



Business challenge

OCB recognized that hundreds of thousands of lives and billions of dollars could be saved in Europe alone by detecting colorectal cancer sooner and reducing unnecessary overtreatment with chemotherapy.

Transformation

Working with Meridian IT to deploy IBM® PowerAI Vision running on IBM Power Systems™ servers, OCB accelerated analysis of digital images of tumors to determine the risk of recurrence of colorectal cancer.

Business benefits:

Months to hours

improvement in time to build models predicting risk of relapse

Enables

new standards of care, enhancing patient outcomes and boosting efficiency

Accelerates

scaling and deployment of the solution, helping OCB to take its offering global

Oxford Cancer Biomarkers (OCB)

Combining leading-edge diagnostics with AI technology to improve outcomes for cancer patients

Formed as a spin-out from the University of Oxford, Oxford Cancer Biomarkers aims to enable early prediction of cancer risk and increased precision of cancer treatment to drive personalized medicine. It does this through the use of platforms incorporating biomarker-based technology from its research and development teams and partners.

“As soon as we saw IBM PowerAI in action, we knew that it was going to have a seismic effect on our ability to process tissue samples. Previously it took us months to years to build and test new models, now we can do it in hours.”

David Browning

CEO

Oxford Cancer Biomarkers

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Personalizing medicine

Cancer is the [second leading cause of death worldwide](#). Tobacco use, alcohol consumption, unhealthy diet and lack of physical activity are key cancer risk factors, so undertaking lifestyle changes can prevent or mitigate the onset of the disease. Generally, the sooner cancer is diagnosed, the better the outcomes. As a result, identifying genetic predisposition to cancer or early signs of the disease is a priority in oncology research.

Oxford Cancer Biomarkers (OCB) was established in 2012 to discover and develop biomarkers (a quantifiable biological parameter that provides insight into a patient's clinical state) to advance personalized medicine within oncology, focusing on colorectal cancer and its treatments.

David Browning, CEO of Oxford Cancer Biomarkers, explains: "At OCB, we want to move away from a one-size-fits-all approach to cancer care by giving clinicians as much information about a patient's condition as possible. We aim to develop screening tests that discover these insights more quickly and cost-effectively and less invasively than existing methods."

Enhancing treatment decisions

OCB turned its attention to chemotherapy toxicity. A common treatment process for cancer patients is surgery to remove the tumor, followed by a cycle of chemotherapy to ensure all cancerous cells are destroyed. However, between 20 and 30 percent of cancer patients experience severe side effects when treated with the most frequently used chemotherapy drug: 5FU (or capecitabine).

Furthermore, approximately 1 percent of patients are at high risk of life-threatening toxicities from the drug. 30 percent of colorectal cancer patients are identified with stage II tumors. Of these, only about 33 percent actually need chemotherapy. The rest are likely to survive without chemotherapy and can be spared toxicity exposure that is potentially life-threatening. However, clinicians are unable to accurately identify the third who will benefit with any degree of certainty.

Treatment protocols vary by country, but some treat all patients in a belt-and-braces approach that increases risk of toxicity whilst others select without robust scientific backup. OCB wanted to provide the ability to target precision medicine for the individual.

"Many patients are routinely prescribed 5FU therapy because, until now, it's been too complicated to predict which patients are likely to suffer a recurrence after surgery," says Browning.





“With IBM’s global healthcare experience and Meridian IT’s deep knowledge of AI solutions, we’re in good hands to bring leading-edge precision diagnostic tests to markets worldwide.”

David Browning, CEO, Oxford Cancer Biomarkers

“As soon as we met the IBM and Meridian IT teams, we felt that our knowledge complemented theirs: OCB could provide the clinical background, while IBM and Meridian IT knew how to adapt leading-edge technology to our use case,” comments Browning. “Both IBM and Meridian IT are at the forefront of artificial intelligence innovation, so we knew that they were the right partners to come on this journey with us.”

Designed for image classification, IBM PowerAI Vision includes an intuitive toolset and the most popular deep learning frameworks.

Using these features, Meridian IT was able to build models for OCB fast. The team took advantage of massive throughput capability offered by the accelerated IBM Power Systems servers equipped with NVIDIA with NVLink GPUs to expedite training of the models, bringing enhanced ColoProg to life sooner than expected.

“We began examining resected tissue samples, combining biomarkers to identify the risk of relapse.

“Before, a pathologist had to analyze each sample using a microscope, meaning we could only assess around ten patients per day. We saw the opportunity to dramatically increase the scale and speed of analysis using the right technology—and began looking for the expertise to make this happen.”

Developing AI-based digital pathology

Working with IBM Business Partner Meridian IT, OCB continued development of image analysis algorithms to enhance its existing [ColoProg](#) platform, based on [IBM PowerAI Vision](#).

Running on [IBM Power Systems AC922](#) accelerated servers hosted by Meridian IT, these enhancements utilize deep learning models to augment OCB’s proprietary DNA ploidy (a measure of the DNA content within tumor cells) and stroma content (non-malignant cells that can provide an extracellular matrix on which tumor cells can grow) assays, to classify resected tissue samples. The company combines these biomarkers to stratify patients into low, intermediate and high-risk groups of colorectal cancer recurrence, enabling better clinical decision-making.

"IBM PowerAI Vision and IBM accelerated Power Systems servers are a match made in heaven for AI challenges," says Browning. "We've been pushing the technology hard to make breakthroughs in a new area, and it hasn't let us down. Meridian IT have collaborated closely with us in an iterative process, challenging and refining our ideas to ensure the best results."

Today, ColoProg has been clinically validated in around 1,000 stage II colorectal cancer patients and approximately 2,500 colorectal patients in total.

The success of the platform has led to OCB winning a bid for the [PathLAKE](#) project, in partnership with the University Hospital Coventry and Warwickshire NHS Trust and other leading groups.

PathLAKE is a UK government initiative that will launch five new centers of excellence for digital pathology and imaging.

Delivering life-saving benefits

Using IBM AI-powered image analysis, OCB has transformed its ability to build patient risk profiles. Browning recalls: "As soon as we saw IBM PowerAI in action, we knew that it was going to have a seismic effect on our ability to process tissue samples. Previously it took us months to years to build and test new models, now we can do it in hours."

OCB provides insights that support more informed clinical decisions following cancer surgery, improving patient outcomes. By minimizing overtreatment with chemotherapy, it also reduces the cost of care.

"Time is of the essence in cancer treatment," says Browning. "With IBM technology, we can get information about a patient's risk of recurrence and their likely reaction to chemotherapy to clinical decision-makers more quickly, which can have life-saving impact. We also help healthcare providers use their resources more efficiently."

Working with Meridian IT and IBM, OCB is reducing time-to-market for the enhanced ColoProg platform, helping it start to deliver value to patients and generate revenues sooner. The company is already exploring how the solution can be extended to breast and prostate cancers.

Browning concludes: "Teaming up with IBM and Meridian IT to tackle issues in colorectal cancer diagnosis and treatment is just the beginning of an exciting collaboration. With IBM's global healthcare experience and Meridian IT's deep knowledge of AI solutions, we're in good hands to bring leading-edge precision diagnostic tests to markets worldwide."

Solution components

- IBM® PowerAI Vision
- IBM Power Systems™ AC922

Take the next step

To learn more about IBM PowerAI Vision, please contact your IBM representative or IBM Business Partner, or visit the following website: ibm.com/uk-en/marketplace/ibm-powerai-vision.

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