Medical Xpress

New computer model of lung tissue could herald safer radiotherapy for cancer

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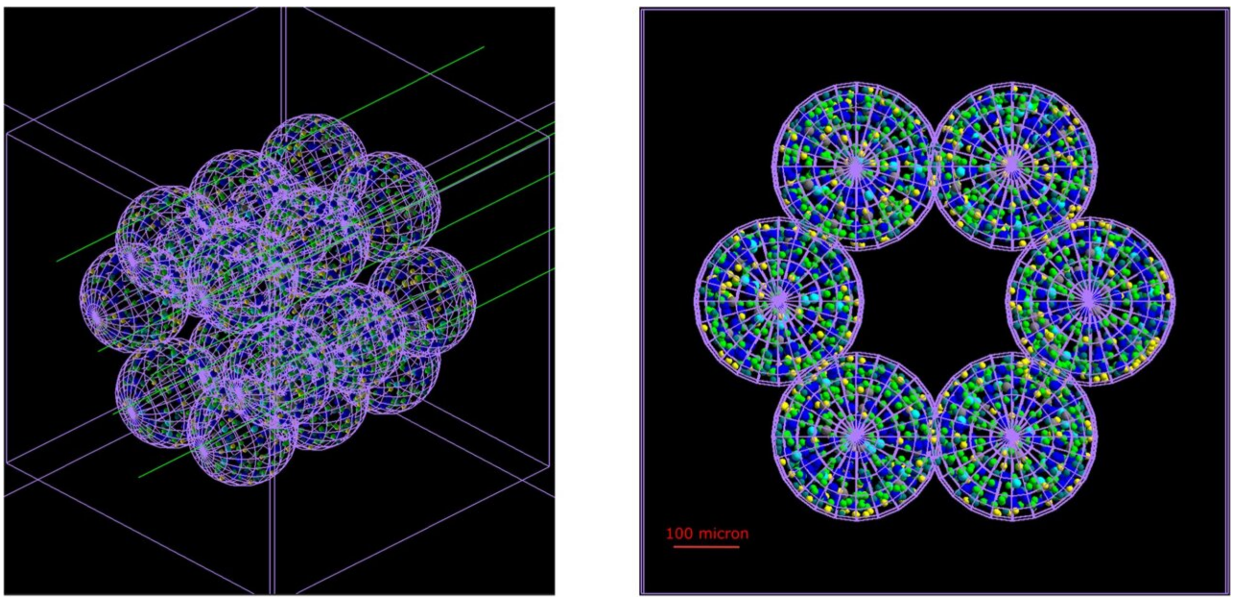

Alveolar segment model in TOPAS-nBio. Credit: *Communications Medicine* (2024). DOI: 10.1038/s43856-024-00442-w

An innovative computer model of a human lung is helping scientists simulate, for the first time, how a burst of radiation interacts with the organ on a cell-by-cell level.

This research, carried out at the University of Surrey and GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, could lead to more targeted treatments for cancer and reduce the damage caused by radiotherapy. The research is published in the journal *Communications Medicine*.

Dr. Roman Bauer, Senior Lecturer at the University of Surrey, said, "Doctors could one day use our model to choose the right length and strength of radiotherapy—tailored to their patient. This is exciting enough—but others could use our technique to study other organs. This could unlock all kinds of medical knowledge and could be great news for doctors and future patients."

Nowadays, more than half of cancer patients receive radiotherapy—but too high a dose can injure their lungs. This can lead to conditions like pneumonitis and fibrosis.

To study these injuries, researchers at GSI and the University of Surrey used artificial intelligence to develop a new model of part of a human lung—cell by cell.

Professor Dr. Marco Durante, head of the Biophysics Department at GSI said, "For the first time, BioDynaMo makes interactive models of entire human organs achievable. This will allow us to model individual patients' lungs in a way that's just not possible with the very general statistical methods we currently use. What's more—it will allow us to study the way fibrosis and other conditions is actually caused, and how they develop over time."

More information: Nicolò Cogno et al, Mechanistic model of radiotherapy-induced lung fibrosis using coupled 3D agent-based and Monte Carlo simulations, *Communications Medicine* (2024). DOI: 10.1038/s43856-024-00442-w

Provided by University of Surrey