**Clinical Case 1**

Patient R., 53 years old, presented to the family doctor with the following complaints: diffuse abdominal pain, flatulence, nausea, changes in bowel habits—alternating diarrhea and constipation. Over the past 3 months, the patient lost 7 kg. Recently, he developed frequent nocturnal urination with associated pain.

Following clinical and laboratory investigations, the patient was referred to an oncology center, where the presence of a malignant rectal neoplasm with metastasis to the regional lymph nodes was confirmed, as well as a second malignant tumor localized in the prostate.

**Questions:**

1. What are the pathogenic mechanisms that contribute to the development of a malignant tumor phenotype?
2. What is the role of Ras protein gene mutation in the pathogenesis of colon cancer?
3. What role can TGF-beta mutations play in carcinogenesis?
4. What mechanisms could tumor cells use to evade apoptosis?
5. What are the pathogenic mechanisms contributing to tumor angiogenesis?
6. What are the steps of the metastatic cascade, particularly in the case of colon cancer metastasis to the prostate?

**Clinical Case 2**

Patient T., 65 years old, was found to have a hard mass in the right breast during a routine examination by a mammologist. Following clinical and laboratory investigations, the patient was referred to an oncology center, where a biopsy confirmed the diagnosis of right breast cancer cT4N3(f) M0, stage III, edematous-infiltrative variant. Immunohistological conclusion: invasive cancer, HER2-positive, FISH-negative.

**Questions:**

1. What are the phenotypic attributes of malignant neoplasms?
2. What pathogenic role do HER2 receptors play in breast carcinogenesis?
3. What are the mechanisms of immune evasion in tumorigenesis?
4. What is the pathogenic role of T-17 in carcinogenesis?
5. What is the pathogenic role of T-reg lymphocytes in carcinogenesis?
6. What is the FISH test?