**Multiple Myeloma Stem Cell Transplant and Treatment Progress**

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**What are the best treatments for multiple myeloma? Right now, a common treatment plan for patients with multiple myeloma is a combination of chemotherapy and stem cell transplants. Not every patient has good success with the typical treatment plan, therefore currently being studied are different combinations of chemotherapy and other medications to contribute to getting more patients to remission. Some patients also have a high success rate with stem cell transplants, but later relapse; such patients are referred to as high-risk and might need a different treatment plan after relapse. Such combinations of treatments for these patients include induction therapy, which includes bortezomib, lenalidomide, and dexamethasone. Several studies have had success with other combinations of drugs for all types of multiple myeloma patients, such as lenalidomide induction therapy. For the treatment plan, high-risk multiple myeloma patient studies have found that instead of using autologous stem cell transplants the use of allogenic stem cell transplants might help high-risk patients reach remission or longer gaps of treatment. Even with the promising results from these studies, there are still many combinations of drugs and treatment plans to be considered for both high-risk and normal case multiple myeloma patients.**

**Introduction**

Multiple myeloma is an uncurable type of cancer affecting the plasma cells. This type of cancer can easily spread throughout the blood and cause tumors to grow in multiple areas of the bones, it can affect organs such as the kidneys, and it can cause immunodeficiency. Multiple myeloma is diagnosed through blood tests, a bone marrow biopsy, and bone x-rays (looking for tumors). After a patient gets diagnosed with multiple myeloma, common treatments include using a type of chemotherapy to lower the cancer count to a low enough level to harvest and then receive an autologous stem cell transplant. A commonly used chemotherapy treatment often consists of 3-4 cycles of a combination of bortezomib, lenalidomide, and dexamethasone. After the initial stem cell transplant, some patients can have reoccurring multiple myeloma meaning the treatments are less effective. These patients are referred to as high-risk patients. Since the original plan of treatment did not yield desirable results, complete remission, there are studies being conducted to find a better treatment plan after relapse. Some studies are also working on different approaches to treating multiple myeloma after diagnosis to better attack the disease. These studies are hoping to find a better, more effective combination of chemotherapy and drugs leading up to a stem cell transplant. The more effective the chemotherapy and drugs before the stem cell transplant, the more likely the procedure will yield the desired results. Sometimes, a patient may need more than one stem cell transplant to get to full remission. However, with more effective treatment this could be avoided.

**Recent Progress**

Progress in the study of multiple myeloma patients is slow because of the rarity of this form of cancer. However, there are some studies that have found possible alternatives to the current treatment plans of patients. One study found that increasing the number of cycles of lenalidomide based chemotherapy from 3-4 cycles to 6 cycles before a stem cell transplant helped considerably lower the cancer counts of 9 out of 10 patients (Yoshihara). This study also used both bortezomib, lenalidomide, and dexamethasone (VRD) and lenalidomide based induction therapy. They used cycles of bortezomib (administered weekly), lenalidomide (administered day 1-21), and dexamethasone (administered twice per week).

 The study on different treatment plans will help future doctors in creating a better treatment plan for new multiple myeloma patients, but what about for relapsed high-risk patients? It is even harder to study treatments for high-risk patients because of the low quantity of patients, and even lower quantity of high-risk patients, therefore the progress is much slower. One new study from the British Journal of Haematology, published in 2021, suggests the common type of chemotherapy for conditioning the patient’s body for an allogenic stem cell transplant instead of the typical autologous hematopoietic stem cell transplant (Mai). Allogenic stem cell transplants are more risky than autologous stem cell transplants and they require a young and extremely healthy individual. This is because autologous stem cell transplants are an individual’s own healthy stem cells being transplanted back into their body, while and allogenic stem cell transplant is a donor’s stem cells being put into someone’s body; therefore, it is slightly more dangerous because an individual’s body could fight off the new stem cells making them sicker.

**Discussion**

Due to multiple myeloma being a rarer type of cancer, the small number of patients that agree to participate in studies or clinical trials is a large contributing factor to the amount and quality of data from new studies. It also directly effects the speed at which forward progress can be made in the development of treatments for multiple myeloma patients. These studies admit to their hypotheses being slightly unreliable until they can further test with more patients. The first study tested the effectiveness of different types of chemotherapy and increased number of cycles of medication before stem cell transplant. The second study looked at the benefit, or risk, of the performance of allogenic stem cell transplants on high-risk, relapsed multiple myeloma patients. There are still many treatments that can be tested for multiple myeloma, but the treatments in these studies might help in finding the new, best treatment plan or plans possible. There is also a great possibility of an allogenic stem cell transplant being effective in high-risk patients possibly allowing them to live longer or get closer to remission. This might lead to discovering better methods of treatment leading up to a stem cell transplant to make allogenic stem cell transplants safer for the patients that need them, in hopes their body will not reject the new stem cells. There are still many questions to be asked and answered, but for now studying the different combinations and risks of treatments or induction therapy and finding a way to better the results and safety of both allogenic and autologous stem cell transplants is a priority.

**References**

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