The Institute of Cancer Research in the UK uses the Stratasys J5 MediJet to aid in cancer drug discovery and treatment

A team of professionals at the Institute of Cancer Research, London, has utilized the J5 MediJet™ 3D printer to create a first-of-its-kind model that accurately depicts the protein being targeted within a cancer cell by novel drugs in development. The model helps researchers to design a drug compound that will fit into the protein and kill the cancer cell.

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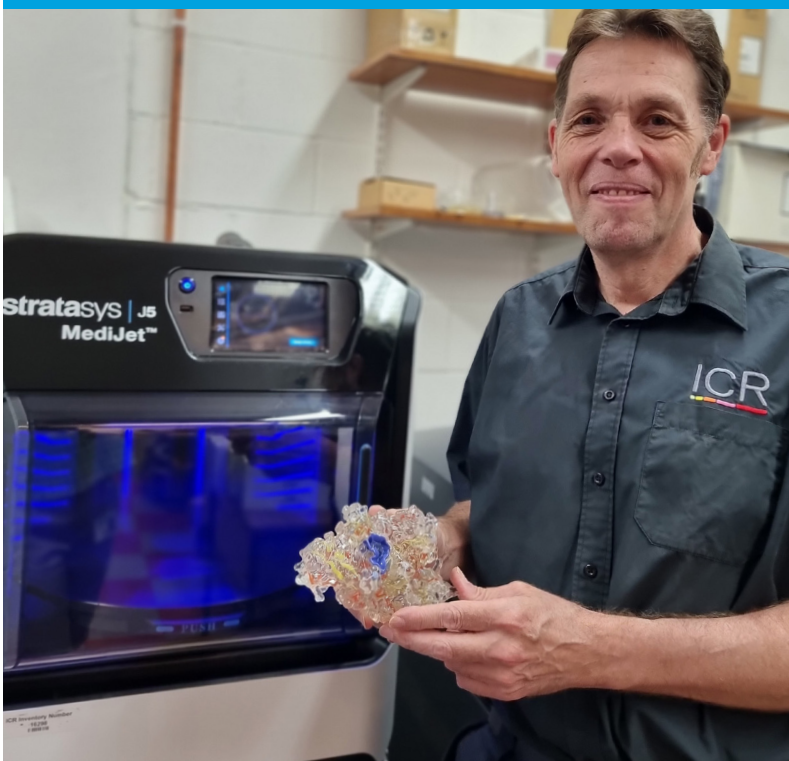
Craig Cummings

Engineer

Research and design workshop manager, 3D print lab
The Institute of Cancer Research



Case Study

Craig Cummings, an engineer who has devoted his work to cancer research since 1988, runs the 3D print lab at The Institute of Cancer Research (ICR) and its clinical partner, The Royal Marsden NHS Foundation Trust, as its research and design workshop manager in London.

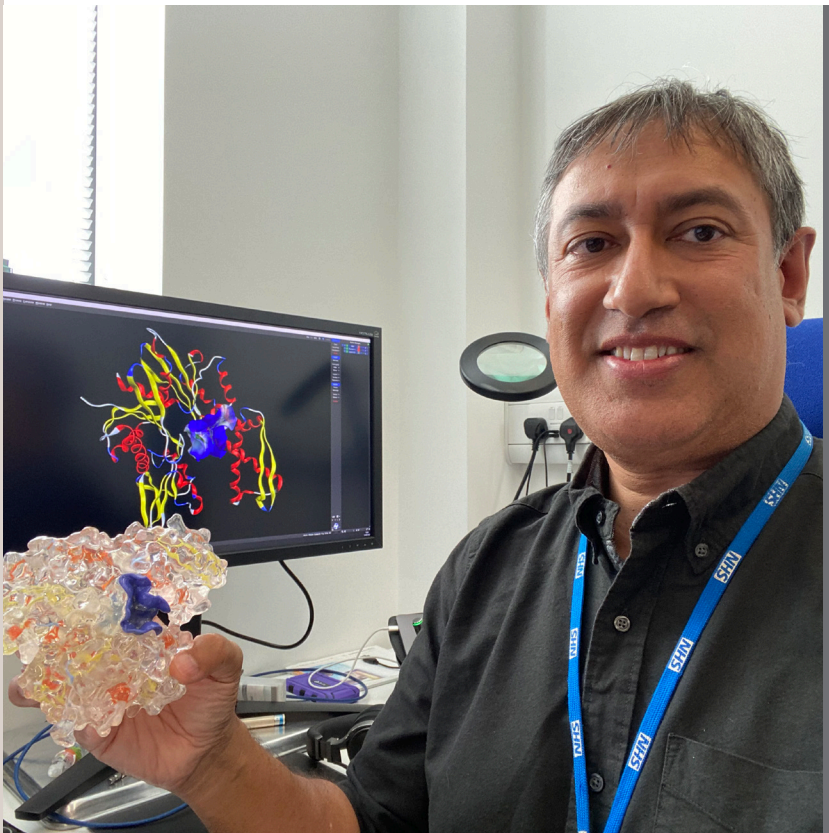
Craig oversees a team of four, manufacturing a range of medical instruments, phantoms, and devices using Stratasys 3D printers, working alongside researchers such as Amin Mirza, an analytical chemist who has worked with Craig since 2000, to support the ICR's and The Royal Marsden's cancer research and treatment development.

A primary focus of the ICR is to image and remove cancers using surgical and radiological approaches as well as developing chemical therapies to treat cancer at the biochemical level. During their time with the ICR, the institute has made significant advancements to that end. The ICR is the world's most successful academic institution at discovering new cancer treatments. Since 2005 alone, ICR researchers have discovered more than 20 drug candidates, 11 of which have progressed into clinical development. The ICR, with The Royal Marsden, has also led radiotherapy trials which have transformed clinical practice.

The blockbuster prostate cancer drug abiraterone (trade name *Zytiga*), which was discovered at the ICR, is generating worldwide sales of more than $2.5bn per year for the manufacturer. Today, Craig and Amin are continuing to push the boundaries of drug discovery by using 3D print technology to help researchers visualize the proteins being targeted by cancer drug discovery programmes at the biochemical level.

With the new J5 MediJet 3D printer, the team has created a first-of-its-kind model that accurately depicts the protein being targeted within a cancer cell by novel drugs in development. Researchers can reference the model to design a drug compound that will fit into the protein and kill the cancer cell.

"Proteins within a cancerous cell are not rigid," explains Amin. "They are complex in structure and flexible; designing a compound of compatible size, shape, and with suitable chemical properties to get into the protein is incredibly difficult. In drug discovery, we're working to develop drugs that will fit into the relevant gap or pocket within the protein structure and stop it working."



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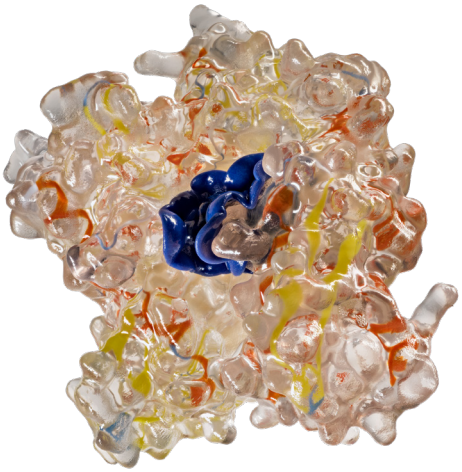
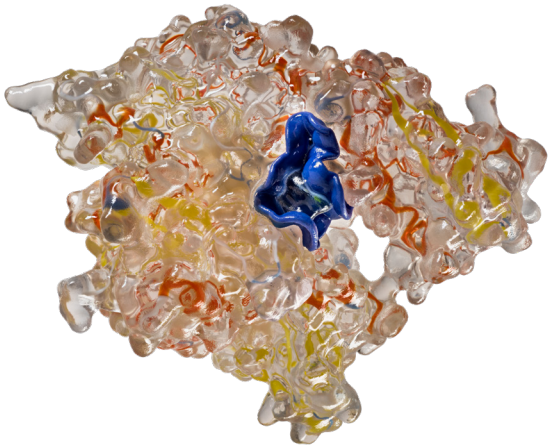
Dr. Amin Mirza

MRSC

Head of Structural Chemistry Team
The Institute of Cancer Research





With legacy filament-based print technology, Craig, Amin and their teams were restricted to creating simplified rigid models with poor resolution that resemble “bubbles stuck together.”

But with the J5 MediJet, the 3D print workshop can replicate a protein in exquisite detail - with accurate ribbons, strands, and helices.

“It requires quite a huge leap in imagination to understand the dynamic nature of these proteins and the gaps within them” says Amin. “Visualization is incredibly important so cancer researchers can design a chemical compound to target these pockets, disrupt the protein’s function, and stop the cancerous cell from replicating. 3D modeling allows us to see in and around cellular proteins at the biomolecular level.”

In 2021, the ICR welcomed the addition of the new J5 MediJet to print anatomy models, guides, and tools alongside its existing Stratasys Eden350 printer.

“The newest 3D print technology allows us to bring to life how we traditionally visualize cellular proteins on a computer in computational chemistry and biology,” says Craig. “These models will help equip the next generation of cancer researchers.”

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