JIM EUDY, PH.D., LEFT, DIRECTS THE NEXT GENERATION DNA SEQUENCING CORE FACILITY WITH ALOK DHAR, PH.D., WHO IS THE LEAD TECHNOLOGIST RESPONSIBLE FOR THE WET-BENCH COMPONENTS AND DAILY OPERATIONS OF THE ILLUMINA GAIIX INSTRUMENT.
Voyage into the building blocks of life — adenine, guanine, cytosine and thymine — the nucleotide bases in a molecule of DNA. Here, within these DNA nucleotides, lie answers to the mysteries of life’s genetic diseases.

The mission of the Next Generation DNA Sequencing Core Facility (NGS) is to sequence large amounts of DNA quickly and inexpensively, said Director Jim Eudy, Ph.D. “It took $2.7 billion and a factory full of DNA analysis instruments 13 years to sequence the first human genome. With the latest NGS instrument, we can do it in 10 days for less than $10,000.”

The advent of Next Generation DNA sequencing allows whole genomes — from humans and other animals to plants and bacteria — to be analyzed in a matter of days instead of months or years. The technology will significantly accelerate UNMC research and discovery in cancer, inheritable diseases, infectious diseases and autism.

“We can measure which genes are actively expressed at any given time (transcriptomes) and study the genetics of inherited diseases,” Dr. Eudy said.

The core facility is funded by grants from the National Institutes of Health, the Nebraska Research Network in Functional Genomics NE-INBRE, Molecular Biology of Neurosensory Systems CoBRE and the Nebraska Research Initiative.

The core facility works closely with the Center for Bioinformatics and Systems Biology at UNMC. Affiliated with the center are Robert Boissy, Ph.D., assistant professor, internal medicine, and Adam Cornish. Dr. Boissy leads the bioinformatics team that processes the data generated by the sequencer and assists with experimental design and analysis.

This technology holds great promise for genome-wide genetic analysis that may influence the treatment of human diseases, development of prognostic biomarkers and the identification of cancer-generating mutations or viral drug-resistance, he said.

“This technology will further our understanding of genetics at a much more rapid pace than has been previously imagined,” Dr. Eudy said. “It's an exciting time to be performing genomics research.”