'It doesn't stop at the lungs. Pollution damages your heart, brain... whole body'

ASK THE DOCTOR

Coughing, burning eyes, breathlessness, winter arrives ominously in Delhi-NCR year after year. Around this time, a long spell of highly polluted air is what crores of people living in India's largest megapolis are exposed to. The damage it's quietly doing goes beyond the lungs, to the heart, brain, kidneys and metabolic systems, **Dr Randeep Guleria**, chairman of internal medicine and respiratory and sleep medicine at Medanta, tells **Anuja Jaiswal**. India, he says, needs a coordinated national strategy to beat pollution

Besides the lungs, which organs are most vulnerable to air pollution?
The heart is especially vulnerable as toxic air causes inflammation in coronary vessels, raising the risk of heart attacks and worsening heart failure. The brain is also affected. Long-term exposure increases the likelihood of stroke, early dementia and memory decline.

Is there evidence to back this?
Strong evidence from animal and human studies shows PM2.5 and ultrafine particles (under 0.1 microns) cross from the lungs into the bloodstream. Once there, they inflame blood vessels, a process known as endotheliitis. In the heart, this raises the risk of heart attacks, heart-failure flare-ups and hypertension. In the brain, similar inflammation and vessel narrowing elevate stroke risk. PM2.5 also carries toxic chemical 'hitchhikers' that magnify damage to multiple organs.

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Are kidneys and the gut also impacted by chronic exposure to poor air quality?
Evidence is limited but growing. Once particulate matter enters the bloodstream, it can affect organs such as the kidneys and gut. Early research suggests pollution may worsen existing kidney disease and contribute to gastrointestinal problems, but more studies are needed.

Does pollution increase risk of cancers?
Yes. While lung cancer risk from polluted air is well established, new studies show particulate-attached toxins can enter the bloodstream, cause cellular mutations and potentially increase cancer risk in other organs as well.

Is there a link between polluted air and metabolic disorders like diabetes?
Emerging data suggests pollution increases the risk of metabolic disorders, including diabetes. More research is needed to pinpoint the pollutants involved and their impact on different metabolic pathways.

Which systemic effects of pollution are most overlooked?
The long-term, whole-body impact. People view pollution as a seasonal lung problem, but chronic exposure affects the heart, brain and other organs. Children growing up in polluted areas have reduced lung capacity, with consequences lasting into adulthood. It's an issue that is rarely discussed.

What early signs should people watch out for that indicate harm beyond lungs?
Early warning signs include eye irritation or redness, nasal congestion, chest tightness, and breathlessness even on mild activity. Pollution can also raise blood pressure and worsen symptoms in people with heart or lung disease. Anyone experiencing persistent eye irritation, nasal blockage, chest tightness or increasing breathlessness should seek medical attention.

What long-term multi-organ effects do you see in younger adults?
Chronic exposure to high pollution levels is like smoking 10-15 cigarettes daily. Young adults may face premature heart disease, early neurological disorders, stroke and long-term respiratory problems — conditions typically seen in long-term smokers.

What immediate clinical and policy-level steps are needed for this?
India needs a coordinated national strategy. Clinicians, scientists and policymakers must quantify long-term effects and set realistic targets to reduce pollution. Increased investment is required in research, monitoring and sustainable interventions that bring pollution down to safe levels over the next few years.