# Appendix 2 – Detail on Reported Cases

**Case #1**

*Past Medical History*

Case #1 is a 52-year-old Hispanic woman with a history of migraine headaches, hepatitis C, and an unspecified past ovarian pathology. The patient had no history of endometriosis. Born in the US, the patient lived in Mexico until approximately 1992, when she returned to live in the States. Her onset of menarche was at age 15. The patient gave birth to 4 children (G6-P4-A2). Between the birth of her first and second children, she used a copper intra-uterine device (IUD.) She used birth control pills (BCPs) for 3 months. The patient did not use hormone replacement therapy (HRT). She breastfed 3 of her 4 children for a total of 18 months. In the 1990s, the patient underwent a Loop electrosurgical excision procedure (LEEP) related to a cervical papilloma. Her medical history included an unspecified surgery of the left ovary. In 2000, the patient had a tubal ligation, followed, in approximately 2002, by a cholecystectomy. She underwent bilateral Lasik eye surgery in 2010.

The patient is a former smoker who began smoking at age 17-18 and smoked 1 pack per week.

*History of present illness:*

Following reports of severe headaches, irregular menstrual bleeding with large clots, weight loss, and fatigue, the patient was diagnosed with metastatic high grade papillary serous carcinoma in early 2011 at age 45. The patient underwent an exploratory laparotomy; total abdominal hysterectomy; bilateral salpingo-oophorectomy; bilateral pelvic lymph node sampling; periaortic lymph node sampling; infracolic omentectomy; and optimal tumor resection in 2011 and she underwent tumor debulking following metastasis to the perineum and peri-aortic lymph node in 2015. From 2011 to 2015, the patient’s chemotherapy treatment included Carboplatin, Taxol, Doxorubicin Liposomal, Gemzar, Cisplatin, Tamoxifen, and Anastrozole. In the spring of 2015, the patient’s ovarian cancer had metastasized to the perineum and she underwent tumor debulking. She developed hydronephrosis and a small ventral incisional hernia. She had a ureteral stent placed for the hydronephrosis as well as hernia repair. As of 2017, the patient was still unable to work due to her disease, and was on disability.

*Other ovarian cancer risk factors*

There was no family history of either ovarian or breast cancer, and the patient’s BRCA test results were negative for mutation.

*Exposure History*

The patient used talc powder for 48 years from birth to age 48 (1966-2014); she used JBP exclusively for her first 18 years of life and then used a combination of JBP and STS Shimmer. Her mother used JBP on her body after diaper changes and baths until age 5. From age 5 to 48 she powdered herself after each bath or shower and every time she used the restroom (approximately 10 times/day, increasing to 10-15 times per day during her menstrual cycle.) When she used the powder in this way away from home, she shook it on to her hands before applying. The patient also shook the talc powder directly onto her chest, under her breasts, underarms, bra, and on her neck 5 times/day (when she woke up, after showers, when dressing, after work, and before bed.) She also applied the powder to her hair as a dry shampoo 2-3 times/week and more frequently in the winter. She shook the powder into her hand before rubbing it into her hair. She also used talc powder on her feet and in her shoes every day. She saw visible dust while applying the talc, and remembered that the talc smelled good when she inhaled it. She stopped using talc powder when she saw lawyer ads about talc and ovarian cancer.

The patient used talc powder during every diaper change for her 4 children for 2 years each, 10 times/day, for a total of 6 years. She also applied the talc powder on each of her 4 children after each bath until they could use it themselves (approximately 5-6 years each.) A nurse gave her J&J Baby Products gift baskets at the hospital when her children were born and showed her to shake the powder directly from the can onto the baby. She also applied the talc powder to her children after each bath until they could use it themselves (approximately 5-6 years old.) She also occasionally applied talc powder during diaper changes and after baths for 5 of her 6 grandchildren. The patient saw and inhaled the visible dust that accompanied application of the talc powder.

All of the patient’s children used talc powder, including her sons, who used it before and after football practices and games. After application by herself or her children in the bathroom, the patient swept up and inhaled the dust.

Within her home, the patient dusted her sheets and pillow every week; she shook talc onto her rugs and on to the living room carpet every day after vacuuming; she shook the powder into her clothes drawers, 2-3 times/week; she shook powder on to her sofa and car seats to make them smell nice; and she used talc powder to remove oily stains and spills.

For 2-3 years prior to 1994, the patient used condoms which may have been dusted with talc.

The patient has no known direct or indirect exposure to asbestos from any other sources. Her husband worked as a crane operator in an enclosed, air-conditioned crane cab. The patient left high school in the 11th grade, at which time she began working in food service for a company that manages retail and restaurants at an airport terminal. She was most recently an operations manager, but is currently on disability.

*Dose Calculation*

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| --- | --- | --- |
| **Case #1 Usage** | **Duration** | **Frequency** |
| Perineal Powdering | 40 years | 10 times per day |
| Upper Body Powdering | 40 years | 5 times per day |
| Having diaper changed (as baby) | 2 years | 8 times per day |
| Changing diaper (as adult) | 8 years | 10 times per day |

*Estimate of Case #1’s inhalation exposure as a baby from diaper changing:*

*1.8 f/cc x = 0.04*

*Estimate of Case #1’s inhalation exposure as an adult from diaper changing:*

*2.2 f/cc x = 0.24*

*Estimate of Case #1’s inhalation exposure from perineal powdering:*

*2.57 f/cc x =3.57*

*Estimate of Case #1’s inhalation exposure from upper body powdering:*

*1.9 f/cc x x =1.32*

*Total asbestos exposure of Case #1 from talc powder:*

*0.04 + 0.24 + 3.57 + 1.32 = 5.17*

*Asbestos fibers breathed in by Case #1from talc powder use as an* ***adult****:*

*x = 37,449,000,000 asbestos fibers*

*Asbestos fibers breathed in by Case #1from talc powder use as an* ***infant****:*

*x =* *220,501,440 asbestos fibers*

*Total dose of asbestos fibers in Case #1 from talc powder:*

*37,449,000,000 asbestos fibers + 220,501,440 asbestos fibers = 37,669,501,400 asbestos fibers*

This is an underestimate of the actual asbestos inhaled because we did not consider the following exposures:

* Exposure to transvaginal asbestos fibers from J&J talcum powder
* Mother’s application of J&J Baby Powder into her shoes and on her body until age 5
* Increase in usage during menstrual cycles
* Application as dry shampoo
* Using talc powder on her feet and in her shoes
* Use of condoms dusted with talc until 1994
* 14 years of post-shower use of powder on her children
* 6 years of using talc powder to change diapers of her grandchildren
* Her relatives’ usages of J&J talcum powder in the house

**Case #2**

*Past medical history*

Case #2 was a 56-year-old African American woman with a history of hypertension treated with Lisinopril, anemia, and diabetes diagnosed at approximately age 40. Prior to her ovarian cancer diagnosis, the patient’s diabetes was treated with metformin; afterwards, she was treated with insulin. She had no known allergies. Her age at menarche was 13. A G5P5A1, she had a tubal ligation at 27 years old. The patient did not use birth control, and had used condoms occasionally. She had not had fertility treatments, did not have hormone replacement therapy (HRT), and did not use an intra-uterine device (IUD.) She breast-fed one of her children for 2-3 months.

In the fall of 2014, the patient had a mammogram with suspicious abnormality (calcifications in the upper/outer left breast.) This was followed by a left breast biopsy which was benign.

Her immediate family history included heart disease, and bone cancer in her mother, who died at age 76.

*History of present illness*

In late-2014, the patient visited urgent care for severe abdominal pain and a CT scan revealed abdominal ascites, extensive omental soft tissue abnormality, and a complex mass in the pelvis. The patient was diagnosed with poorly differentiated, high grade serous ovarian carcinoma, stage IIIC and underwent an exploratory laparotomy, tumor resection, omentectomy, and bilateral salpingo-oophorectomy in early 2015 at age 53. Surgical findings included ~1 liter of bloody ascites, an approximately 10 cm left pelvic mass and an approximately 8 cm right pelvic mass, with extensive frozen pelvis and extensive omental caking and involvement of the transverse colon mesentery. The patient underwent chemotherapy and, later that same year, a laparoscopy, a total laparoscopic hysterectomy, bilateral pelvic lymph node dissection, peri-aortic lymph node sampling, and tumor resection. The operative findings indicated that the patient’s carcinomatosis was resolved. Subsequent CT scan did not indicate evidence of disease until a 3.7 cm round cystic lesion in the left adnexa was identified at the end of 2017. Given the increase in the size of this lesion, recurrent disease could not be ruled out. Although a PET-CT scan was recommended, subsequent medical records were not available for review. In January 2018, at the time of a scheduled PET scan to assess a spot on her kidney, the patient was determined to have loss of kidney function from chemotherapy.

*Other ovarian cancer risk factors*

She was not tested for BRCA. She was never diagnosed with endometriosis. Her mother died of bone cancer at age 76. There is no first-degree family history of Lynch syndrome, ovarian cancer or breast cancer. She never had HRT or an IUD. She weighed ~200lbs at the time of cancer diagnosis and had a BMI of ~31.3. The patient had a tubal ligation at 27 years of age.

*Exposure History*

The patient used a mixture of JBP and STS for 36 years from age 17 to 53 (1979-2015). Over this period, she used talc powder once each day in her underwear or, while menstruating, on her tampons. She also used talc powder once per day on her chest for 23 years from 1992 to 2015. She used one 22oz bottle of JBP every 3-4 months. Whenever she used the talc powder, she saw visible dust and inhaled it while applying. She stopped using talc powder when she was diagnosed with ovarian cancer in 2015.

From approximately 1980 to 1987, she also used this talcum powder on her five children during diaper changing. She applied the talc to her 5 babies with every diaper change and bath, changing their diapers 6-9 times/day for 1.5 years each. The hospital where she delivered gave her baby product gift baskets which included Johnson’s Baby Powder following the births of each of her five children. She saw and inhaled dust when applying the talc powder. She also believes her mother used talc powder during diaper changes when the patient was an infant.

The patient’s three daughters also used talc powder while they lived with her. The patient cleaned up the dust by mopping and then sweeping.

The patient has no known direct or indirect exposure to asbestos from any other sources. A high school graduate, she has taught daily living skills as an Instructional Aide for disabled children for the past 19 years. Prior to this, she was a certified nurse’s assistant.

*Dose Calculation*

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| --- | --- | --- |
| **Case #2 Usage** | **Duration** | **Frequency** |
| Perineal Powdering | 36 years | 1 time per day |
| Upper Body Powdering | 23 years | 1 time per day |
| Having diaper changed (as baby) | 2 years | 8 times per day |
| Changing diaper (as adult) | 7.5 years | 7.5 times per day |

*Estimate of Case #2’s inhalation exposure as a baby from diaper changing:*

*1.8 f/cc x = 0.04*

*Estimate of Case #2’s inhalation exposure as an adult from diaper changing:*

*2.2 f/cc x = 0.17*

*Estimate of Case #2’s inhalation exposure from perineal powdering:*

*2.57 f/cc x =0.32*

*Estimate of Case #2’s inhalation exposure from upper body powdering:*

*1.9 f/cc x =0.15*

*Total asbestos exposure of Case #2 from talc powder:*

*0.04 + 0.17 + 0.32 = 0.68*

*Asbestos fibers breathed in by Case #2 from talc powder use as an* ***adult****:*

*x = 4,672,000,000 asbestos fibers*

*Asbestos fibers breathed in by Case #2 from talc powder use as an* ***infant****:*

*x = 220,501,440 asbestos fibers*

*Total dose of asbestos fibers in Case #2 from talc powder:*

*4,672,000,000 asbestos fibers + 220,501,440 asbestos fibers = 4,892,501,440 asbestos fibers*

This is an underestimate of the actual asbestos inhaled because we did not consider the following exposures:

* Exposure to transvaginal asbestos fibers from J&J talcum powder
* Her relatives’ usages of J&J talcum powder in the house
* Application of J&J Baby Powder on her babies after bath
* Cleaning up the talc dust by mopping and then sweeping

**Case #3**

*Past Medical History*

Case #3 is a 52-year-old pre-menopausal African-American woman with a history of uterine fibroids. The patient had breast reduction surgery at age 22. She gained 85 lbs during her second pregnancy at age 34 and two years after had a Roux-en-Y gastrojejunostomy for weight loss at age 37. She had a BMI of 27.4 at the time of surgery, never smoked, and had no history of direct or para-occupational asbestos exposure. She was G7P2A5 and she had a tubal ligation at age 37. She used BCPs from 1981 to 1992 and a BC patch for 12 months in 1992-1993. She was diagnosed with uterine fibroids in October 2011, which were treated by uterine artery embolization in July 2013.

*History of present illness*

In early 2014, the patient complained of abdominal pain and heavy menstrual bleeding and an ultrasound and CT scan revealed a left ovarian cyst and a recurrence of uterine fibroids. A second ultrasound and CT scan completed in mid-2014 revealed a pelvic mass. The patient was diagnosed with high grade serous carcinoma found in the ovary, fallopian tube serosa and pelvis at age 49. She underwent a total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, pelvic and para-aortic lymph node dissection, and appendectomy, but some residual tumor was left at surgery. She was then treated with six cycles of Carboplatin and Taxol. The patient had a recurrence in 2016 and had a radical pelvic dissection for complete tumor debulking, low anterior resection with anastomosis. This was followed by two cycles of intravenous Taxol and Carboplatin, one cycle of intravenous Docetaxel and Carboplatin, and three cycles of intravenous Docetaxel and intraperitoneal Cisplatin. The patient is now in considered to be in remission.

*Other ovarian cancer risk factors*

The patient is BRCA negative. She was never diagnosed with endometriosis. There is no first-degree family history of Lynch syndrome, ovarian, or breast cancer. She did not have hormone replacement therapy (HRT), and she never used an intra-uterine device (IUD.)

The patient’s father had been diagnosed with lung cancer and leukemia before he died of renal failure in his early 70s. Her mother, who worked, for the phone company, died in her mid-70s from colon cancer. A maternal aunt was diagnosed with stage 0 breast cancer at approximately age 80. At 49, a cousin, who was positive for a BRCA gene, was diagnosed with breast cancer.

*Exposure History*

The patient used talc powder for 39 years from age 10 to 49 (1975 – 2014); she used JBP exclusively until ~1985, followed by primarily mixed JBP and STS use. She occasionally used generic baby powder from Shop-Rite, Pathmark and CVS. The patient used talc in various cosmetic applications over this period. She applied talc after every shower, at least 2 times daily and sometimes up to 4 times a day. She poured talc on her hands and applied it to her inner thighs 2-4 times a day. She poured it from the can to apply it under her arms 2-4 times per day from 1975-1995. She poured it from the can onto her chest from her collarbone to underneath her breasts 2-4 times per day from 1975-1985. She shook the talc directly onto her underwear 2 – 4 times day from 1975-2014. From age 20-22, she applied talc to her face using a make-up brush. She saw and inhaled visible talc dust while applying the talc to her face, upper body and underwear. She stopped using talc powder in 2014 when she saw lawyer advertisements regarding the relationship between ovarian cancer and talc.

She used talc JBP on her 2 babies for 2-3 years with each diaper change (6-8 times per day) and after each bath. She was given J&J baby product gift baskets at each hospital following the birth of her sons. She shook the talc powder directly onto her babies and inhaled dust when applying the talc to her children. She thinks her mother used talc on her as a baby since her mother encouraged her to use it on herself at age 10 and showed her how to use it on her children.

She applied the talc to her body in the bathroom standing over a throw rug. Once a week she shook the rug out, swept the floor and washed the rug. She used talc on her own sheets and pillows once a week from age 10 until age 49 and her children’s sheets and pillows until each reached age 9. She saw and inhaled visible talc dust when she shook the rug out and when she powdered her and her children’s’ bedding. She used condoms which may have been dusted with talc from 1980 to 1998. She used a diaphragm infrequently for 2 years during college and applied talc before storing it.

The patient has no known direct or indirect exposure to asbestos from any other sources. Her father, who was diagnosed with lung cancer, worked for public transportation as a foreman mechanic. He had no known exposure to asbestos. Beginning at approximately age 15, the patient had washed her father’s work clothes, and remembered them as having been greasy. The patient has a bachelor’s degree in business marketing and a certificate in computer programming. She worked in the field of information technology until 2011, when she stopped working due to back pain. With injuries sustained in several past automobile accidents, she received related disability payments for five years until 2014. Since April, 2016, she works in customer service driving the jet bridge for a major airline.

*Dose calculation*

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| --- | --- | --- |
| **Case #3 Usage** | **Duration** | **Frequency** |
| Perineal Powdering | 39 years | 3 times per day |
| Upper Body Powdering | 20 years | 3 times per day |
| Having diaper changed (as baby) | 2 years | 8 times per day |
| Changing diaper (as adult) | 5 years | 7 times per day |

*Estimate of Case #3’s inhalation exposure as a baby from diaper changing:*

*1.8 f/cc x = 0.04*

*Estimate of Case #3’s inhalation exposure as an adult from diaper changing:*

*2.2 f/cc x = 0.11*

*Estimate of Case #3’s inhalation exposure from perineal powdering:*

*2.57 f/cc x =1.04*

*Estimate of Case #3’s inhalation exposure from upper body powdering:*

*1.9 f/cc x =0.40*

*Total asbestos exposure of Case #3 from talc powder:*

*0.04 + 0.11 + 1.04 + 0.40 = 1.59*

*Asbestos fibers breathed in by Case #3 from talc powder use as an* ***adult****:*

*x = 11,315,000,000 asbestos fibers*

*Asbestos fibers breathed in by Case #3 from talc powder use as an* ***infant****:*

*x =* *220,501,440 asbestos fibers*

*Total dose of asbestos fibers in Case #3 from talc powder:*

*11,315,000,000 asbestos fibers + 220,501,440 asbestos fibers = 11,535,501,440 asbestos fibers*

This is an underestimate of the actual asbestos inhaled because we did not consider the following exposures:

* Exposure to transvaginal asbestos fibers from J&J talcum powder
* Cleaning the bathroom rug
* Application of talcum powder on her family’s sheets and pillows
* Use of condoms dusted with talc until 1994
* Application of talcum powder to diaphragm

**Case #4**

*Past medical history*

Case #4 was a 79-year-old postmenopausal Caucasian woman who passed away in 2014. The patient had 2 children.

*History of present illness*

Upon discovery of a cyst in her midsection, she underwent a hysterectomy, bilateral salpingo-oophorectomy resection, a low anterior resection with anastomosis for complete debulking of gross tumor, bilateral pelvic and peri-aortic lymph node dissection, omentectomy, and cystoscopy in the fall of 2013 at age 78. Pathology revealed ovarian tumors of up to 3.5 cm on the left, and the patient was diagnosed as having poorly differentiated, Grade 3/4 serous adenocarcinoma, Stage IIC. The patient died in June 2014.

*Other ovarian cancer risk factors*

She was 78 years old at the time of her diagnosis. It is unknown whether or not the patient had tubal ligation. The patient had no history of endometriosis. Her use of birth control pills, intrauterine devices, and hormone replacement therapy is unknown. Her history of breastfeeding is unknown. She tested negative for BRCA 1 and BRCA 2. Her brother died of prostate or bladder cancer (disputed).

*Exposure history*

Because the patient is deceased, a complete exposure history was not collected. Case #4 used Johnson’s Baby Powder for 43 years. Her son-in-law testified that he found J&J talc powder in her home after she died and that there was dust in the bathroom. He said that, through the years he knew her, he could smell the talc powder on her and that there was always Johnson’s Baby Powder in her bathroom. His wife complained about how much powder her mother used. The son-in-law said that his wife told him that case #4 used talc powder every time she went to the restroom.

The patient has no known direct or indirect exposure to asbestos from any other sources.

*Dose Calculation*

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| --- | --- | --- |
| **Case #4 Usage** | **Duration** | **Frequency** |
| Body powdering | 43 years | Once per day |

*Estimate of Case #4’s inhalation exposure from perineal powdering:*

*2.57 f/cc x =0.38*

*Total asbestos exposure of Case #4 from talc powder:*

*0.38*

*Asbestos fibers breathed in by Case #4 from talc powder use as an* ***adult****:*

*x = 2,774,000,000 asbestos fibers*

*Total dose of asbestos fibers in Case #4 from talc powder:*

*2,774,000,000 asbestos fibers*

This is an underestimate of the actual asbestos inhaled because we did not consider the following exposures:

* Exposure to transvaginal asbestos fibers from J&J talcum powder
* Possible use more than once per day (every time she used the restroom according to son-in-law).

**Case #5**

*Past medical history*

Case #5 is a 59-year-old Hispanic woman with a history of migraines, treatment for a depressive disorder, insomnia, acute sinusitis, and dermatophytosis of the nail. The patient has five children (G5P5), two of which were born by Cesarean section. In 2000, she had a tubal ligation.

*History of present illness*

In the late summer of 2011, the patient was seen regarding of 2 months of abdominal pain and bloating issues that included 4 bowel movements per day. An abdominal ultrasound, a colonoscopy and related pathology were all normal. At the beginning of the following year, a pelvic ultrasound indicated enlarged ovaries, with multiple complex cysts, and an MRI suggested that the bilateral complex cysts were concerning for ovarian malignancy. The patient, at age 52, underwent surgery for a radical resection of ovarian primary malignancy with bilateral salpingo-oophorectomy and omentectomy; a pelvic and periaortic lymphadenectomy; and an appendectomy. Pathologic diagnosis was low-grade serous carcinoma (grade 2 of 3) with a prominent component of serous borderline tumor, with focal fallopian tube and multifocal ovarian serosal surface involvement. One reviewer of the pathology felt that this was a serous borderline tumor that had transformed to a serous carcinoma, and found certain of the ovarian neoplasia specimens to be significantly involved by metastatic serous carcinoma (grade 2) and particularly striking serous carcinoma outside of the ovary.

The patient underwent chemotherapy treatment with Anastrozole following diagnosis. As of early 2017, the patient remained on aromatase inhibitors for her recurrent low grade serous ovarian cancer.

*Other ovarian cancer risk factors*

The patient’s onset of menarche was at age 12. She breastfed for only one week. The patient had never used an intrauterine device (IUD), though she had used birth control pills (BCPs) on-and-off, for 5 years. In 2000, she had a tubal ligation, and from 2003 to the present, used condoms. The patient was never diagnosed with endometriosis, and did not use hormone therapy. The patient was never tested for a BRCA mutation, though there was no known cancer of any kind in her family history.

*Exposure History*

The patient used talc powder for 50 years from age 5 to 55 (1964-2014); she used a mixture of JBP, STS, and STS Shimmer. The patient’s mother used Johnson’s Baby powder on the patient during diaper changes until approximately age 2.

Beginning at age 5, the patient used the powder cosmetically once each day by applying it to her chest, underarms, and neck. She also applied it to her genital area and underwear every day, and put talc on her pads and tampons while menstruating. She sometimes shook the powder directly onto her body; other times, she shook it into her hands before applying it. She inhaled the dust. She used the talc in her bathroom and swept the dust up every day. She stopped her use of talc powder when she saw a news story regarding talc and cancer.

She used talc during diaper changes about ten times per day for about 2 years for each of her 5 children. She received Johnson’s Baby Powder as part of the gift basket given to her by the hospital where her children were born. She inhaled the powder during diaper changing.

She used talc powder three times per week in her shoes. Once every month, she applied the powder to her sheets, on her carpets, and on her car mats. She shook the powder directly from the bottle onto these surfaces.

The patient has no known direct or indirect exposure to asbestos from any other sources. The patient completed 11th grade before receiving her GED. Her work history includes 28 years as an accountant for the county government, a job that she had to quit following her diagnosis of cancer. Divorced since 2013, the patient’s first husband was a copper miner who showered daily at work before returning home. Her second husband worked at a desk job for local government.

*Dose Calculation*

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| --- | --- | --- |
| **Case #5 Usage** | **Duration** | **Frequency** |
| Perineal Powdering | 47 years | 1 time per day |
| Upper Body Powdering | 47 years | 1 time per day |
| Having diaper changed (as baby) | 2 years | 8 times per day |
| Changing diaper (as adult) | 10 years | 10 times per day |

*Estimate of Case #5’s inhalation exposure as a baby from diaper changing:*

*1.8 f/cc x = 0.04*

*Estimate of Case #5’s inhalation exposure as an adult from diaper changing:*

*2.2 f/cc x = 0.31*

*Estimate of Case #5’s inhalation exposure from perineal powdering:*

*2.57 f/cc x =0.42*

*Estimate of Case #5’s inhalation exposure from upper body powdering:*

*1.9 f/cc x =0.31*

*Total asbestos exposure of Case #5 from talc powder:*

*0.04 + 0.31 + 0.42 = 1.08*

*Asbestos fibers breathed in by Case #5 from talc powder use as an* ***adult****:*

*x = 7,592,000,000 asbestos fibers*

*Asbestos fibers breathed in by Case #5 from talc powder use as an* ***infant****:*

*x = 220,501,440 asbestos fibers*

*Total dose of asbestos fibers in Case #5 from talc powder:*

*7,592,000,000 asbestos fibers + 220,501,440 asbestos fibers = 7,812,501,440 asbestos fibers*

This is an underestimate of the actual asbestos inhaled because we did not consider the following exposures:

* Exposure to transvaginal asbestos fibers from J&J talcum powder
* Her mother’s application of J&J Baby Powder on her whole body
* Application of talcum powder in her shoes
* Application of talcum powder on her sheets, carpets and car mats

**Case #6**

*Past Medical History*

Case #6 is a 61-year-old Caucasian woman with a history of hypothyroidism. The patient’s age at menarche was 11. She had no history of diaphragm or intrauterine device (IUD) use, and used birth control for approximately 3 years, from 1981-1984. In the Spring of 1985, the patient was seen for an investigation of primary infertility. Her annual cervical/endocervical screen was negative and a hysterosalpingogram was normal. In the Fall of 1985, at age 27 (gravida 0, para 0,) she was treated for infertility with Clomid (50 mg, 1 daily, beginning on day 6 of her cycle, for 5 days). The patient took Clomid daily for approximately two months. Her first child was born in late 1986, and she gave birth a second time in mid-1988. In 1988, at 183 lbs, the patient was told to lose weight, and was put on Adipex P for weight control. In 1989, at age 31, she gave birth to twins (G3, P4.) In the Fall of 1993, a cervical/endocervical smear indicated the presence of columnar and or metaplastic cells, categorized as benign cellular changes.

*History of present illness*

In mid-2009, the patient was in her usual state of good health when, following a week of new abdominal firmness and pain that extended to her back, the patient took a flight and experienced sudden abdominal swelling. CT scans revealed moderate-to-large atelectasis, a 5 mm density seen at the right lung base, and peritoneal neoplastic nodules in the pelvis and subphrenic region. Via a paracentesis approximately 3,600 ccs of fluid were removed and initial results indicated no malignancy. Further cytopathology findings reported the presence of malignant cells and adenocarcinoma in the peritoneal fluid. The patient underwent a total abdominal hysterectomy, bilateral salpingo-oophorectomy, diaphragmatic stripping, radical tumor debulking, retroperitoneal stripping, and appendectomy and was diagnosed with of high grade serous papillary carcinoma in June 2009 at age 51. The patient underwent 6 cycles of chemotherapy with Carboplatin and Docetaxel and 6 cycles of consolidation IP chemo with Cisplatin.

In early 2015, she was noted to be without evidence of disease, and in remission for 6 years. In early 2016, the patient’s CA-125 level was elevated and subsequent CT scans indicated right epiphrenic soft tissue masses/lesions consistent with metastatic disease. A biopsy of the largest (3.7 x 2.2 cm) was found to be positive for malignant cells and led to a diagnosis of metastatic adenocarcinoma with an immunoprofile consistent with metastatic high grade papillary serous carcinoma of Mullerian origin. The patient underwent 6 cycles of standard chemotherapy with Carboplatin & Taxol/Docetaxel, resulting in some tumor shrinkage. Beginning in late-2017, the patient began another round of chemotherapy treatment with Cisplatin and Gemzar.

*Other ovarian cancer risk factors:*

She did not have a tubal ligation, and she did not breastfeed. At age 51, the patient was peri-menopausal at the time of diagnosis. The patient had no family history of colon cancer or polyps, though her mother died of pancreatic cancer at age 79. Results of the patient’s BRCA1 and BRCA2 testing in 2013 were negative.

*Exposure history*

The patient used talc powder for 40 years from age 11 to 51 (1959-2009); she used a mixture of JBP and STS over this period. Beginning at age 11 until age 51, the patient used powder on herself once daily after showering by shaking it directly into her underwear, and by applying it directly onto her chest and arms. The patient used 2-3 22-oz bottles of powder in this way per year. She reported having seen visible dust when she applied the talc, and remembered that the talc smelled good when she inhaled it.

The patient also used talc powder during diaper changes 10 times per day for all 4 of her children, for approximately 2-3 years each. She received Johnson’s Baby Powder in a gift basket from the hospital when she delivered her children. She shook the powder directly onto her babies and onto the diapers and both saw and inhaled talc powder dust. The patient’s mother had used JBP on the patient after baths, and during her diaper changes until approximately age 2.

Once per month – and more frequently in the summer, the patient’s husband also used talc powder, to prevent chafing. Both he and the patient applied the talc powder in the bathroom, which she would vacuum in order to clean up the talc.

Approximately 2-3 times per week, for two years (from 1990-1992,) the patient/and her husband used condoms which may have been packaged in talc.

The patient has no known direct or indirect exposure to asbestos from any other sources. She worked as a computer operator (from ~1975 to 1985) and school bus driver (from 1995 to 2017) – a job from which she had to go on leave in early 2018 as a result of her disease. Her husband of 37 years worked as a network engineer.

*Dose Calculation*

|  |  |  |
| --- | --- | --- |
| **Case #6 Usage** | **Duration** | **Frequency** |
| Perineal Powdering | 40 years | 1 time per day |
| Upper Body Powdering | 40 years | 1 time per day |
| Having diaper changed (as baby) | 2 years | 8 times per day |
| Changing diaper (as adult) | 10 years | 10 times per day |

*Estimate of Case #6’s inhalation exposure as a baby from diaper changing:*

*1.8 f/cc x = 0.04*

*Estimate of Case #6’s inhalation exposure as an adult from diaper changing:*

*2.2 f/cc x = 0.31*

*Estimate of Case #6’s inhalation exposure from perineal powdering:*

*2.57 f/cc x =0.36*

*Estimate of Case #6’s inhalation exposure from upper body powdering:*

*1.9 f/cc x =0.26*

*Total asbestos exposure of Case #6 from talc powder:*

*0.04 + 0.31 + 0.36 + 0.26 = 0.97*

*Asbestos fibers breathed in by Case #6 from talc powder use as an* ***adult****:*

*x = 6,789,000,000 asbestos fibers*

*Asbestos fibers breathed in by Case #6 from talc powder use as an* ***infant****:*

*x = 220,501,440 asbestos fibers*

*Total dose of asbestos fibers in Case #6 from talc powder:*

*6,789,000,000 asbestos fibers + 220,501,440 asbestos fibers = 7,009,501,440 asbestos fibers*

This is an underestimate of the actual asbestos inhaled because we did not consider the following exposures:

* Exposure to transvaginal asbestos fibers from J&J talcum powder
* Her mother’s application of J&J Baby Powder on her whole body after baths
* Her husband’s usage of talcum powder in the same house
* Vacuuming to clean up the talc dust in the bathroom
* Use of condoms dusted with talc until 1994

**Case #7**

*Past medical history:*

Case #7 is a 63-year old Caucasian woman with a previous diagnosis of renal cell carcinoma in 2010 at age 55. The patient had onset of menarche at age 13. She has three children (G3P3). She used birth control pills (BCPs) for one year before the birth of her second child. She had a history of ovarian cysts and had one hormone shot when she first went into menopause, but none since.

The patient had a previous diagnosis of renal cell carcinoma. At the end of the summer in 2010 the patient, at age 55 and menopausal, reported a bulge and symptoms of frequency. She was assessed with cystocele and Stage II utero-vaginal prolapse. A Pap smear taken at the time was negative for intraepithelial lesion and malignancy. A month later she presented with right-sided, mid-to-upper quadrant pain, an abdominal/pelvic CT indicated a right renal mass that was clinically considered to be a malignant carcinoma. An abdominal/pelvic CT with contrast showed a right kidney mass (2.4 x 2.5 cm) extending from the posterior cortex. The patient underwent a right partial nephrectomy via laparoscopy. Pathology indicated a clear cell renal cell carcinoma with resection margins free of tumor, and no evidence of capsule invasion. The diagnosis was renal cell carcinoma. The following year, an abdominal/pelvic CT indicated no evidence of recurrent or residual renal cell carcinoma.

*History of present illness*

In late summer, 2011, the patient experienced several weeks of pain and swelling in her abdomen, significant enough that she could no longer sleep on her stomach. A CT showed pelvic ascites of uncertain etiology. Thirty liters of fluid containing predominantly lymphocytes and mesothelial cells were obtained via a paracentesis. Another abdominal CT showed peritoneal nodular deposits, a small left effusion, and enlargement of the right and left adnexa. An ultrasound identified complex-appearing adnexal lesions that had developed since a 2010 CT and were presumed to be in the location of the ovaries. The patient presented the next day to the ER with increasing abdominal pain. She was admitted, with a plan to perform an ultrasound and aspiration of the ascites. Results from a CA-125 test were in the 3,000s (reference: <35 µ/mL.) An exploratory laparotomy with total abdominal hysterectomy, bilateral salpingo-oophorectomy, partial omentectomy, and extensive cyto-reductive surgery was performed and metastatic cancer was found, with involvement of the omentum, hemi-diaphragm, the ileum, the cul-de-sac, and the bladder. In late-2011 at age 56, she was diagnosed with bilateral, stage IIIc, grade 3, serous adenocarcinoma unrelated to her previous renal cell carcinoma. From late 2011 to mid-2012, the patient received 6 cycles of chemotherapy with Carboplatin and Taxol. In the spring of 2013, she was determined to have no evidence of disease. At the end of 2017, the patient was assessed as being clinically disease-free.

*Other ovarian cancer risk factors*

There was no family history of ovarian cancer, and the patient was BRCA1 and 2-negative. She had a tubal ligation age 28. The patient had no known exposure to asbestos. The patient has no history of condom use, no history of intra-uterine device (IUD) use, and did not breastfeed. She never received estrogen replacement therapy. The patient had a sister with breast cancer who died in her late 50s.

*Exposure history*

The patient used talc powder for 37 years from age 19 to 56 (1974-2011); she used JBP, STS, and STS Shimmer over this period. Her personal cosmetic use of the powder (from age 19 to age 56) involved shaking the powder directly into her underwear, and onto her back and chest every day after showering. Every year, she personally used 3-4 22-oz. bottles of powder (either Shower to Shower or Johnson’s Baby Powder).

She cleaned up the powder dust by vacuuming and then wet-mopping. Co-workers frequently commented that she still had powder on her clothes when she arrived at work. She wore make-up very rarely, and used face powder 1-2 times/year. She does not know if the face powder contained talc. She stopped using talc products in 2011 because she saw a legal advertisement on talc and ovarian cancer.

She also used the powder during every diaper change of her 3 children (7-8 times daily for 2 years each,) and used powder on them every day for 2 years each after she bathed them. She also used powder on the diapers of all 6 of her grandchildren, 6-8 times per day, 3-4 days per week, for 2 years each. She used two 22-oz. bottles of Johnson’s Baby Powder per year on diapering her children and grandchildren.

The patient has no known direct or indirect exposure to asbestos from any other sources. She completed high school and has held jobs in retail (including K-mart, and Walmart, where from 1995 to 2011 she was a department manager). Her husband works in an equipment laboratory where he has no known exposure to asbestos.

*Dose Calculation*

|  |  |  |
| --- | --- | --- |
| **Case #7 Usage** | **Duration** | **Frequency** |
| Perineal Powdering | 37 years | 1 time per day |
| Upper Body Powdering | 37 years | 1 time per day |
| Changing diaper (as adult) | 6 years | 7.5 times per day |

*Estimate of Case #7’s inhalation exposure as an adult from diaper changing:*

*2.2 f/cc x = 0.14*

*Estimate of Case #7’s inhalation exposure from perineal powdering:*

*2.57 f/cc x =0.33*

*Estimate of Case #7’s inhalation exposure from upper body powdering:*

*1.9 f/cc x =0.24*

*Total asbestos exposure of Case #7 from talc powder:*

 *0.14 + 0.33 + 0.24 = 0.71*

*Asbestos fibers breathed in by Case #7 from talc powder use as an* ***adult****:*

*x = 5,183,000,000 asbestos fibers*

*Total dose of asbestos fibers in Case #7 from talc powder:*

*5,183,000,000 asbestos fibers*

This is an underestimate of the actual asbestos inhaled because we did not consider the following exposures:

* Exposure to transvaginal asbestos fibers from J&J talcum powder
* Application of talcum powder to her 6 grandchildren’s diapers
* Vacuuming talcum powder dust

**Case #8**

*Past Medical History*

Case #8 was a 48-year-old Caucasian female with a history of migraines, hypothyroidism, and fibrocystic breasts who passed away in 2018. She began menstruation at age 13, and gave birth to her two children, both delivered vaginally (G3, P2, A1). The patient reported that birth control caused worsened migraines and she had used them for 9 months in total over her lifetime. The patient reported an abnormal pap smear in 1998, though the treatment for that was unknown.

*History of present illness*

In the summer of 2014, the patient experienced constant, diffuse abdominal pain for 2-3 weeks. 2600 mL of ascites were drained by paracentesis and a liver mass biopsy showed metastatic adenocarcinoma and morphologic and immunohistochemical findings in keeping with an ovarian primary carcinoma. In 2014 at age 44, the patient was diagnosed with stage IV high grade primary bilateral ovarian serous carcinoma with involvement of the ovarian surface, right fallopian tube, and right pelvic sidewall. The patient underwent 3 cycles of neoadjuvant chemotherapy with Carboplatin and Taxol. She underwent exploratory laparotomy with total abdominal hysterectomy, bilateral salpingo-oophorectomy, and debulking three months after diagnosis. At a follow-up exam in early 2015, the patient’s solitary hepatic metastasis was considered resolved, a 3mm pulmonary micronodule was stable, as were mild ascites, and the sclerotic lesions previously seen on the thoracolumbar spine were then considered to be stable, treated osseous metastases. A CT scan later that year indicated a new sub-carinal lymph node thought to represent metastatic disease and the patient started a second round of chemotherapy with Carboplatin and Gemzar, later changed to Carboplatin and Taxol due to a patient reaction. From late 2016 to the summer of 2017, the patient underwent a third round of chemotherapy, first with Taxol and Bevacizumab, then Bevacizumab alone, and when this was unsuccessful, Taxol and Carboplatin. CAT scan in late 2017 showed enlarged abdominal/thoracic and pelvic lymph nodes. The patient passed away in August 2018.

*Other ovarian cancer risk factors*

The patient had a BRCA2 variant L771V resulting in a substitution of ileum for leucine at the amino acid position 771 of the BRCA2 protein; otherwise, she was BRCA 1 and BRCA 2 negative. She never took birth control.

Her father had prostate cancer at age 63 and her mother had lung cancer at age 71. A paternal cousin had cervical cancer. The patient’s sister was diagnosed at age 38 with breast cancer; 2 paternal aunts also had breast cancer, and paternal grandfather had lung cancer.

*Exposure history*

The patient was interviewed and examined before she passed away. The patient used talc powder for 29 years from age 15 to 44 (1985-2014). The patient daily applied Johnson & Johnson Baby Powder as part of her personal cosmetic routine for 24 years (from 1985-1990, and from 1995-2014). For 5 years in the interim (1990-1995,) she used Johnson & Johnson Baby Powder only 1-2 times per month. She applied the powder, once daily after every shower, by shaking it directly onto her entire body, except when she applied it to her thighs and perineum, when it was her practice to first pour it into her hand. For 3 years (from 1987-1990,) she did apply the powder directly on to her genitals. Every month, she used two 16-oz. bottles of J&J Baby Powder. She usually applied the talc powder in the bathroom or bedroom; she saw and inhaled visible dust when she used it. She stopped using Johnson & Johnson’s Baby Powder when she saw an article regarding talc and ovarian cancer.

She used the talc powder on her 2 children every time she bathed them for 4 years each, and every time she changed their diapers (3-4 times/day) for 2 years each. When the patient gave birth to her two children, the hospital presented her with J&J baby product gift baskets that contained a small sample of J&J Baby Powder. She both shook the talc directly onto her children and poured it into her hands being rubbing it in. She saw and inhaled visible dust when she applied the talc powder to her children.

The patient has no known direct or indirect exposure to asbestos from any other sources. She has a college degree in psychology was employed as a sales associate and small business owner. She met her husband when she worked in a large-chain retail store where he is a manager.

*Dose Calculation*

|  |  |  |
| --- | --- | --- |
| **Case #8 Usage** | **Duration** | **Frequency** |
| Perineal Powdering | 24 years | 1 time per day |
| Upper Body Powdering | 24 years | 1 time per day |
| Changing diaper (as adult) | 4 years | 3.5 times per day |

*Estimate of Case #8’s inhalation exposure as an adult from diaper changing:*

*2.2 f/cc x = 0.04*

*Estimate of Case #8’s inhalation exposure from perineal powdering:*

*2.57 f/cc x =0.21*

*Estimate of Case #8’s inhalation exposure from upper body powdering:*

*1.9 f/cc x =0.16*

*Total asbestos exposure of Case #8 from talc powder:*

 *0.04 + 0.21 + 0.16 = 0.41*

*Asbestos fibers breathed in by Case #8 from talc powder use as an* ***adult****:*

*x = 2,993,000,000 asbestos fibers*

*Total dose of asbestos fibers in Case #8 from talc powder:*

*2,993,000,000 asbestos fibers*

This is an underestimate of the actual asbestos inhaled because we did not consider the following exposures:

* Exposure to transvaginal asbestos fibers from J&J talcum powder
* Her usage of J&J Baby Powder from 1990 to 1995 (lack of frequency data)
* Her application of J&J Baby Powder on her children after baths

**Case #9**

*Past Medical History*

Case #9 was a 45-year-old Caucasian woman who passed away in July 2017. She had one child, who she breastfed.

*History of present illness*

In 2014, at age 41, the patient was seen at the hospital for near-complete pelvic organ prolapse. Workup revealed large pelvic masses and a para-aortic mass abutting the renal hilum, as well as elevated levels of CA-125. The patient underwent cytsoscopy, bilateral retrograde ureteropyelogram, bilateral ureteral stent placement, left pelvic lymph node dissection, left modified template retroperitoneal lymph node dissection with excision of large para-aortic mass, left ureterolysis, resection right hemidiaphragm, stripping of right hemidiaphragm, stripping of the right retroperitoneum, wedge resection or left hemidiaphragms mass, open cholecystectomy, appendectomy, resection of mass in the lesser sac, and esophagogastroduodenoscopy. Final pathologic diagnosis was stage IIIc poorly differentiated ovarian adenocarcinoma, with focal serous papillary adenocarcinoma, and minor components of transitional cell and mucinous carcinoma: 70% poorly differentiated; 15% serous; 10% transitional; and 5% mucinous. She was 41 years old at the time of diagnosis. The patient underwent 26 rounds of chemotherapy and radiation. The patient died of her ovarian cancer in July 2017.

*Other ovarian cancer risk factors*

The patient’s age at diagnosis was 41. She did not have HRT or a tubal ligation.

The patient had a family history of breast cancer: her grandmother, cousin, and two great-aunts had breast cancer. She also had a maternal aunt who suffered pancreatic cancer. The patient was BRCA-negative.

*Exposure history*

Because the patient is deceased, a complete exposure history was not collected. The patient’s mother used Johnson & Johnson brand talc baby powder on her during diaper changes. Her mother also applied the baby powder on to the patient after baths when she was a baby and when she was a little girl. According to her mother and husband, the patient herself continued this practice, and applied talcum powder to her underarms and to her perineal area once a day until 2014 (age 42). The patient’s mother and sister used the talcum powder in the same manner.

Her entire household used baby powder for various purposes: her father applied it to his armpits and chest and her family used talcum powder to abate the sand when they went to the beach.

The patient has no known direct or indirect exposure to asbestos from any other sources. The patient was an artist, who worked from her home in California. Her husband is a self-employed businessman who owns a furniture store.

*Dose Calculation*

|  |  |  |
| --- | --- | --- |
| **Case #9 Usage** | **Duration** | **Frequency** |
| Perineal Powdering | 42 years | 1 time per day |
| Upper Body Powdering | 42 years | 1 time per day |
| Having diaper changed (as baby) | 2 years | 8 times per day |

*Estimate of Case #9’s inhalation exposure as a baby from diaper changing:*

*1.8 f/cc x = 0.04*

*Estimate of Case #9’s inhalation exposure from perineal powdering:*

*2.57 f/cc x =0.37*

*Estimate of Case #9’s inhalation exposure from upper body powdering:*

*1.9 f/cc x =0.28*

*Total asbestos exposure of Case #9 from talc powder:*

*0.04 + 0.37 = 0.69*

*Asbestos fibers breathed in by Case #9 from talc powder use as an* ***adult****:*

*x = 4,745,000,000 asbestos fibers*

*Asbestos fibers breathed in by Case #9 from talc powder use as an* ***infant****:*

*x = 220,501,440 asbestos fibers*

*Total dose of asbestos fibers in Case #9 from talc powder:*

*4,745,000,000 asbestos fibers + 220,501,440 asbestos fibers = 4,965,501,440 asbestos fibers*

This is an underestimate of the actual asbestos inhaled because we did not consider the following exposures:

* Exposure to transvaginal asbestos fibers from J&J talcum powder
* Her mother’s application of J&J Baby Powder on her whole body after baths
* Her family’s usage of J&J Baby Powder in the same house
* Usage of talcum powder to abate the sand when they went to the beach

**Case #10**

*Past Medical History:*

Case #10 is a 47-year-old Caucasian woman with a history of ulcerative colitis, gall bladder dysfunction, acute sinusitis, GERD, and hypertension. She has 2 children (G2P2). Her ulcerative colitis was resolved in the early 2000s, with recurrence including rectal bleeding and loose stools, for which she was treated with medication in 2012. The patient’s brother also has colitis. In 2013, she experienced an increase in abdominal pain (right upper quadrant, epigastrium, periumbilical area, and lower abdomen), thought to be brought on by the stress of caretaking for her grandparents; abdominal distention, right back and flank pain, an increase in heartburn, and some indigestion. In late 2013, she had significant diarrhea, hematochezia, and a change in bowel habits which led to a colonoscopy, the impression of which was internal hemorrhoids. Biopsies taken at that time for an evaluation of microscopic colitis were found to be benign.

She experienced menarche at age 12. She had had a Cesarean section in 2002, at age 30

*History of present illness*

In the fall of 2014, the patient reported bloating and that she felt a solid mass in her abdomen. Approximately one month prior, she had begun physical therapy for back pain. She was encouraged to continue with physical therapy. By the end of that year, she reported to the ER with complaints of heavy menstrual bleeding and cramping, an abdominal mass and feelings of fullness over the two prior weeks. An X-ray revealed an abdominal mass. A CT of the abdomen and pelvis showed a large (~19 x 11 x 15 cm) cystic mass, with some soft tissue, that seemed to come off of the right ovary. She underwent an exploratory laparotomy, total abdominal hysterectomy, bilateral salpingo-oophorectomy, partial omentectomy, and staging laparotomy, with multiple peritoneal biopsies, bilateral pelvic lymph node biopsies, and a periaortic lymph node biopsy. In early 2015 at age 42, the patient was diagnosed with high-grade ovarian papillary serous carcinoma limited to the right ovary. She completed 5 cycles of post-operative adjuvant chemotherapy with Taxol and Carboplatin. In early 2018, the patient was without evidence of recurrent disease.

*Other ovarian cancer risk factors*

Her mother was diagnosed with breast cancer at age 51, and her paternal grandmother was diagnosed with breast cancer at age 65. The patient was BRCA-negative. The patient did not have hormone replacement therapy (HRT) or use an intrauterine device. She never smoked. She used birth control pills (BCPs) for only 1-2 months. She breastfed for a total of 2 months.

*Exposure history*

The patient used talc powder for 32 years from age 11 to 43 (1983-2015); she used JBP, STS, and STS Shimmer during this period. Starting at age 11, the patient used talc powder at least twice per day, applying it to her underwear, to her bra, and to her chest. During menstruation, she also applied the powder to her pads. Twice each week, she also applied it to her face and to her hair as dry shampoo. When she used the powder on her breasts and head, she poured it into her hands first; otherwise she shook the powder directly from the bottle on to her body; she saw and inhaled talc powder.

She also used baby powder when diapering her own 2 children for 2 years each. As caregiver to her grandmother, she also used the powder for approximately 5 years in the diapers that her grandmother wore. She pre-powdered one 12-pack of adult diapers at a time. She saw and inhaled talc dust during these activities. Her mother used the baby powder on her as an infant as part of her diapering routine.

For 24 years, she also used and vacuumed up the powder twice/week on her carpets. For 15 years, she cleaned the homes of others, and used the talc powder in the same way. She also used powder on her dog once/week for 23 years. The dog shook after she applied the powder, and spread the dust throughout the immediate area. With talc powder, she removed sand from her body an average of 30 times/summer. She also used talc in her shoes for 34 years.

She used condoms from 1993 to 2013; in the 1990s, these may have contained talc.

The patient has no known direct or indirect exposure to asbestos from any other sources. Her husband worked on a Navy ship in NJ for one year (~1992-1993) as a religious petty officer (chaplain’s assistant). She did not move with him; she stayed in South Carolina. Her husband had no known asbestos exposures. The patient completed two years of college and was a stay-at-home mother for 15 years before beginning work as the activities director in a skilled nursing unit Alzheimer’s ward.

*Dose Calculation*

|  |  |  |
| --- | --- | --- |
| **Case #10 Usage** | **Duration** | **Frequency** |
| Perineal Powdering | 32 years | 2 times per day |
| Upper Body Powdering | 32 years | 2 times per day |
| Having diaper changed (as baby) | 2 years | 8 times per day |
| Changing diaper (as adult) | 4 years | 8 times per day |

*Estimate of Case #10’s inhalation exposure as a baby from diaper changing:*

*1.8 f/cc x = 0.04*

*Estimate of Case #10’s inhalation exposure as an adult from diaper changing:*

*2.2 f/cc x = 0.10*

*Estimate of Case #10’s inhalation exposure from perineal powdering:*

*2.57 f/cc x =0.57*

*Estimate of Case #10’s inhalation exposure from upper body powdering:*

*1.9 f/cc x =0.42*

*Total asbestos exposure of Case #10 from talc powder:*

*0.04 + 0.10 + 0.57 + 0.42 = 1.13*

*Asbestos fibers breathed in by Case #10 from talc powder use as an* ***adult****:*

*x = 7,957,000,000 asbestos fibers*

*Asbestos fibers breathed in by Case #10 from talc powder use as an* ***infant****:*

*x = 220,501,440 asbestos fibers*

*Total dose of asbestos fibers in Case #10 from talc powder:*

*7,957,000,000 asbestos fibers + 220,501,440 asbestos fibers = 8,177,501,440 asbestos fibers*

This is an underestimate of the actual asbestos inhaled because we did not consider the following exposures:

* Exposure to transvaginal asbestos fibers from J&J talcum powder
* Application of J&J Baby Powder to her grandmother’s diapers
* Application of talcum powder to her sanitary pads
* Application of talcum powder as dry shampoo
* Vacuuming up the talcum powder on her carpets
* Using talc powder to clean her house and the homes of others
* Application of J&J Baby Powder on her dog
* Usage of talcum powder to remove sand from her body
* Use of condoms dusted with talc until 1994