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HEADLINE: A deadly mystery: Why did Amoco lab scientists get brain tumors?

BYLINE: SHARON COHEN, Associated Press Writer

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BODY:

The brilliant scientist knew he was dying, his brain was under siege, but he wanted to make his mind work.

So he would retreat to his wood-paneled basement, decorated with photos of the sun-bleached buildings of his native Greece, and compose lists on both sides of lined notebook paper.

He listed hundreds of opera recordings he had collected. Verdi, Wagner, Mozart and many more.

He listed restaurants he dined at in his world travels. His favorite was in Lyon, France.

And he listed chemicals he had mixed and measured. He had handled almost every element on the periodic table, from aluminum to zinc, in his long career.

As the scientist wrote, a tumor ballooned in his head, squeezing his brain, tormenting his body and mind. He began limping. He stumbled once, then twice. His memory faded. He began fumbling for words.

And his lists began overlapping. Chemicals showed up on pages of operas, and vice versa.

Nick Karayannis' brain was betraying him, and he thought he knew why. He suspected it was

connected to his years as a research chemist at Amoco Corp. Workers in the same building where he had conducted groundbreaking experiments had developed brain cancer. He didn't think it was coincidence.

Neither did his son, Marios, a lawyer specializing in personal injury cases. So he took on a new client: his father.

Nick Karayannis would never make it to court. But when he died last February, his son pushed on.

He hadn't known what his father was writing during those final months, so he wasn't sure what to make of it.

"He never said, 'I composed a list. Here are all the chemicals I've worked with,' " Marios Karayannis says.

Maybe it was just a mental exercise. But maybe it was something more.

Could Nick Karayannis have been taking inventory, trying to figure out if one chemical, or a combination, had somehow poisoned him?

His son will never know.

"But knowing his personality," he says, "I suspect it was exactly that."

The Amoco Research Center, a pastoral campus of brick buildings in Naperville, 30 miles west of the oil giant's Chicago headquarters, is a hub of invention.

This arm of research and development has brought Amoco billions of dollars over the years with developments that include the raw material for making polyester, oil additives and plastics used in car lights, carpet fibers and milk cartons.

Many came from the 500 building complex, center of chemical research.

Now that complex - particularly building 503 - is at the heart of a medical mystery that is tragic and frustrating and, after a decade, still unsolved.

Since 1989, 20 center workers have been diagnosed with benign and malignant brain tumors; 14 worked in the 500 complex.

The seven with brain cancer - all men - were in that complex, five in building 503. All were

Amoco veterans, working on similar projects from the late 1970s to the mid 1980s.

Four, including Nick Karayannis, are already dead.

The malignant tumors are gliomas, a cancer of the cells that insulate the nerves of the brain.

The glioma rate in building 503 is eight times the national average; seven per 100,000 people develop the tumor each year.

Amoco has spent millions investigating and hiring experts to determine what, if anything, in the workplace caused these tumors.

"We've done everything we can to take the place apart and get to the bottom of what's going on here," says Mike Wells, Amoco's epidemiologist. "So little is known about brain cancer and tumors, trying to understand is a very difficult thing."

"We're trying to put together a puzzle," he adds, "and we don't even have a picture of what it looks like."

Amoco has studied the air, water and soil (digging 30 feet deep to make sure the building was not atop a toxic dump). It has checked for radiation, poked into drain traps and ventilation hoods.

Experts even installed life-size mannequins with nose and mouth sensors to test vapors and built a model of the 500 complex, with trees and roads, and recreated weather and atmospheric conditions to study ventilation.

Soon, Amoco will receive the results of its most exhaustive study: the final report from a two-year investigation by researchers from Johns Hopkins University and the University of Alabama-Birmingham.

Last October, those investigators confirmed their earlier findings that the malignant tumors seemed more than a random cancer cluster. But Amoco emphasizes that's not proof.

"What we have been able to do is establish a pattern with the brain cancers that suggests the possibility of a work relationship," Wells says.

Though investigators have yet to declare a culprit, attorneys already are pointing fingers.

Nine lawsuits allege workers were exposed to numerous neurotoxins - elements that poison the central nervous system - because of inadequate ventilation and lax safety.

"Amoco was exposing its employees for 25 years to toxic chemicals and did nothing about it," claims Grant Dixon, a lawyer representing six former workers, three of whom are dead. "Since the building opened, 503 had a number of problems and has never been adequately fixed.

Ventilation is the heart of the whole case."

Amoco says it always responded quickly to complaints of foul odors or other ventilation-associated problems and notes investigators have discounted this as a likely source of tumors.

"If there was a ventilation problem, you would expect the carcinogen would have gone through the entire building as opposed to just have been limited to the third floor and perhaps the second floor," adds Jim Lowry, head of Amoco's brain cancer task force.

Amoco's first sign something was amiss came from the third floor of building 503. In 1989, two researchers who worked in lab 3327 were diagnosed with gliomas within a month.

Red flags went up.

A records check unearthed a third glioma in 1986 in the same lab.

The lab's plumbing, walls and ceilings were torn apart. Nothing was found.

Amoco called in medical experts. A consultant's epidemiological report concluded the three brain cancers in the same place were "a true curiosity but ... a blind alley."

One reason: The two men diagnosed in 1989 had worked in the lab less than a year - and the latency period for brain cancer is much longer.

Amoco, urged to closely monitor health conditions, began recording all brain tumors.

Until February 1996, there were six - all benign.

Then a retired Amoco chemist, a man who was popular and admired, was diagnosed with brain cancer. He, too, had worked on the third floor.

His name was Nick Karayannis.

It was October 1995 and Nick Karayannis was vacationing, reading at poolside in Florida. He put his book down and looked up.

"Nikos, what's wrong with you?" asked his wife, Sasha.

He flicked his fingers under his chin, signaling he could not answer. When paramedics arrived he spoke in Greek. Later, he asked for his soccer ball, as if he were a little boy.

Doctors said he may have suffered a small stroke or had too much sun.

Sasha had already noticed changes in her husband's personality: He poured coffee into his wine glass. He drove too fast. He debated animatedly about politics, a topic he hated.

A change in life, she thought.

Then three months later, Nick Karayannis collapsed.

Doctors found a walnut-sized brain tumor. It was a grade IV glioblastoma multiforme, which usually is a death sentence. Most people live less than three years.

"He accepted it," recalls his son, Marios. "He said, 'Maybe I can squeeze four to six years out of it.' I don't know whether he believed that or not. Once I had educated myself on what he had, I pretty much accepted what was inevitable."

Nick Karayannis endured four operations, chemotherapy and radiation. He never complained.

"So strong," Sasha says, tightly gripping a tissue, tilting her head back to stem the tears. Once, she recalls, they sat in the hospital where he and some children awaited treatment.

"Remember, we've had the most beautiful life," he said, grasping the hand of the woman he had met as a child on the Greek island of Skopelos. "You should feel sorry for these kids. They didn't have a life. I fulfilled my life."

And what a life it was.

Nick Karayannis listened to opera, read and watched his beloved White Sox - simultaneously.

He bowled, danced, swam, played bridge and soccer.

He spoke Greek, English and French, along with some Italian and German. He read in foreign languages to stay fresh. He filled his shelves with Greek tragedies, Pirandello plays, volumes of Stravinsky ballets and Gauguin paintings, the works of Victor Hugo, James Joyce, George Bernard Shaw.

Nick Karayannis held 29 U.S. patents. He wrote 225 scientific papers. He lectured in Russia, France, China, Brazil and Australia.

He seemed unstoppable.

Ten days after his surgery, his head still bandaged, he attended a 5 -hour opera, part of Wagner's "Ring" cycle.

But the tumor - a malignancy his doctor calls "the embodiment of evil" because of its frenzied growth - soon took control.

He had to quit driving. His skull swelled so much Sasha unscrewed his glasses so they would fit.

His proud face was scarred with stitches shaped like a huge question mark running behind his ear and across his left temple. Doctors drew a florescent pink circle on his skull with an X in the middle - a target for zapping him with radiation.

His brain was withering, too.

The man who could recite the White Sox rosters for the last 20 years couldn't even remember players' names while watching them on television.

"I can't believe how stupid I am!" he would say in frustration.

His decline came as his son's investigation picked up.

"As he became less able to communicate," Marios Karayannis says, "I learned a heck of a lot more."

He hired experts, conducted interviews, boned up on polypropylene - the plastic that was his father's specialty. Nick Karayannis had used heavy metals as catalysts to create plastics cheaper, more quickly and more efficiently.

He pored over Amoco documents the company handed over.

"I never felt I had information being held back," says Marios Karayannis.

But Nick Karayannis was still alert one summer day when he received a call.

"He became red," Sasha recalls. "He said, 'Oh, no! Don't tell me that.'

"I don't believe it," he said as he put the phone down. "Paschke's come down with it."

It was July 1996 when Ed Paschke called his bridge partner.

He had a golf ball-sized tumor in his head.

After four operations, Paschke has no hearing in his right ear. He can't blink or chew on his

right side.

But he's lucky.

His tumor, a Schwannoma, was benign, though he lives with the stomach-churning fear of having worked in building 503 more than 20 years - within 150 feet of four men diagnosed with brain cancer.

Paschke, who remains an Amoco employee, says the company should have made doctor referrals and notified brain tumor victims about others in similar straits. Amoco says ethics and medical confidentiality laws prohibit that.

But news travels fast among researchers - especially bad news.

So when Paschke learned Rusins Albertins was ill, he called him.

A hearty-looking retired chemical engineer, Albertins, 61, spent much of his long Amoco career in building 502, next door to 503. He took formulas Nick Karayannis developed and tested them.

It was June 1997 when Albertins, attending a conference on teaching civics to developing democracies in his native Latvia, rose to speak. Out came gibberish.

He began making mistakes on his computer. His right leg started dragging. His head throbbed when he lay down. He began knocking drinking glasses over.

The diagnosis: grade IV glioblastoma multiforme.

"I had a good career," Albertins says, rubbing his bald head, the result of surgery, chemotherapy and a decision to shelve a new $ 600 wig.

"I was pretty well rewarded for what I did," he adds. "Unfortunately the price that I paid, seemingly, is more than I bargained for."

Both men are among six Amoco workers Marios Karayannis represents in a negligence suit.

Years ago, he played soccer and bowled with these men in Amoco leagues; they attended White Sox games together. That's when he was simply Nick's son.

"He certainly has a personal commitment in view of his father's death," Paschke says. "He's not going to drop the ball."

For now, Paschke and Albertins are members of a club no one wants to join.

They know the order of their diagnoses. Paschke was No. 11. Albertins was No. 13.

"It's very difficult every time another one is identified," Paschke says. "It's not just another number, it's another friend."

Amoco compares its investigation to an archaeological dig.

Using thousands of handwritten lab notebooks, accounting records and interviews, investigators have tried to recreate 30 years of where people worked, what chemicals they handled, what protective gear they wore.

"It's easy to go in and make sure the building is safe today," says Wells, the Amoco epidemiologist. "It's harder to go back in the past."

Once Amoco compiled a list of the 8,000 employees who had worked at the research center since it opened in 1970, it located the 1,800 from the 500 complex; it used people-tracking agencies to find some as far away as Asia and Europe.

It has been a daunting numbers game.

Investigators also have sifted through more than 100,000 chemical research projects before focusing on 34 in which two brain cancer victims overlapped. Three men worked on nine of the same projects.

But that could be a blind alley, too, because researchers who worked near each other may not have been assigned to the same project. It's also possible the cancers are a horrible coincidence.

"Clusters like this do occur ... all over the world," Wells says. "Many times there is no environmental explanation."

Marios Karayannis disagrees, just as he doubts Amoco's view that the benign tumors probably are unrelated to the malignant ones.

"If I put you in a room with three known toxins and you get cancer, which of the three gave it to you?" he asks. "I don't know, but I think it's pretty likely that one of them did."

No one expects investigators will identify a single compound that caused brain cancer - but they could isolate a class of suspect chemicals.

Wells hopes they will find some connection.

"The absolute best thing would be to understand that something is behind this," he says, "then

we could go to the employees and say, 'We have an answer.' "

Near the end, Nick Karayannis was bedridden in his family room, beneath an oil portrait of himself as a young man. Sasha slept at his side on a couch.

His family brought him Godiva chocolates and papaya. His little grandson and namesake, Nick, fed him Italian mints until he couldn't remember to suck them.

The grandfather who once could frolic on the floor for hours with his two grandchildren could only blow them kisses.

The scholar and student of language could only utter one-word grunts.

The athlete who loved swimming and soccer couldn't lift his hands to feed himself.

Sometimes, Sasha recalls, Marios couldn't bear to see his once vital father so helpless and would sit in an adjoining room.

"You could see how sad Marios was. Many times, I'd just say, 'Go!' " she recalls, shooing her hand.

Nick Karayannis was 66 when he died.

"My life is ruined," Sasha says in a near whisper, sitting in her living room. "But I'd like to find the truth. Other people are suffering."

But her son, a man trained in the law, knows there are limits to solving this mystery.

"I need to search for what likely is the truth," he says. "And that's the best that can be hoped for."

At the funeral, Marios Karayannis recognized one of his father's colleagues from building 503.

As the mourner walked to the front of the church, Marios noticed his freshly scarred, shaven head.

He knew the man recently had a biopsy. The diagnosis: brain cancer.

The club had one more member.

EDITOR'S NOTE - Sharon Cohen is the AP's Midwest regional reporter, based in Chicago.

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