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Review Article

The Role of Genetic Mutations in Kahler Disease (Multiple Myeloma)

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Abstract
Kahler's disease is a disease that affects the bone in the arch of the foot called the ankle bone. It most often occurs in children between 5 and 10 years old. Signs and symptoms of the disease include swelling, redness or palpation of the feet, which can lead to abnormal foot touch or gait. Although the exact cause of Kahler's disease is unknown, some scientists believe it may be due to excessive pressure on the ankle bone and its blood vessels. This condition usually resolves with or without treatment. However, to relieve pain, rest and avoid strenuous activities can help with treatment.

Signs
- Signs and symptoms of Kahler's disease vary, but may include the following:
- Swelling of the foot
- Redness of the affected area
- Leg strain, especially along the arch of the foot
- Abnormal foot touch or gait
- If the weight is placed on the injured foot, it can cause pain and the symptoms may get worse.

Reasons
The main cause of Kahler's disease is unknown. However, some scientists believe that this may be due to excessive pressure on a particular bone (the ankle bone) and its associated blood vessels before the bone is completely decayed. Although some scientists have suggested that genetic factors also play a role in the development of Kahler's disease, no gene has been identified so far.

Diagnosis
The diagnosis of Kahler's disease is based on the presence of specific signs and symptoms. X-rays can be used to diagnose and evaluate the progression of this disease.

Key words: coronavirus COVID-19, vibration approach, resonance technology, telemedicine, international medical network

Generalities of Kahler's Disease
Kahler's disease, also known as multiple myeloma, is a cancer that develops in the bone marrow, the spongy tissue found in the center of most bones. Bone marrow produces red blood cells, which carry oxygen around the body. White blood cells make up the body's immune system (immune system). And platelets are essential for blood clotting [1].

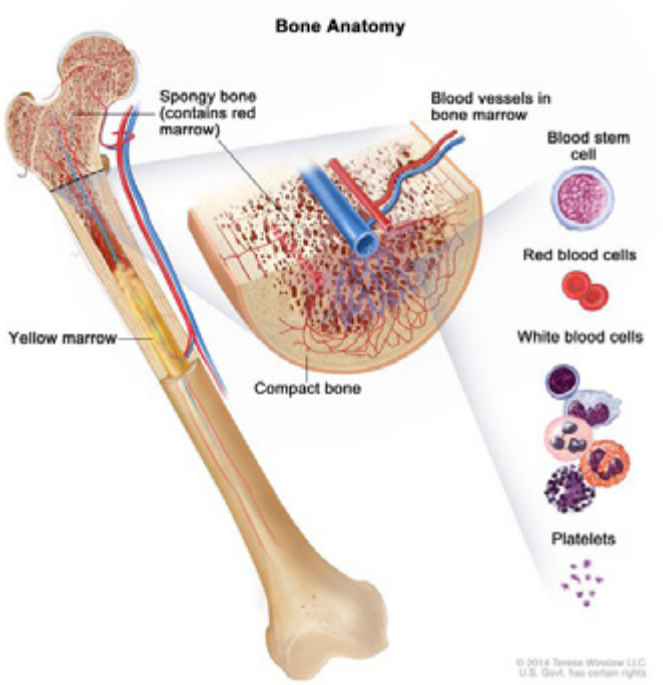

Figure 1: Schematic of bone anatomy1

Clinical Signs and Symptoms of Kahler's Disease

Kahler disease (multiple myeloma) is characterized by abnormalities in the plasma cells, a type of white blood cell. These abnormal cells proliferate out of control and grow from about one percent of bone marrow cells to most bone marrow cells. Abnormal cells form tumors inside the bone, causing bone pain and an increased risk of fractures. If tumors interfere with nerves near the bones, numbness or weakness develops in the arms or legs. Affected individuals may also experience loss of bone tissue, especially in the skull, spine, ribs, and pelvis. Worse bone deterioration can lead to excessive blood calcium (hypercalcemia) which can lead to nausea and loss of appetite, excessive thirst, fatigue, muscle weakness and confusion [1, 2].

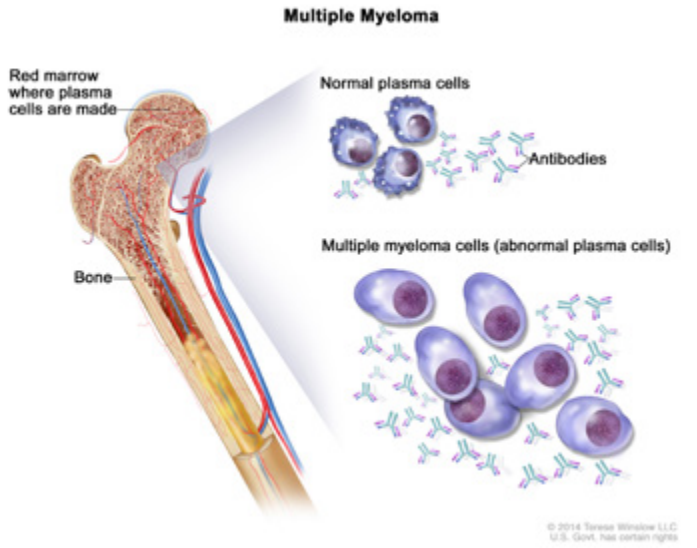

Figure 2: Schematic of multiple myeloma in bone tissue1

Abnormal plasma cells in Kahler disease (multiple myeloma) produce proteins that kill normal blood cells. As a result, people with the disease may have lower red blood cell counts (anemia), which can lead to fatigue, weakness, and abnormally pale skin (paleness). An abnormal white blood cell count (leukopenia) can lead to a weakened immune system and recurrent infections such as pneumonia. And a decrease in platelet count (thrombocytopenia) can lead to abnormal bleeding and bruising. Kidney problems also occur in this disorder, which is caused by hypercalcemia or toxic proteins produced by abnormal plasma cells [1, 2].

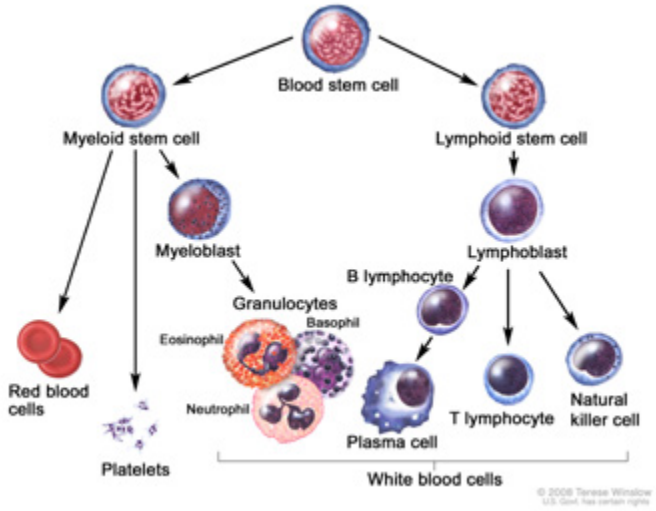

Figure 3: Schematic of blood cell interaction1

People with multiple myeloma typically develop the disorder around the age of 65. Over time, people with the condition can develop life-threatening complications, but the rate of occurrence varies greatly. It is worth noting that some infected people are diagnosed accidentally when performing tests for other purposes and do not experience symptoms for years [1, 2].

Etiology of Kahler's Disease

The cause of Kahler's disease (multiple myeloma) is unknown. Somatic mutations, which are not genetic or inherited changes but occur during a person's lifetime in specific cells (in this case plasma cells), have been identified in people with multiple myeloma. Some of these changes in genes that play an important role in regulating cell division prevent over-division of cells rapidly or in an uncontrolled manner. Mutations in these genes may interfere with proper control (regulation) of cell growth and division (proliferation), resulting in overproduction of plasma cells, which is characteristic of multiple myeloma [1, 3].

Abnormal exchange of genetic material between chromosomes (translocations) is a common physical event in myeloma. Translocations often involve exchanges between chromosome 14 and another chromosome. The genes that control cell growth and division are likely to be affected by these mutations. Researchers are trying to determine what role these genetic and chromosomal changes play in the growth and development of multiple myeloma [1, 3].

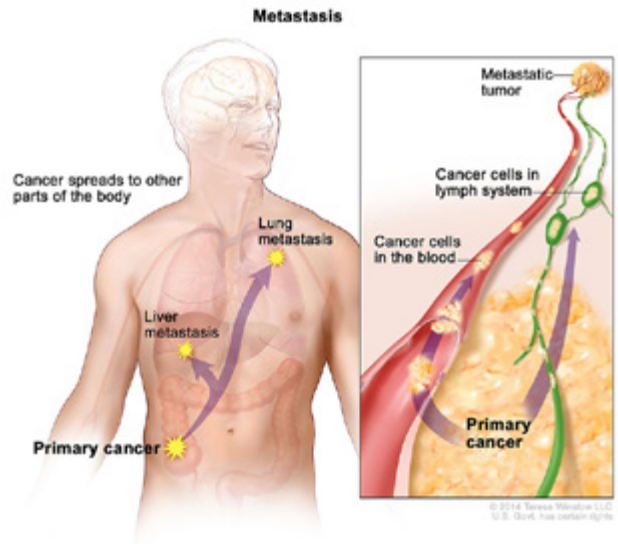

Figure 4: Schematic of the metastatic process in multiple myeloma[1]

Close relatives of people with multiple myeloma increase the risk, suggesting that hereditary changes in certain genes may contribute to the development of the disorder in some people. In contrast, some other inherited genetic changes appear to reduce the risk of multiple myeloma.

Non-genetic factors that increase the risk of multiple myeloma include previous radiation therapy or exposure to other radiographs. Exposure to certain chemicals, including benzene, has also increased the risk of multiple myeloma. Benzene, a known carcinogen, is a petroleum product used as an industrial solvent and a gasoline additive.

This condition is not generally inherited but is caused by a somatic mutation in plasma cells. Some families appear to have an increased risk of developing multiple myeloma, but the inherited pattern is unknown [1, 4].

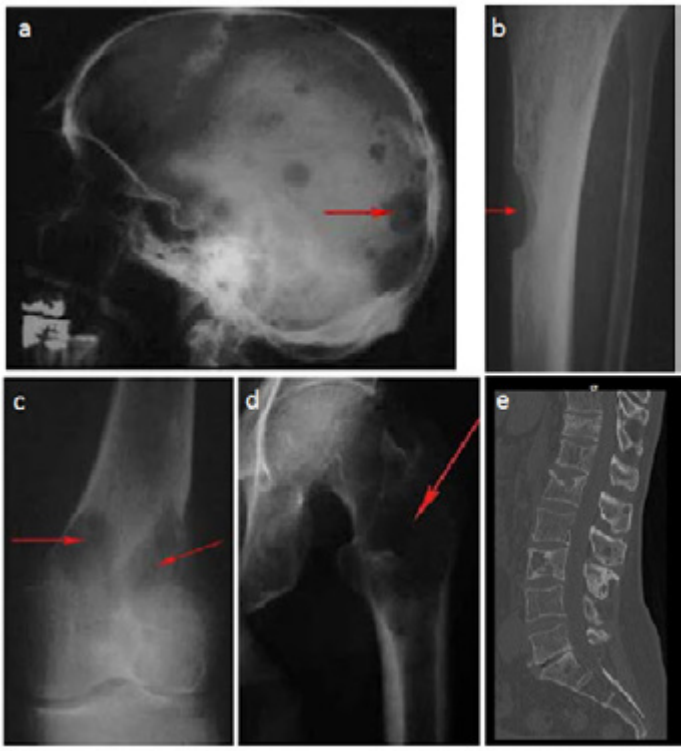

Figure 5: Radiological images of multiple myeloma disorder[1]

Prevalence of Kahler's Disease

Multiple myeloma is a rare cancer. It accounts for about 10 percent of leukemias and hematopoietic tissues and about one to two percent of cancers. Multiple myeloma occurs approximately 4 times per 100,000 people each year. There are currently approximately 100,000 people with the disease in the United States [1, 5].

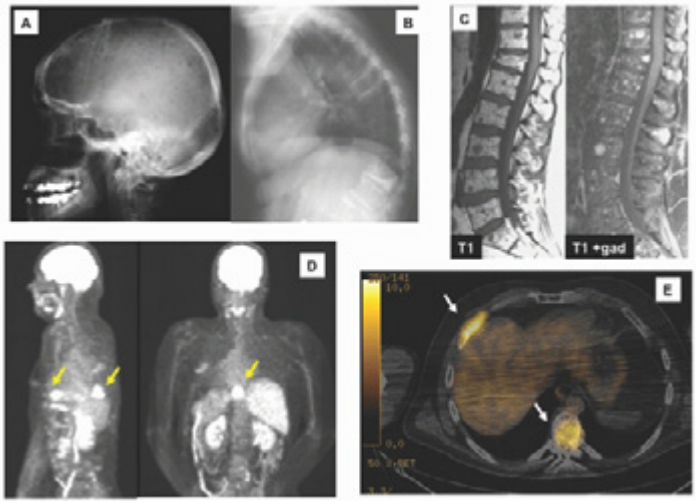

Figure 6: Radiological images of related disorders in Kohler's disease (multiple myeloma)[1]

Diagnosis of Kahler's disease

On plain radiographs, tumors from multiple myeloma are seen as circular areas of multiple darkening of the bone. One of the areas where bone changes are most commonly seen on radiographs is the skull bone. Bone scans sometimes show multiple points of bone involvement.

Blood and urine tests can sometimes show high levels of antibodies that help diagnose the disease. Anemia, low white blood cell count, low platelet count, and high blood calcium are other symptoms of the disease that can be detected by a blood test [1,5].

Treatments for Kahler's disease

Chemotherapy: Drugs called prednisone and melphalan are mainly used to treat this disease.

Plasma Cell Transplantation: Plasma cell cells are taken from a patient, placed in the presence of very high doses of melphalan, and then re-injected into the patient.

Radiotherapy: This method can reduce the size of painful bone masses.
Medication: Medications such as bisphosphonates, erythropoietin, corticosteroids, analgesics, and various vaccines are used to reduce the risk of infection in these patients.

Surgery: In areas of the bone that are so weak that there is an imminent risk of fracture, the orthopedic surgeon strengthens the bone by placing metal instruments in it [1,5].

Discussion and Conclusion

Researchers have recently achieved interesting results in the treatment of Kohler's disease, and to prevent the progression of this chronic and problematic disease, they have recently received a license to produce an effective drug. This cancer has many side effects for bone marrow cells.

Pharmaceutical company Novartis has announced the development of a new drug that could stop the progression of Kohler's disease or bone marrow cancer. The FDA has licensed the drug Farydak®. Previously,

bortezomib or l'ImiD was used to slow the progression of the disease, but the new drug has a greater and better effect in stopping the progression of the disease, and by affecting the HDAC enzyme, the patient can live longer. Gives. Kohler's disease refers to the abnormal production of antibody-producing plasma cells or white blood cells in the bone marrow. Plasma cells make substances that destroy bone marrow, and this drug can stop their abnormal production process. The effect of the new drug is not yet fully approved and has been rejected by the FDA for years, but this time it has been licensed and is set to receive a manufacturing license from the European Union [1, 6].

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