DES Action® VOICE

We identify, educate, empower and advocate for DES-exposed individuals

Inside

A Focus on Diethylstilbestrol

SUMMER 2021 #169

Increased Risk of Preterm Birth, Low Birthweight in Third Generation

DES Grandchildren appear to have an increased risk of premature birth and low birthweight compared to children whose mothers were not exposed prenatally to DES, according to a new study.

The ongoing study was conducted by a team of researchers at Harvard University School of Public Health, Harvard Medical School and Columbia University. It was published April 5, 2021, in the *International Journal of Epidemiology* (DOI: 10.1093/ije/dyab065).

The researchers analyzed data from the Nurses' Health Study, a large, long-term study of more than 100,000 registered nurses that allows scientists to study a variety of different environmental exposures and chronic disease.

The women in the study were born between 1946 and 1964 in the U.S. The study participants complete questionnaires about their lifestyle, medication use and illnesses or other health issues every two years.

Out of 54,334 pairs of grandmothers (DES Mothers) and mothers (DES Daughters), 1.8% of the grandmothers (a total of 973 DES Mothers) were given DES while pregnant. These DES Mothers had a combined 128,275 grandchildren. Among these grandchildren, 6.2% were born premature, and 3.4% had a low birthweight.

A low birthweight was defined as less than 5.5 lbs, and preterm birth was defined as being born at less than 37 weeks gestation.

DES Grandchildren were three times more likely to have a low birthweight than children whose mothers had not been exposed to DES in utero. DES Grandchildren were also 2.8 times more likely to be born premature. Finally, DES Daughters were 1.6 times more likely to have a stillbirth than non-DES Daughters.

Even for DES grandchildren born at full term, there is a 1.6 times greater risk of being born with a low birthweight.

In their calculations, the researchers took into account a long list of other characteristics that might play a role in the risk of preterm birth or low birthweight. Those factors included, for example, the socioeconomic status, education level, occupation and home ownership of the DES Grandchildren's grandparents (DES Mothers and their partners).

The authors also made adjustments to remove the possible effects of smoking or alcohol use during pregnancy among DES

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Possible 3rd Gen Effects from DDT Exposure

A recent study found evidence of third generation effects for a different chemical than DES, showing that it is possible for multiple different chemicals to impact later generations. The study focused on women who had been exposed to DDT, a pesticide that was used for many years in the U.S. before the Environmental Protection Agency finally banned it in 1972.

The study, published April 14 in the medical journal *Cancer Epidemiology, Biomarkers and Prevention*, found that the granddaughters of women exposed to DDT during pregnancy had a higher risk of obesity than those whose grandmothers had not been exposed to DDT.

Specifically, the researchers looked at granddaughters with generational exposure to DDT whose grandmothers were a healthy weight. These granddaughters were 2.6 times more likely to have obesity than those without the exposure.

The scientists did not find any increased risk of obesity among the DDT-exposed granddaughters of grandmothers who themselves were overweight or had obesity.

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May Member Meeting Update

DES Action held a member meeting in May to discuss the news that the National Institutes of Health has ceased funding the DES Follow-Up Study within the National Cancer Institute. DES Action has partnered with The Endocrine Society to seek funding to continue the generational study, ideally with the National Institute of Environmental Health Sciences (NIEHS).

Before the meeting, we sought input from members about research they most want to see continue regarding DES. Members listed various health problems they have experienced that they suspect could be related to DES, but there isn't enough research to determine that.

Members would also like to see investigation into DNA markers to learn whether people with certain genes are more susceptible to effects of DES.

DES researcher Michel Tournaire said there needs to be ongoing research into Third Generation effects, especially regarding fertility, pregnancy outcomes, birth defects and genital malformations and tumors. He also wants to see research looking for birth defects in the Fourth Generation.

Aside from halting new knowledge, suspending current research also reduces awareness of DES and its effects. One member had to argue that DES is a risk factor when she got her mammogram. Another noted that medical schools need to include DES in curricula. It's clearly an uphill battle to educate new generations of doctors and even experienced doctors about DES.

The meeting focused on the importance of continuing the *DES Follow-Up Study* and other DES research. While it's too late to form a new cohort of DES Daughters, it's not too late to form cohorts of Grandchildren.

Finally, some members wondered why the CDC had removed information from their website on DES. The information has not been updated in many years, but the pages are still available online using the Internet Archive. A link is available on the DES Action website.

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We have a number of old emails in our database for members. This prevents us from keeping you up to date. Also, if your old email is connected to your membership record, it may prevent you from logging in and accessing the website. If your email has changed, please email Britt@desaction.org with your new email. -BV

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Q&A with Michelle: From Mammogram Tech to Breast Cancer Survivor

Michelle P. ('51) is a DES Daughter in Syracuse, New York, whose career as an X-ray technologist and mammographer helped her navigate her care when she was diagnosed with breast cancer. Her first diagnosis was invasive ductal carcinoma, and then she was later diagnosed with ductal carcinoma in situ (DCIS).

Tell us how you learned of your DES exposure and its impact on your life.

My mom told me about it. She was a retired nurse and had had a preemie that died after a few hours. I was their pride and joy since they lost my older sister, and she was upset that she had to tell me.

I was very self conscious about my exposure, and I did not know anybody else who had been exposed to DES. It wasn't something you could talk socially about.

Once I found DES Action USA, I loved the newsletters that came and saved them for reference over the years. I felt I was not alone when I read different stories from across the country and internationally. As an X-ray technologist, I did a lot of mammograms, and anybody who would ask about DES, I would refer them to where they could get more information.

I married 10 years before I had my baby, and I went through minor fertility testing. I had a miscarriage before I had my daughter. Then, when I finally did get pregnant, I had a cerclage [a medical procedure that stitches the cervix closed to prevent preterm birth] at about four months and was on complete bed rest for two thirds of my pregnancy. I couldn't even go to the birthing classes. I ended up giving birth one week early with a C-section and then had a gallbladder attack three days after giving birth.

Tell us how DES Action and your career helped you navigate your breast cancer diagnosis.

I was diagnosed in November 2019. I went back to where I worked for the mammogram, and I could see the cancer without my glasses on.

It was weird, after being 45 years in that profession, taking care of patients, holding their hand, holding in the tears when they find out—it was surreal to be on the other side. I realized what all the patients had gone through for decades before, and then here I am a patient going through it.

My professional background helped me tremendously. I kept up with medical journals when I was still working, I knew what surgeons I would recommend, I knew what oncology site to go to, and I handpicked my own oncologist, which a lot of people don't know they can do.

Do you suspect your cancer is linked to your DES exposure?

I do think my risk was increased because of DES. Through all the research I've seen, I'm the first one on both sides of the family to have this [breast cancer]. I know the statistics are 1 in 8 because I've told patients that for years. I just believe that [DES] is the source of it.

I've told the surgeon, the oncologist and everybody that I'm a DES Daughter, and some are aware of it, and some are really aware of it. I always ask, if you've seen other DES Daughters in this situation, what do you recommend?

How have your DES exposure and other health experiences affected how you see the medical field or the pharmaceutical industry?

I've come across a lot of patients in my work, and even some in medical professions, who still have not heard of DES, and that still amazes me.

I find that there always has to be clear communication between different physicians who know you differently than another specialist who you're just going to. You have to have clear communication, have clear questions and write down clear answers.

I've always been very aware of drugs and side effects, whether short-term or long-term. Now that I'm on an anti-cancer drug—they give everybody letrozole for DCIS—it's affected my bone density, so now I have osteoporosis.

I had to juggle between my primary doctor and my oncologist because they wanted to switch [medications], but I told them if this is still working, I'm not stopping it. I don't want osteoporosis, but I don't want the cancer to come back.

I think most people know that a drug you take for one thing can affect numerous different things as side effects. Sometimes you have to just hope and pray you're making the right decision. I've been very conscious, because of the DES exposure, not to take anything with estrogen all my life.

What is your hope for the future based on your experience as a DES Daughter?

I would wish, hope and pray that new technology and research will help even more people, including research into the third generation and fourth generation—anyone affected by DES exposure, including those who don't know about it.

I hope that my daughter and the grandchildren will be free from any DES effects for that generation and beyond.

The Many Uses of DES

While the members of the DES community live with the effects of the drug every day, most of us probably think of the drug's use as something in the distant past. It's been half a century since DES was found to increase risk of clear cell adenocarcinoma, and it was pulled from clinical use for pregnant women very soon afterward.

But DES never really went away. It remains a common chemical in use today for a wide range of purposes, including pharmaceutical ones. It was also used for medical purposes in the past aside from prescribing it to prevent miscarriage.

Other Uses in Female Health

DES was most widely used for preventing miscarriage, but it has also been prescribed in the past for other women's health issues. And again, it was not always tested properly or shown in research to have enough of a benefit to justify these uses.

Drug companies had submitted DES for approval in 1940 for treating menopause symptoms, but FDA Commissioner Walter Campbell initially rejected it. He said there was no proof that it would not harm women, following what he called the "conservative principle," which today is called the "precautionary principle."

However, the FDA came under political pressure and changed its position several months later, approving DES in 1941 for menopausal symptoms and other women's health issues, such as preventing lactation after giving birth, gonorrheal vaginitis and atrophic vaginitis.

The FDA removed its approval for DES for lactation suppression in 1978, but by then it was already being used for another purpose: an early version of the "morning after pill" starting in the early 1970s and continuing in the 1980s. A letter to the editor of the *Annals of Internal Medicine* in 1970 cited two previous studies, one in 1966 and one in 1967, claiming that DES could prevent pregnancy after intercourse.

These studies were so poorly done that they should hardly be called studies. The one from 1967 notes, "Any estrongenic substance in sufficient dosage would probably prevent implantation." That does not exactly inspire confidence about how well different estrogens and doses were tested.

The study describes several different estrogens, including DES, at different doses used for five days after sexual intercourse. Proof of their effectiveness was that "In over 100 midcycle exposures there have been no pregnancies," while women with lower doses did have pregnancies. However, that kind of evidence would never pass muster today since any number of reasons could have accounted for no pregnancies, including simple chance.

The use of DES as a morning-after pill became so controversial that the FDA would only allow it for rape or incest, lowered the dose available in pharmacies from 25 mg to 5 mg or less, and required packaging to include on the label, "This drug product should not be used as a postcoital contraceptive."

DES for Tall Girls

Growing to be well above average in height often led to social stigma in very tall girls, so families sometimes sought ways to slow down teenage girls' height growth. Starting in 1956, DES was prescribed for exactly this purpose. The practice continued into the 1970s at least, though it may have lasted longer in some areas. Today, DES is no longer used to stunt the growth of tall girls.

It's possible that the discovery of DES's harms in 1971 eventually led fewer doctors to prescribe it for this purpose, considering the findings of a 1978 study in the journal *Pediatrics*.

The study reported findings from a survey of physician members of the Lawson Wilkins Pediatric Endocrine Society—today called the Pediatric Endocrine Society—and the European Society of Pediatric Endocrinology. The survey was small, with responses from only 74 American pediatric endocrinologists and 29 European pediatric endocrinologists.

Still, the findings showed that DES was still used for slowing the growth of tall girls and several other uses in adolescent females. Yet half of the American endocrinologists and 17% of the European ones said they never treated "tall girls" with estrogen because the long-term effects of high doses of estrogen in adolescence were unknown.

Another reason was the simple fact that being tall is not a disease—it's simply a physical characteristic, so using a drug with possible negative side effects to treat it was not appropriate.

Still, the survey revealed that many doctors were still prescribing it, and for reasons other than stunting height growth. The other two uses reported in the survey were as hormone replacement therapy in teens who had not yet developed normally in puberty and as a form of birth control for sexually active teens.

Other Pharmaceutical Uses

Aside from use in women's health, DES has also been "used within treatment protocols to 'manage' intersex patients," according to the research of Jacquelyn Luce, a professor for Gender Studies at Mount Holyoke College, and the study investigator behind the *Gender, Sex, Sexuality and DES-Exposure: A Research Study.*

Intersex patients are those who are born with ambiguous genitalia and sex organs. They may have both female and male organs, or one type of internal sexual organ

with the external genitals of the other sex.

For example, a study from 1971 reported on five patients who had not developed sex organs who were prescribed stilbestrol. Sadly, a study one year later reported on 24 patients who received DES for five years or longer to treat underdevelopment of sex organs, and three of these patients developed endometrial cancer. The women were an average age of 31 when they developed the cancer.

More studies followed in 1975 and through the end of the 1970s that reported on endometrial carcinoma in patients treated with DES for underdevelopment of sex organs. There were also reports in the 1970s and 1980s showing that DES was sometimes prescribed as hormone therapy for transgender women.

DES has also been used to treat cancer. DES was found in 1941 to be one of the first effective drugs for treatment of prostate cancer since it can suppress production of the male sex hormone androgen.

DES remained the standard treatment for prostate cancer until 1985, when newer drugs became available, though people with prostate cancer today still have the option to take DES as part of their overall therapy.

Most ironically, DES was also a standard effective treatment for advanced breast cancer from 1960 until 1977, when it was replaced with tamoxifen.

For the same reason that DES can effectively suppress androgen in prostate cancer, DES has very recently found a completely new, and highly unusual, use among some women in China.

According to several articles published this year, some Chinese wives are looking for ways to prevent their husbands from cheating. They have decided that preventing their husband from achieving an erection is one way to accomplish that goal.

Therefore, some Chinese wives have purchased DES through online shops and then secretly mixed it into their husbands' meals and drinks to cause impotence. Of course, there have definitely never been any studies showing that DES can prevent cheating, but that has not stopped some wives from claiming it's effective.

"The medicine took effect just two weeks after I started feeding it to my husband. Now he basically stays at home, behaving himself well," one woman reported in an online forum.

Shortly after these articles appeared, several stores in China removed DES from their shelves, but it appears it's still possible to purchase it online. It's impossible to know whether this is a widespread trend or only a small group of women secretly spiking their husbands' meals with DES.

Veterinary and Agricultural Uses

Many people are surprised to learn that DES has found uses outside the field of human medicine, both in veterinary medicine and in agricultural applications.

For example, DES can be used off-label to treat urinary incontinence in dogs, though it should never be prescribed to female dogs with estrogen-sensitive tumors.

DES was also used for years to increase cows' growth. It was the first major hormone to be used to increase how quickly and how large cows grew, starting in 1947 at Purdue University with a tablet implanted under the skin.

Later, scientists at Iowa State College found the growth effects of DES were stronger when it was given orally, so it was soon added to feed for cattle and sheep.

DES's use in cattle feed was formally approved by the FDA in 1954, and it quickly became a widespread practice. Within a few years, nearly 90% of all cattle in the United States fed from cattle feed supplemented with DES.

Eventually, however, studies found high levels of hormones in chickens who ate feed with DES. Then low levels of DES were detected in some cows' livers, suggesting they were receiving too much DES. There is not any evidence suggesting that people who ate beef or beef liver during this period of time ingested DES that affected them. Though we cannot rule out that possibility entirely, people would have to have eaten extremely large amounts of beef liver to equal even one dose of DES.

Nevertheless, it was concerning to find any DES in the livers. The combination of those findings and the news about CCA in DES Daughters led the FDA to ban the use of DES in cattle feed in 1972.

Possible 3rd Gen Effects from DDT Exposure

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In addition, granddaughters with generational exposure to DDT were twice as likely as their peers to start menstruation early, regardless of their grandmother's weight.

Weight and early menstruation are both risk factors for breast cancer. Past studies have found an increased risk of breast cancer in women who had DDT in their blood during or after pregnancy.

Daughters who were exposed in utero to DDT also have an increased risk of breast cancer as well as a higher risk of obesity and dense breasts.

Put together, all these findings suggest it's possible that granddaughters with generational DDT exposure may have a slightly higher risk of breast cancer as well. However, it's currently too soon to know that, and there is not yet research to show that.

"Ancestral exposure to environmental chemicals, banned decades ago, may influence the development of earlier menarche [start of menstruation] and obesity, which are established risk factors for breast cancer and cardiometabolic diseases," the authors concluded.

Study Links Makena to Cancer as FDA Stands By Proposal to Withdraw It

Despite being linked to cancer and showing no benefit in preventing preterm birth, the drug Makena remains on shelves—after the FDA's Center for Drug Evaluation and Research has proposed withdrawing it from the market. The FDA still has the power to force its removal from the market, and now we must wait to see if the agency does that.

Makena is a synthetic progesterone drug that has been prescribed since 2011 to prevent preterm birth in women with a history of preterm birth. The drug received approval through the FDA's accelerated approval process based on a single medical trial, with the condition that the manufacturer, AMAG Pharmaceuticals, conduct another study after approval.

As we've reported before, however, the subsequent studies conducted by AMAG did not show that Makena prevented preterm birth, making it unsafe to remain on the market when it could cause side effects without offering any benefits. Unfortunately, further research has revealed exactly what we at DES Action feared: the drug may be linked to increased cancer risk in the children prenatally exposed to it during pregnancy.

A study presented at The Endocrine Society's annual meeting in April looked at cancer rates in 18,751 people born between June 1959 and June 1967. Among these people, 954 people overall developed cancer. Among their mothers, 181 women had been prescribed Delalutin—the same chemical (hydroxyprogesterone caproate, or OHPC) as the drug Makena—in the 1950s and 1960s.

Children of mothers given OHPC had twice the risk of cancer than those who were not exposed to the drug in the womb. In addition, 65% of these cancers occurred in people under age 50. When the researchers who conducted the study looked at specific cancers, they found that children exposed prenatally to OHPC had almost five times greater risk of colon and rectal cancers and four times the risk of prostate cancer than unexposed children. The researchers also found a slightly higher risk of breast and cervical cancer in those exposed to OHPC.

The total number of people exposed is a relatively small sample size in the study, and the study has not yet been peer-reviewed, so these findings are preliminary and require confirmation.

"Our findings suggest multiple organ systems are susceptible to endocrine disruption during early development, which may increase risk of cancer decades later," said Caitlin Murphy, PhD, an assistant professor at the University of Texas Southwestern Medical Center in Dallas and one of the study's researchers. "Caution using OHPC and other endocrine-active pharmaceuticals in early pregnancy is warranted."

Guidelines for Pap Smears and Cervical Cancer Screening

DES Action USA frequently receives questions about the current cervical cancer screening recommendations. The USPSTF explicitly states that the standard screening guidelines do not apply to DES Daughters since they have an increased risk of cervical cancer. It also does not apply to women who are living with HIV or who have previously been diagnosed with cervical cancer or a high-grade cervical precancerous lesion.

DES Action has a "Gynecologists' Guide to DES Daughter Care" print out available free on the home page, which has all the following information along with medical citations.

DES Daughters should receive annual cervical cancer screenings with a comprehensive pelvic exam, even if they have had a hysterectomy. Further, cytology and HPV tests are not adequate for DES Daughters' cervical cancer screening. DES Daughters should receive a four-quadrant Pap test, which involves taking samples from all sides of the vagina.

Currently, the USPSTF does not recommend any screening for cervical cancer in women older than 65 if they are not otherwise at an increased risk for cervical cancer. The USPSTF does not provide specific guidance for DES Daughters regarding if or when they should stop receiving screenings. Discuss your specific situation with your doctor.

There is no guidance or information about DES Granddaughters. DES Action's advice is for DES Granddaughters to present the DES Daughter guidelines to your gynecologist and discuss the options of DES Granddaughters following the same guidelines.

Increased Risk of Preterm Birth, Low Birthweight in Third Generation

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Mothers.

The authors also explored whether their results could have occurred because of a hereditary predisposition toward prematurity that was passed down. In other words, was the reason for a higher risk of premature births due to DES Grandchildren's generational exposure to DES, or was the increased risk because these children's grandmothers already had a history of premature pregnancies that led doctors to prescribe them DES?

Although doctors don't understand what all the factors are, there is evidence suggesting that prematurity can run in some families. The researchers wanted to be sure that any prematurity in the Third Generation was not due to a greater tendency toward prematurity inherited from DES Mothers.

Therefore, the researchers made statistical adjustments to their calculations to take into account whether the DES Mothers had a low birthweight or were born prematurely. They also accounted for DES Mothers' history of miscarriage.

After making these adjustments to remove the possibility of skewing the results, the findings did not substantially change. In other words, DES Grandchildren still had a higher likelihood of premature birth and low birthweight even after taking away the possible contribution of premature birth, low birthweight or history of miscarriages from their grandmothers.

Those findings strengthen the likelihood that multigenerational DES effects are involved in the findings.

"Thus, our findings argue for a direct effect of DES exposure on the risk of low birthweight and preterm birth in the [third] generation," the authors wrote.

The study did have other limitations, however. For example, the authors did not have information regarding the dose of DES that the DES Mothers were prescribed. It's also possible some participants misremembered whether they did or did not receive DES during pregnancy. There could be some women who said they received it when they didn't, or said they did not receive it but they did.

However, even when the researchers looked only at those participants who were certain of their exposures, the study results were basically the same.

"Although DES is no longer used in pregnancy, this study adds to data suggesting that its legacy can continue to adversely affect those exposed in utero (second generation) and their children (third generation), and many chemicals in use today can have similar actions," the authors concluded. "Even though those actions may be weaker than DES, there are many more such compounds to which people are exposed today. The possible combined effect of many such exposures is not yet clear."

Does DES Cause Kidney Problems?

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tumor (DOI:10.1097/00000478-200007000-00007). The growth patterns were different than typically seen in kidney cancer.

All the participants in the study were women except one. The one man in the case series had had prostate cancer and was treated with lupron for four years and DES for seven years. DES has been a common treatment for prostate cancer.

In addition, seven of the women in the case series had received long-term oral estrogen therapy after having a hysterectomy, except one who had the estrogen therapy but not a hysterectomy.

It's difficult to draw conclusions from such a small number of cases, but the authors do note that it's possible there is a connection between the hormone therapy and the unusual kidney tumor. "These findings raise the possibility of a hormonal mechanism of pathogenesis or hormonal stimulation of growth for these tumors," the authors wrote.

We were unable to find additional research into this possible link, and if a connection does exist between hormone exposure and kidney cancer, it appears to be very rare and to only apply to people who had exposure to estrogen for many years during adulthood.

That said, there was a single case study in 1986 of a DES Daughter who was 18 years old, pregnant and had clear cell carcinoma in her kidney. Since it's a single case report, there is not much we can learn from it. No other similar reports have been published since 1986. It's impossible to say whether the above-cited woman's DES exposure in utero was or was not related to her kidney cancer.

Beyond these studies, no increased numbers of kidney problems have been found in ongoing long-term studies of DES Daughters. This does not mean it is impossible for DES to affect kidneys.

After all, other studies have found that the kidneys have estrogen receptors in them, and estrogen can cause an increase in a hormone called angiotensin that causes the kidney to retain sodium. Estrogen can also cause an increase in an enzyme called renin, which is made in the kidneys and helps the body control blood pressure.

However, it's not likely exposure in the womb would necessarily affect those chemicals based on what we understand about how they work. Further, changes in those chemicals lead to changes in blood pressure, not kidney functioning.

Therefore, based on the current research we have available right now, there is no evidence that DES has an effect on the kidneys.

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Does DES Cause Kidney Problems?

The evidence so far suggests no.

Several women's health problems involve both the reproductive and urinary organs. Since DES has such a big potential impact on reproductive organs, does that mean it can affect organs leading to the genitourinary tract as well? We looked at the evidence to see whether there is any information on DES effects on kidneys and renal disease.

Studies on rodents

A handful of studies have investigated effects on kidneys in rodents given DES. In fact, a 2020 study on male mice exposed them to DES to see how it affected their urogenital tract since DES is known to affect prostate glands (DOI:10.3390/ijms21113902). That study found that newborn male mice exposed to DES were more likely to have kidney problems with urination and enlarged bladders.

Another study in 2013 gave male rats DES for 20 or 50 days and then studied their kidneys. The rats who were exposed for 50 days had degradation in their kidneys and damage in some of the kidney tissue, but not as much impact was seen in the rats who received DES for 20 days.

However, the dosing and timing of DES in these studies was very different than the prenatal exposure to DES Sons and Daughters. Further, many studies show effects in mice and rats that do not translate to humans, and there is not much we can learn from these studies right now.

Interestingly, scientists have also discovered that DES causes kidney (renal) cancer in hamsters—and only in hamsters, not in any other rodents or animals. In fact, DES is so reliable at causing kidney cancer in hamsters that researchers have intentionally bred a line of Syrian hamsters to purposely study kidney cancer in, and they use DES to cause the cancer so they can study it.

It's not clear why DES causes kidney cancer in hamsters and not in any other mammals, but it reveals how difficult it is to translate findings in one species to another species.

Studies in humans

Not much research exists on DES and kidneys in humans. There are only a handful of studies that involve both, and they are not able to tell us much.

One of those studies, from 2000, was a case series looking at 12 people who had an unusual type of kidney

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