

BHOPAL: A small, red-painted building in this central Indian city has become the focus of a grim battle being waged against the after-effects of a poison gas leak that killed 2,500 people last December.

In the first weeks after the disaster, the victims were reported to have died as their lungs filled with fluids after they inhaled methyl isocyanate (MIC) gas leaking from a pesticide factory owned by the Indian subsidiary of the US Union Carbide Company.

But doctors here now say the deaths, and injuries to more than 125,000 people, may have been caused by cyanide released into their blood when they inhaled the gas.

Every morning survivors flock to the clinic where they receive injections of one gram of a colourless liquid called sodium thiosulphate, an antidote for cyanide poisoning.

In the clinic's other room an array of equipment, including a blood-gas analyser and a urine spectrophotometer, monitors samples collected from the victims.

The results so far show most of them have been rescued from a slow death, doctors said.

"Sodium thiosulphate treatment has made a dramatic difference," said Dr Suresh Bala Varma at the clinic.

She said the drug was reacting with cyanide deposits in the body to produce a harmless compound called thiocyanate that was discharged in the victims' urine.

"Even better results have emerged from our monitoring of blood samples," Dr Varma said. "Before treatment most victims had alarmingly low oxygen levels in their arterial blood — between 30 and 50 per cent compared with the normal 90 per cent."

"Now the oxygen content is slowly rising. At the same time, sodium thiosulphate is also bringing down the ratio of carbon dioxide in victims' blood, which pre-treatment tests showed had shot up to twice the safe level."

Dr Varma said each victim was given a daily injection of sodium thiosulphate for six days. The treatment is then spaced out to bi-weekly and weekly administrations of the drug.

"Our tests show that the gas victims' blood was not being sufficiently oxygenated," she said. "People who could not walk even a few paces without stopping exhausted for breath are showing visible signs of improvement."

But Dr Varma said doctors held little hope of repairing the tissue of the victims' lungs, damaged when they sucked in methyl isocyanate as they fled from the poison gas on the night of the disaster.

Dr Ishwar Dass, health secretary of Madhya Pradesh State (Bhopal is the State capital), said the fight to save the lives of the survivors had been hindered by a lack of information on

BHOPAL VICTIMS HAD CYANIDE POISONING

By CHAITANYA KALBAG

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the reactions triggered by methyl isocyanate in the body. Other doctors said the same.

The health secretary said two days after the gas leaked on Dec. 3, Union Carbide doctors said methyl isocyanate poisoning produced lung damage and acute respiratory distress and had recommended treatment with oxygen, cortisone steroids to revive tissue, and broncho-dilators to reopen blocked lung passages.

But most victims did not improve with that treatment, he said.

"It was only when people continued to die days after the leak that we realised that something else was causing damage in victims' bodies," Dr Dass said.

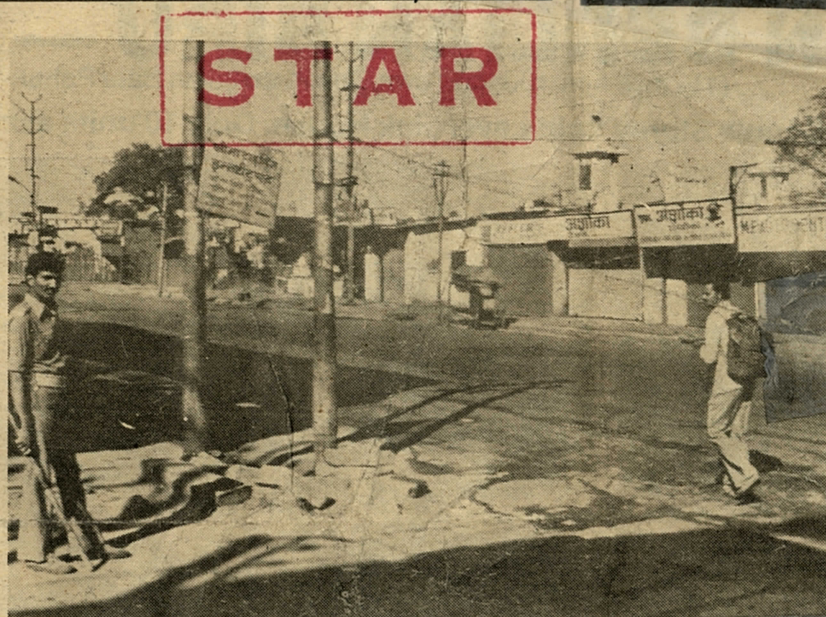
He said the first suggestion of cyanide poisoning came from Dr Heeresh Chandra, head of the Department of Forensic Medicine and Toxicology at Bhopal's Gandhi Medical College.

Dr Chandra said his team had performed autopsies on more than 300 gas victims. "Even autopsy surgeons were affected by methyl isocyanate trapped inside the bodies," he said.

"Every victim had unnaturally cherry-red coloured blood, and the bodies themselves were pink and showed no signs of cyanosis — the blueness commonly associated with death," he said. "They were signs that clearly pointed to cyanide poisoning."

Dr Chandra said his suspicions were reinforced when survivors exhibited every symptom of chronic cyanide poisoning listed in toxicology manuals — dizziness, weakness, lung congestion, conjunctivitis, and weight and appetite loss.

But regular treatment of the survivors with sodium thiosulphate started only in mid-February, two months after the gas leak, after detailed tests conducted by experts from the Indian Council of Medical Research (ICMR) in New Delhi.



Downtown Bhopal deserted days after the gas leak on the night of Dec. 3... gas victims' blood not being sufficiently oxygenated.

"Bright-red blood is also caused by carbon monoxide poisoning," said Dr S. Sriramachari, ICMR's director-general. "But that would have been cured by the heavy doses of oxygen we were giving victims, whereas they were suffering worsening respiratory problems."

Dr Sriramachari said in the absence of precise clinical data on methyl isocyanate, the only clues available were found in Union Carbide's technical literature.

He said that a manual on the lethal chemical issued by the company says thermal decomposition, which occurred when water accidentally leaked into a methyl isocyanate storage tank at the factory, "may produce hydrogen cyanide, nitrogen oxides, carbon monoxide and/or carbon dioxide."

Dr Sriramachari said he performed 22 post-mortems in Bhopal and the results supported Dr Chandra's

theory of cyanide poisoning.

"In normal death, our cells continue to process oxygen for some time after heart function stops, leaving unexpelled carbon dioxide which causes blueness," he said. "This was absent in Bhopal, indicating that something was blocking oxygenation."

Dr Sriramachari said the cyanide theory was confirmed by a test performed under controlled conditions on gas victims between Feb. 4 and 12.

"Fifteen victims received injections of glucose solution and 15 others sodium thiosulphate," he said. "Only one patient given glucose showed increased thiocyanate excretion in his urine."

"But ten of the 15 victims given sodium thiosulphate excreted thiocyanate at seven or eight times the normal level," he added.

"The methyl isocyanate appears to have split after it was inhaled, releasing

RETURN TO BHOPAL



This is the second of a three-part series on the long-term effects of December's poison gas leak on the Indian city and its population.