Renal Cell Carcinoma (RCC), a type of kidney cancer, is a relatively rare and serious disease in which the cancerous process starts in certain areas of the kidney. Early stage renal cancers tend to have a better prognosis, while advanced/metastatic cancers have a worse prognosis.

Facts and Figures
- In the United States, approximately 60,000 new cases of RCC are diagnosed each year and approximately 13,000 patients were expected to die from the disease.
- At diagnosis, approximately 20 percent of RCC patients will have advanced (metastatic) disease.
- When the tumor is confined to the kidney, five-year survival may be as high as 80-95 percent.
- Five year survival rates for patients with advanced RCC remain low, in the 10 to 20 percent range.
- Improvements in imaging techniques have led to an increasing number of incidentally diagnosed RCC cases that are smaller and of lower stage than historically seen.

Risk Factors
- **Smoking:** Cigarette smoking doubles the risk of developing RCC.
- **Obesity:** Research has often shown a link between kidney cancer and obesity. Some doctors think obesity is a factor in 20 percent of people who get this cancer.
- **Gender:** Men are two to three times more likely to develop RCC than women.
- **Family history and genetics:** People with a strong family history of RCC have a higher chance of developing this cancer. Certain genetic conditions including von Hippel-Lindau disease, a rare inherited disorder characterized by the abnormal growth of blood vessels in certain parts of the body, may also increase the risk of developing RCC.

Biology of Renal Cell Carcinoma
- Vascular endothelial growth factor (VEGF) and platelet-derived growth factor (PDGF) are two proteins found at high levels in patients with renal cell carcinoma. Overproduction of these proteins in RCC patients is often caused by a genetic mutation, the most common of which is the inactivation of the von Hippel-Lindau gene.
- VEGF and PDGF are important to the growth and survival of tumors.
  - High VEGF levels lead to a process called angiogenesis – the formation of new blood vessels that feed the tumor.
  - High PDGF levels lead to the maturation and survival of newly formed and existing blood vessels and supporting tissue.
  - In addition, increased levels of PDGF may be associated with tumor progression in renal cell carcinomas.
- The mammalian target of rapamycin (mTOR) pathway has also been shown to play a central role in the regulation of cell growth and increasing evidence suggests its dysregulation in cancer.
  - The mTOR pathway contributes to many critical cellular functions, including angiogenesis, and recent studies have shown that the mTOR pathway is strongly activated in RCC patients.

Diagnosis and Treatment
- Symptoms of RCC may include blood in the urine, a lump in the side or back, pain in the side that doesn’t go away, tiredness, loss of appetite, weight loss, or anemia, a deficiency of red blood cells.
- The main treatment for early-stage RCC is surgery.
  - However, many kidney cancers are often found at a late stage when they are harder to treat.
- Until 2005, there were limited treatment options available and interleukin-2 and interferon alfa were widely used as first-line treatment of metastatic disease. Historically, median overall survival rates for patients treated with these therapies were approximately 12 months.
- Since 2005, several drugs have been approved by regulatory agencies for advanced renal cell carcinoma, which have greatly impacted how this disease is managed, and more are in development.


SUTENT (sunitinib malate) Prescribing Information. Pfizer Inc.

TORisel (temsirolimus) Prescribing Information. Wyeth Pharmaceuticals.

NEXAVAR (sorafenib) Prescribing Information. Bayer Pharmaceuticals/Onyx.

AVASTIN (bevacizumab) Prescribing Information. Genentech Inc.

AFINITOR (everolimus) Prescribing Information. Novartis Oncology.

VOTRIENT (pazopanib) Prescribing Information. GlaxoSmithKline.

INLYTA (axitinib) Prescribing Information. Pfizer Inc.