations between exposure to progestogens in intrauterine systems and copper intrauterine devices and the risk of surgically treated intracranial meningioma , with all the modes of exposure used

Analysis	Cases *n* (%)	Controls *n* (%)	OR (95% CI)
IUS levonorgestrel 52 mg	N = 15,162	N = 75,810	
Isolated exposure to an IUD loaded with 52 mg levonorgestrel	566 (3.7%)	3,888(5.1%)	0.94 [0.86 to 1.04]
CMA and/or NOMAC and/or CPA in the preceding 3 years	2,471 (16.3%)	3,417 (4.5 %)	*4.75 [4.47 to 5.05]*
IUS levonorgestrel 13.5 mg	N = 4,048	N = 20,240	
Isolated exposure to an IUD loaded with 13.5 mg levonorgestrel	10 (0.2%)	48 (0.2%)	1.39 [0.70 to 2.77]
CMA and/or NOMAC and/or CPA in the preceding 3 years	588 (14.5%)	770 (3.8%)	*4.99 [4.41 to 5.65]*
Copper IUD	N = 15,162	N = 75,810	
Isolated exposure to a copper IUD	452 (3.0%)	2,642 (3.5%)	*1.13 [1.01 to 1.25]*
CMA and/or NOMAC and/or CPA in the preceding 3 years	2,471 (16.3%)	3,417 (4.5%)	*4.81 [4.53 to 5.12]*

Abbreviations: 95% CI, 95% confidence interval; CMA, chlormadinone acetate; CPA, cyproterone acetate; IUD, intrauterine device; IUS, intrauterine system; NOMAC, nomegestrol acetate; OR, odds ratio

Table R. Associations between exposure to oral, percutaneous, intra-vaginal, and intra-muscular progestogen and risk of surgically-treated intracranial meningioma, and by sub-class

	Cases	Controls	
	N = 18,061	**N = 90,305**	**OR* (CI 95)**
	n (%)	**n (%)**	
Hydroxyprogesterone	0 (0.00%)	3 (0.00%)	N/A
Medrogestone	42 (0.2%)	79 (0.1%)	3.49 (2.38 to 5.10)
Medroxyprogesterone acetate	9 (0.05%)	11 (0.01%)	5.55 (2.27 to 13.56)
Promegestone	83 (0.5%)	225 (0.2%)	2.39 (1.85 to 3.09)
Chlormadinone acetate	628 (3.5%)	946 (1.0%)	3.87 (3.48 to 4.30)
Nomegestrol acetate	925 (5.1%)	1,121 (1.2%)	4.93 (4.50 to 5.41)
Cyproterone acetate	891 (4.9%)	256 (0.3%)	19.21 (16.61 to 22.22)
17 to OH to progesterone (3) Hydroxyprogesterone - Medrogestone - Medroxyprogsterone -	51 (0.28%)	93 (0.10%)	3.61 (2.55 to 5.10)
17-OH-progesterone (5) Hydroxyprogesterone- Medrogestone- Medroxyprogsterone- CPA-CMA	1,584 (8.7%)	1,320 (1.5%)	7.00 (6.48 to 7.58)
19-nor-progesterone NOMAC-Promegestone	1,015 (5.6%)	1,390 (1.5%)	4.35 (4.00 to 4.74)

Abbreviations: CI 95, 95% confidence interval; CMA, chlormadinone acetate; ; CPA, cyproterone acetate; NOMAC, nomegestrol acetate. OR, odds ratio.

17-OH-progesterone (3): current exposure to hydroxyprogesterone and/or medrogestone and/or medroxyprogesterone

17-OH-progesterone (5): current exposure to hydroxyprogesterone and/or medrogestone and/or medroxyprogesterone and/or CPA and/or CMA

19-nor-progesterone: current exposure to promegestone and/or NOMAC

*Odds ratios involving less than 6 exposed cases are not shown.

Table S. SAS code of statistical analysis

```
*******************************************************************************;
*******************************************************************************;
* macro definition (conditional logistic regression for our data);
*******************************************************************************;
*******************************************************************************;

%macro condlogreg(input=base, selection=(1), mode=current,
var_exp_1=, var_exp_2=, list_var_exp_9=,
cl=wald, list_var_strata=, nb_controls=, output=);
	%* mode : current or short_prolonged;
	%* definition of the exposure variable exp :
	- for mode=current :
	+ exp=0
	+ if &var_exp_1.=1 ==> exp=1 (modality of main interest)
	+ if at least one of the variables in &list_var_exp_9. is equal to 1
	(&list_var_exp_9. may be empty)
	==> exp=9 (modality serving for adjustment)
	- for mode=short_prolonged :
	+ exp=0
	+ if (&var_exp_1.=1) and (&var_exp_2.=0) ==> exp=1
	+ if (&var_exp_1.=1) and (&var_exp_2.=1) ==> exp=2
	+ if at least one of the variables in &list_var_exp_9. is equal to 1
	(&list_var_exp_9. may be empty)
	==> exp=9 (modality serving for adjustment);
	%* cl (confidence limits) : wald or pl (profile likelihood)
note : pl requires nb_controls=1;
	%* list_var_strata : list of variables to be used in the strata statement;
	%* nb_controls : number of controls per case
	(if empty, all controls in the input data set are used)
note : if 1 control per case ==> transformed data approach;
	%* input : input data set
	(default : base,
	one row per patient,
	the following variables are expected :
	- id_pat : patient identifier
	- case : 1 – case, 0 – control
	- id_pat_case :
for cases, the patient identifier
for controls, the patient identifier of the corresponding case
	- no_control (for controls only) :
sequential numbering of all controls for a given case (1,2,…)
	- the variables related to exposure and used for the parameters
var_exp_1, var_exp_2 and list_var_exp_9
[for example in our the analysis by short-term and prolongend
exposure, i.e. with mode= short_prolonged, for dydrogesterone
(our medication code 3), we used
var_exp_1=med_code_3_1a365
(1 - at least one dispensation of dydrogesterone
in the year prior to the index date
0 - otherwise)
var_exp_2= med_code_3_366a730
(1 - at least one dispensation of dydrogesterone
in the 2nd year before the index date
0 - otherwise)
list_var_exp_9=
med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095
(coding the presence of at least one dispensation of
nomegestrol, chlormadinone and cyproterone acetate
(our medication codes 7, 8, 9), respectively,
in the 3 years prior to the index date)]
- the variables used for the parameter list_var_strata
[typically id_pat_case, but other choices are possible
(see e.g. Mansournia 2018 AJE)]);
%* selection : selection criterion applied to the input data set
(default : no selection);
%* output : output data set with the number of exposed cases, the number of
exposed controls and the estimated odds ratios, including confidence
```

```
limits;
%if &cl.=pl and not(&nb_controls.=1) %then %do;
%goto endofmacro;
%end;
%if (&mode.=current) %then %do;
%let var_exp_2=dummy;
%end;
%let cond_var_exp_9=(0);
%let cont=1;
%let i=0;
%do %while(&cont.);
%let i=%eval(&i.+1);
%let var_exp_9=%scan(&list_var_exp_9.,&i.);
%if %length(&var_exp_9.)>0 %then %do;
%let cond_var_exp_9=&cond_var_exp_9. or (&var_exp_9.=1);
%end;
%else %do;
%let cont=0;
%end;
%end;
%put cond_var_exp_9=&cond_var_exp_9.;
data macro_base;
set &input.(where=((&selection.)
%if %length(&nb_controls.)>0 %then %do;
and ((case=1) or ((case=0) and (no_control le &nb_controls.)))
%end;
));
exp=0;
%if &mode.=current %then %do;
dummy=0;
if &var_exp_1.=1 then exp=1;
%end;
%if &mode.=short_prolonged %then %do;
if (&var_exp_1.=1) and (&var_exp_2.=0) then exp=1;
if (&var_exp_1.=1) and (&var_exp_2.=1) then exp=2;
%end;
if &cond_var_exp_9.
then exp=9;
exp_1=0;
if exp=1 then exp_1=1;
exp_2=0;
if exp=2 then exp_2=1;
exp_3=0;
if exp=3 then exp_3=1;
exp_9=0;
if exp=9 then exp_9=1;
run;
proc freq data=macro_base;
tables exp*case/out=macro_stat outpct;
run;
data macro_test;
set macro_base(where=((&var_exp_1.>0) or (&var_exp_2.>0)));
run;
%let nb_exp_1_2=;
proc sql noprint;
select nobs into :nb_exp_1_2 separated by ' ' from dictionary.tables
where libname='WORK' and memname='MACRO_TEST';
quit;
%if &nb_exp_1_2.>0 %then %do;
%if %length(&nb_controls.)=0 or (&nb_controls.>1) %then %do;
ods output ParameterEstimates=macro_est CLOdds&cl.=macro_or
ConvergenceStatus=macro_conv;
proc logistic data=macro_base;
strata &list_var_strata. / nosummary;
model case(event='1')=exp_1 exp_2 exp_3 exp_9/ clodds=&cl.;
run;
ods output close;
%end;
%if &nb_controls.=1 %then %do;
%* see + conditional analysis using transformed data + in
https://support.sas.com/documentation/onlinedoc/stat/131/logistic.pdf;
```

```
proc sort data=macro_base;
by id_pat_case no_control;
run;
data macro_base_trans(
keep=id_pat_case
exp_1_case exp_1_control exp_2_case exp_2_control
exp_3_case exp_3_control exp_9_case exp_9_control
delta_exp_1 delta_exp_2 delta_exp_3 delta_exp_9 zero);
merge macro_base(where=(case=1)
rename=(exp_1=exp_1_case exp_2=exp_2_case exp_3=exp_3_case
exp_9=exp_9_case))
macro_base(where=(no_control=1)
rename=(exp_1=exp_1_control exp_2=exp_2_control exp_3=exp_3_control
exp_9=exp_9_control));
by id_pat_case;
delta_exp_1=exp_1_case-exp_1_control;
delta_exp_2=exp_2_case-exp_2_control;
delta_exp_3=exp_3_case-exp_3_control;
delta_exp_9=exp_9_case-exp_9_control;
zero=0;
run;
ods output ParameterEstimates=macro_est CLOdds&cl.=macro_or
ConvergenceStatus=macro_conv;
proc logistic data=macro_base_trans;
model zero=delta_exp_1 delta_exp_2 delta_exp_3 delta_exp_9 /
noint clodds=&cl.;
run;
ods output close;
%end;
data macro_est;
merge macro_est(keep=variable probchisq)
macro_or(keep=effect oddsratioest lowercl uppercl
rename=(effect=variable));
by variable;
run;
data macro_stat_exp_1(keep=exp nb_exp_among_cases pct_exp_among_cases
nb_exp_among_controls pct_exp_among_controls);
merge macro_stat(where=((exp=1) and (case=1))
rename=(count=nb_exp_among_cases pct_col=pct_exp_among_cases))
macro_stat(where=((exp=1) and (case=0))
rename=(count=nb_exp_among_controls pct_col=pct_exp_among_controls));
run;
data macro_stat_exp_2(keep=exp nb_exp_among_cases pct_exp_among_cases
nb_exp_among_controls pct_exp_among_controls);
merge macro_stat(where=((exp=2) and (case=1))
rename=(count=nb_exp_among_cases pct_col=pct_exp_among_cases))
macro_stat(where=((exp=2) and (case=0))
rename=(count=nb_exp_among_controls pct_col=pct_exp_among_controls));
run;
data macro_stat_exp_3(keep=exp nb_exp_among_cases pct_exp_among_cases
nb_exp_among_controls pct_exp_among_controls);
merge macro_stat(where=((exp=3) and (case=1))
rename=(count=nb_exp_among_cases pct_col=pct_exp_among_cases))
macro_stat(where=((exp=3) and (case=0))
rename=(count=nb_exp_among_controls pct_col=pct_exp_among_controls));
run;
data macro_stat_exp_9(keep=exp nb_exp_among_cases pct_exp_among_cases
nb_exp_among_controls pct_exp_among_controls);
merge macro_stat(where=((exp=9) and (case=1))
rename=(count=nb_exp_among_cases pct_col=pct_exp_among_cases))
macro_stat(where=((exp=9) and (case=0))
rename=(count=nb_exp_among_controls pct_col=pct_exp_among_controls));
run;
data macro_stat_bis;
set macro_stat_exp_1
macro_stat_exp_2
macro_stat_exp_3
macro_stat_exp_9;
run;
%if %length(&nb_controls.)=0 or (&nb_controls.>1) %then %do;
%let variable_prefix=exp;
```

```
%end;
%else %do;
%let variable_prefix=delta_exp;
%end;
data macro_est(drop=variable);
set macro_est;
if variable="&variable_prefix._1" then exp=1;
if variable="&variable_prefix._2" then exp=2;
if variable="&variable_prefix._3" then exp=3;
if variable="&variable_prefix._9" then exp=9;
run;
data macro_est;
merge macro_stat_bis
macro_est;
by exp;
run;
data macro_est;
merge macro_est
macro_conv(keep=status reason);
run;
%end;
%else %do;
data macro_est;
comment="No exposure var_exp_1 or var_exp_2 observed";
run;
%end;
* macro_or;
data &output.
%if &mode.=current %then %do;
(where=((exp ne 2) and (exp ne 3)))
%end;
%if &mode.=short_prolonged %then %do;
(where=(exp ne 3))
%end;;
set &output.
macro_est(in=a);
if a then do;
selection="&selection.";
var_exp_1="&var_exp_1.";
var_exp_2="&var_exp_2.";
list_var_exp_9="&list_var_exp_9.";
nb_controls=&nb_controls.;
cl="&cl.";
end;
run;
%endofmacro:;
proc delete data=macro_stat; run;
proc delete data=macro_stat_exp_1; run;
proc delete data=macro_stat_exp_2; run;
proc delete data=macro_stat_exp_3; run;
proc delete data=macro_stat_exp_9; run;
proc delete data=macro_stat_bis; run;
proc delete data=macro_test; run;
proc delete data=macro_est; run;
proc delete data=macro_or; run;
proc delete data=macro_conv; run;
proc delete data=macro_test; run;
%if &nb_controls.=1 %then %do;
proc delete data=macro_base_trans; run;
%end;
%mend;


*******************************************************************************;
*******************************************************************************;
* estimating the risk related to current use;
*******************************************************************************;
*******************************************************************************;

*******************************************************************************;
* parameters;
```

```
*******************************************************************************;

%let cl=wald;
%let nb_controls=5; *%let nb_controls=1;
%let output=condlogreg_current_&nb_controls._&cl.;
data &output.;
length selection $100. var_exp_1 $32. var_exp_2 $32. list_var_exp_9 $100.
nb_controls 3. cl $4.;
run;

*******************************************************************************;
* estimation for each product;
*******************************************************************************;

* medrogestone (code_1);
%condlogreg(var_exp_1=med_code_1_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* oral progesterone (code_2);
%condlogreg(var_exp_1=med_code_2_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* dydrogesterone (code_3);
%condlogreg(var_exp_1=med_code_3_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* dienogest (code_4);
%condlogreg(var_exp_1=med_code_4_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* promegestone (code_6);
%condlogreg(var_exp_1=med_code_6_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* medroxyprogesterone acetate (code_10);
%condlogreg(var_exp_1=med_code_10_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* percutaneous progesterone (code_22);
%condlogreg(var_exp_1=med_code_22_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* hydroxyprogesterone (code_30);
%condlogreg(var_exp_1=med_code_30_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* spironolactone (code_40);
%condlogreg(var_exp_1=med_code_40_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* IUS levonorgestrel 52mg (code_12) with restriction to index years 2011-2018
(annee_index_2011_2018=1);
%condlogreg(selection=(annee_index_2011_2018),
var_exp_1=med_code_12_1a1825, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* IUS levonorgestrel 13.5mg (code_14) with restriction to index years 2017-2018
(annee_index_2017_2018=1);
%condlogreg(selection=(annee_index_2017_2018),
var_exp_1=med_code_14_1a1095, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
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list_var_strata=id_pat_case,
output=&output.);
* copper IUS (diu_cuivre) with restriction to index years 2011-2018
(annee_index_2011_2018=1);
%condlogreg(selection=(annee_index_2011_2018),
var_exp_1=diu_cuivre_1a1825, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* nomegestrol acetate (code_7);
%condlogreg(var_exp_1=med_code_7_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* chlormadinone acetate (code_8);
%condlogreg(var_exp_1=med_code_8_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* cyproterone acetate (code_9);
%condlogreg(var_exp_1=med_code_9_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_strata=id_pat_case,
output=&output.);
*****************************************************************************;
*****************************************************************************;
* estimating the risk related to short-term and prolonged use, respectively;
*****************************************************************************;
*****************************************************************************;

*****************************************************************************;
* parameters;
*****************************************************************************;

%let cl=wald;
%let nb_controls=5; *%let nb_controls=1;
%let output=condlogreg_prolonged_&nb_controls._&cl.;
data &output.;
length selection $100. var_exp_1 $32. var_exp_2 $32. list_var_exp_9 $100.
nb_controls 3. cl $4.;
run;
*****************************************************************************;
* estimation for each product;
*****************************************************************************;
* medrogestone (code_1);
%condlogreg(var_exp_1=med_code_1_1a365, var_exp_2=med_code_1_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* oral progesterone (code_2);
%condlogreg(var_exp_1=med_code_2_1a365, var_exp_2=med_code_2_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* dydrogesterone (code_3);
%condlogreg(var_exp_1=med_code_3_1a365, var_exp_2=med_code_3_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* dienogest (code_4);
%condlogreg(var_exp_1=med_code_4_1a365, var_exp_2=med_code_4_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* promegestone (code_6);
%condlogreg(var_exp_1=med_code_6_1a365, var_exp_2=med_code_6_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
```

```
list_var_strata=id_pat_case,
output=&output.);
* medroxyprogesterone acetate (code_10);
%condlogreg(var_exp_1=med_code_10_1a365, var_exp_2=med_code_10_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* percutaneous progesterone (code_22);
%condlogreg(var_exp_1=med_code_22_1a365, var_exp_2=med_code_22_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* hydroxyprogesterone (code_30);
%condlogreg(var_exp_1=med_code_30_1a365, var_exp_2=med_code_30_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* spironolactone (code_40);
%condlogreg(var_exp_1=med_code_40_1a365, var_exp_2=med_code_40_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* nomegestrol acetate (code_7);
%condlogreg(var_exp_1=med_code_7_1a365, var_exp_2=med_code_7_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* chlormadinone acetate (code_8);
%condlogreg(var_exp_1=med_code_8_1a365, var_exp_2=med_code_8_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* cyproterone acetate (code_9);
%condlogreg(var_exp_1=med_code_9_1a365, var_exp_2=med_code_9_366a730,
mode=short_prolonged, cl=&cl., nb_controls=&nb_controls.,
list_var_strata=id_pat_case,
output=&output.);
*****************************************************************************;
*****************************************************************************;
* estimating the risk in subgroups and for specific localisations;
*****************************************************************************;
*****************************************************************************;

*****************************************************************************;
* parameters;
*****************************************************************************;
%let cl=wald;
%let nb_controls=5;
%let output=condlogreg_subgroups_&nb_controls._&cl.;
data &output.;
length selection $100. var_exp_1 $32. var_exp_2 $32. list_var_exp_9 $100.
nb_controls 3. cl $4.;
run;

*****************************************************************************;
* estimation for each product;
*****************************************************************************;
%macro loop(selection=(1), cl=, nb_controls=, output=);
* medrogestone (code_1);
%condlogreg(selection=(&selection.),
var_exp_1=med_code_1_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* promegestone (code_6);
```

```
%condlogreg(selection=(&selection.),
var_exp_1=med_code_6_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* medroxyprogesterone acetate (code_10);
%condlogreg(selection=(&selection.),
var_exp_1=med_code_10_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_7_1a1095 med_code_8_1a1095 med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* nomegestrol acetate (code_7);
%condlogreg(selection=(&selection.),
var_exp_1=med_code_7_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* chlormadinone acetate (code_8);
%condlogreg(selection=(&selection.),
var_exp_1=med_code_8_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_exp_9=med_code_9_1a1095,
list_var_strata=id_pat_case,
output=&output.);
* cyproterone acetate (code_9);
%condlogreg(selection=(&selection.),
var_exp_1=med_code_9_1a365, cl=&cl., nb_controls=&nb_controls.,
list_var_strata=id_pat_case,
output=&output.);
%mend;
* age : < 35 years;
%loop(selection=(age_cl in (1,2)),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* age : 35-44 years
%loop(selection=(age_cl=3),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* age : 45-54 years;
%loop(selection=(age_cl=4),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* age : 55-64; years
%loop(selection=(age_cl=5),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* age : 65 years and over;
%loop(selection=(age_cl in (6,7,8)),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* anatomical location : anterior base of the skull;
%loop(selection=(localisation_ant_case=1),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* anatomical location : mid-base of the skull;
%loop(selection=(localisation_mid_case=1),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* anatomical location : posterior base of the skull;
%loop(selection=(localisation_post_case=1),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* anatomical location : convexity;
%loop(selection=(localisation_conv_case=1),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* anatomical location : falx cerebri and tentorium;
%loop(selection=(localisation_falx_case=1),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* anatomical location : others;
%loop(selection=(localisation_oth_case=1),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* severity : benign;
%loop(selection=(grade_ben_case=1),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* severity : atypical;
%loop(selection=(grade_atyp_case=1),
cl=&cl., nb_controls=&nb_controls., output=&output.);
* severity : malignant;
%loop(selection=(grade_mal_case=1),
cl=&cl., nb_controls=&nb_controls., output=&output
```

Figure A. Flowchart for the analysis of levonorgestrel 52 mg IUS (restricted inclusion period: 2011-2018)

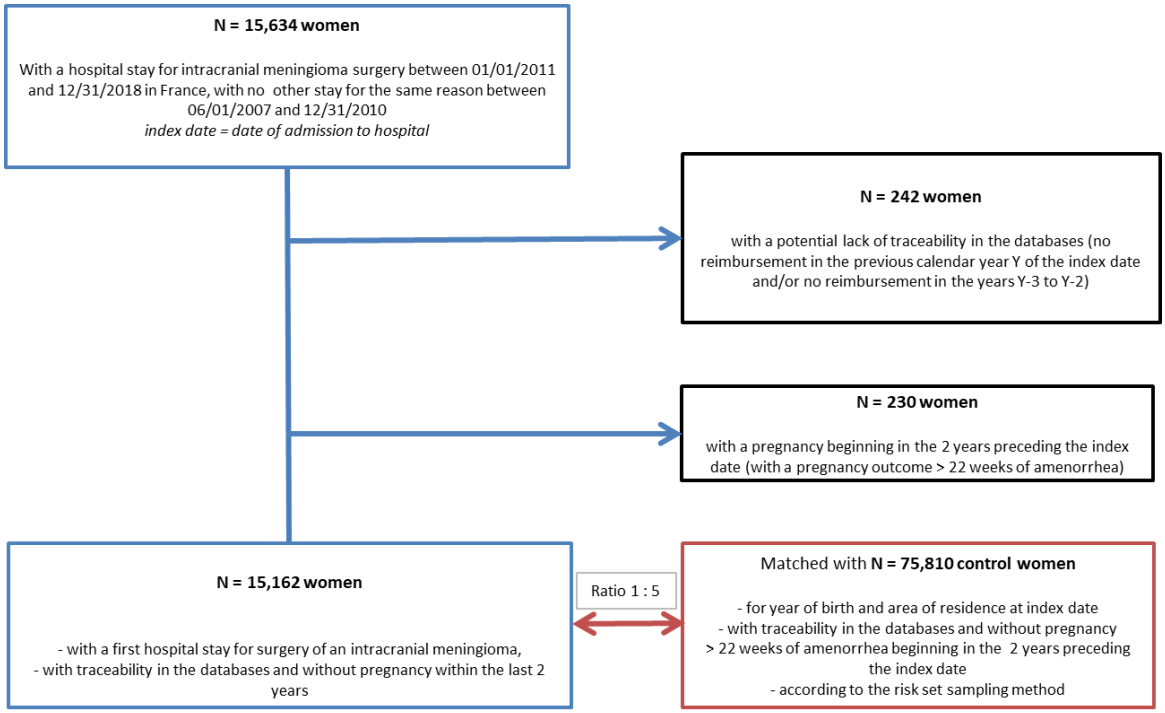


Figure B. Flowchart for the analysis of levonorgestrel 13.5 mg IUS (restricted inclusion period: 2017-2018)

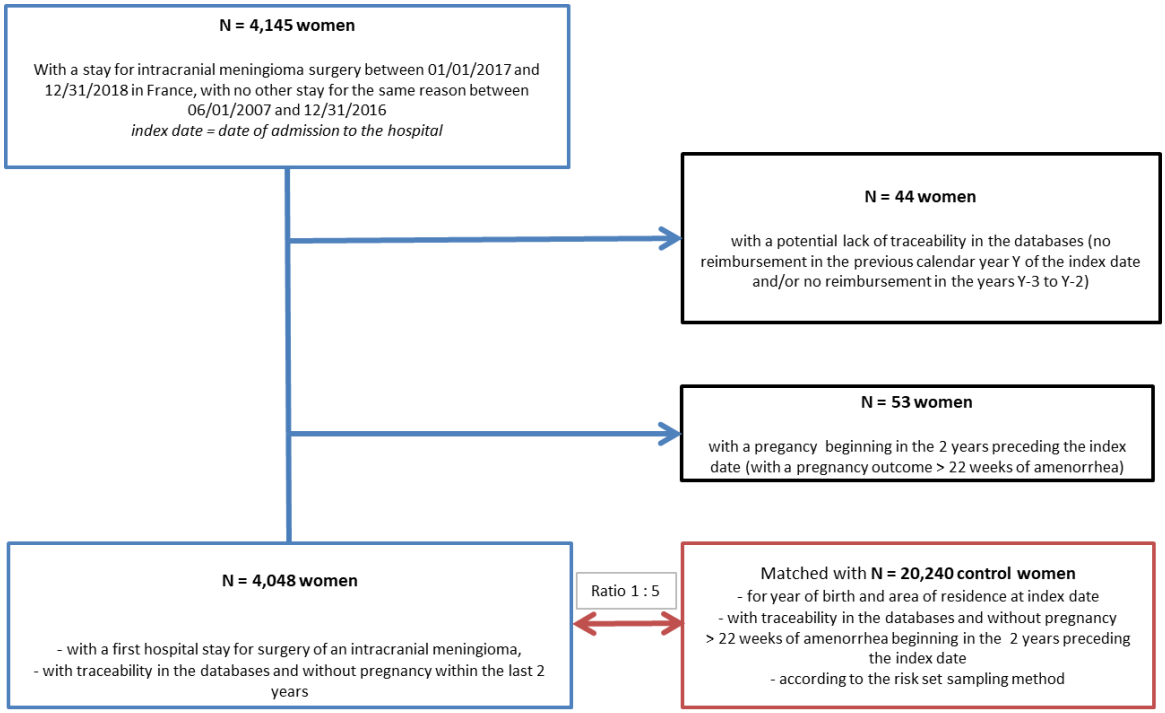
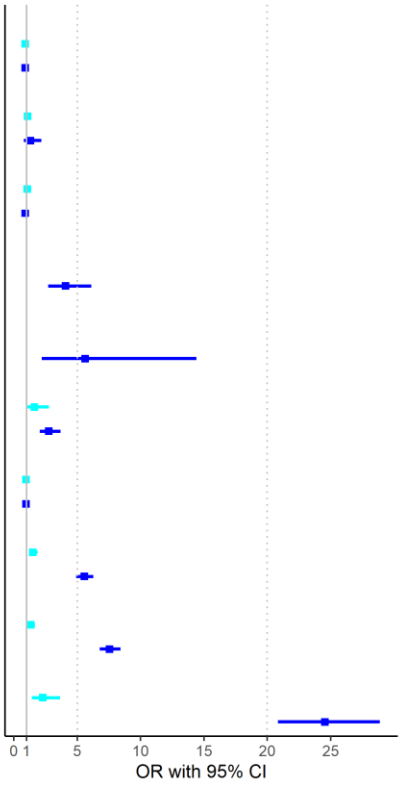


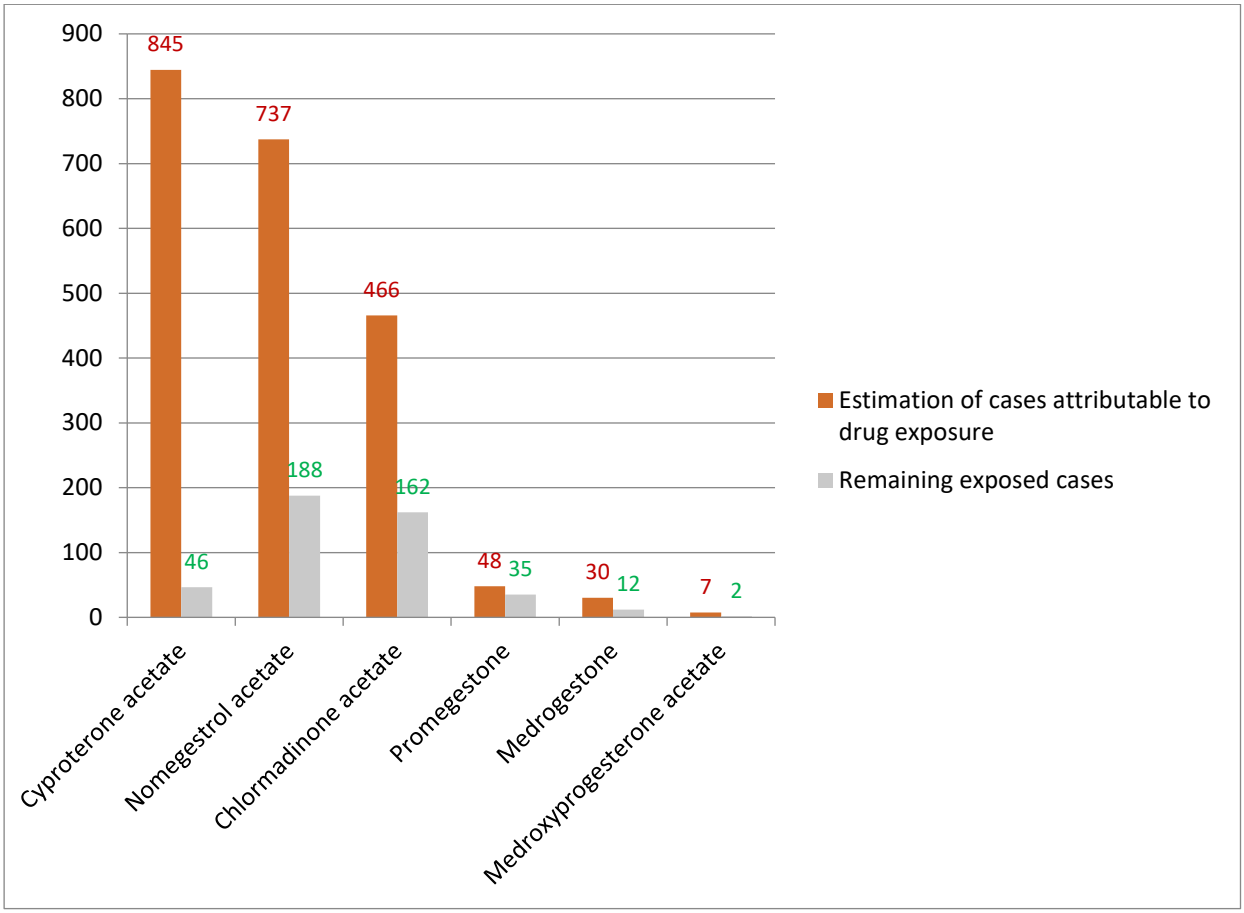
Figure C. Forest plot representing the associations between exposure to oral, intravaginal, intramuscular, or percutaneous progestogens and the risk of meningioma requiring surgery

	Cases (N=18,061)	Controls (N=90,305)	OR [95% CI]
Oral and intravaginal progesterone			
Short-term use (<1 year)	69 (0.38%)	480 (0.53%)	0.90 [0.70-1.16]
Prolonged use (≥1 year)	260 (1.44%)	1,669 (1.85%)	0.88 [0.77-1.00]
Percutaneous progesterone			
Short-term use (<1 year)	72 (0.40%)	415 (0.46%)	1.07 [0.83-1.38]
Prolonged use (≥1 year)	18 (0.10%)	88 (0.10%)	1.30 [0.78-2.17]
Dydrogesterone			
Short-term use (<1 year)	68 (0.38%)	415 (0.46%)	1.05 [0.81-1.37]
Prolonged use (≥1 year)	88 (0.49%)	575 (0.64%)	0.89 [0.71-1.12]
Medrogestone			
Short-term use (<1 year)	2 (0.01%)	16 (0.02%)	N/A
Prolonged use (≥1 year)	40 (0.22%)	63 (0.07%)	4.08 [2.72-6.10]
Medroxyprogesterone (inj)			
Short-term use (<1 year)	1 (0.01%)	1 (0.00%)	N/A
Prolonged use (≥1 year)	8 (0.04%)	10 (0.01%)	5.62 [2.19-14.42]
Promegestone			
Short-term use (<1 year)	17 (0.09%)	73 (0.08%)	1.62 [0.95-2.76]
Prolonged use (≥1 year)	66 (0.37%)	152 (0.17%)	2.74 [2.04-3.67]
Spironolactone			
Short-term use (<1 year)	67 (0.37%)	381 (0.42%)	0.94 [0.73-1.22]
Prolonged use (≥1 year)	197 (1.09%)	1,092 (1.21%)	0.96 [0.82-1.12]
Chlormadinone acetate			
Short-term use (<1 year)	101 (0.56%)	392 (0.43%)	1.50 [1.20-1.87]
Prolonged use (≥1 year)	527 (2.92%)	554 (0.61%)	5.55 [4.90-6.28]
Nomegestrol acetate			
Short-term use (<1 year)	106 (0.59%)	471 (0.52%)	1.34 [1.08-1.66]
Prolonged use (≥1 year)	819 (4.53%)	650 (0.72%)	7.54 [6.76-8.41]
Cyproterone acetate			
Short-term use (<1 year)	25 (0.14%)	58 (0.06%)	2.28 [1.42-3.65]
Prolonged use (≥1 year)	866 (4.79%)	198 (0.22%)	24.54 [20.85-28.88]



Abbreviations: CI, confidence interval; OR, odds ratio.
Short-term use: at least one dispensation in the year preceding the index date, without dispensation in the year before that (use in the year preceding the index date but not in the year before that)
Prolonged use: at least one dispensation in the year preceding the index date, with at least one dispensation in the year before that (use in the year preceding the index date and in the year before that)
For short and prolonged exposures: absence of exposure to chlormadinone acetate, nomegestrol acetate, and cyproterone acetate in the 3 years preceding the index date (in the analyses for chlormadinone acetate and nomegestrol acetate, the absence of exposure was tested only against cyproterone acetate; in the analysis for cyproterone acetate, no absence of exposure was tested)
The odds ratios for fewer than 6 exposed cases are not displayed. Therefore, hydroxyprogesterone and dienogest are missing in this forest plot

Figure D. Number of attributable cases of intracranial meningioma requiring surgery, by progestogen, for the 2009-2018 period



Abbreviations: CMA, chlormadinone acetate; ; CPA, cyproterone acetate; NOMAC, nomegestrel acetate.

Medrogestone, promegestestone and medroxyprogesterone acetate: cases with simultaneous/prior exposure to chlormadinone, nomegestrol and/or cyproterone acetate in the previous 3 years are excluded from the calculation.

Chlormadinone and nomegestrol acetate: cases with simultaneous/prior exposure to cyproterone acetate in the previous 3 years are excluded from the calculation.

All of the calculations relate to the source population of this study, which is dynamic and, notably, excludes women with a pregnancy beginning in the previous 2 years.