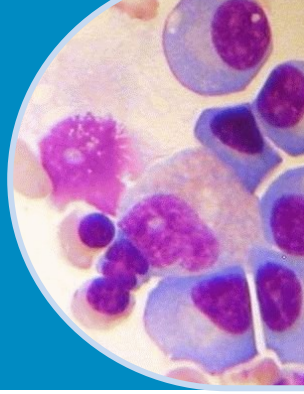
Leukaemia Foundation
VISION TO CURE
MISSION TO CARE

# FACT SHEET

## Immunotherapies and Myeloma



### About us

The Leukaemia Foundation is Australia's peak body for blood cancer, funding research and providing free services to support people with leukaemia, lymphoma, myeloma and related blood disorders.

We invest millions of dollars in the work of Australia's leading researchers to develop better treatments and cures and provide free services to support patients and their families.

We receive no ongoing government funding and rely on the generosity of the community and corporate sector to further our Vision to Cure and Mission to Care.

### We can help you

Our range of free services supports thousands of Australians, from diagnosis, through treatment and beyond. To learn more, please call 1800 620 420 to speak with one of our Support Services team.

### You can help us

There are many ways that you can help us to improve the quality of life for people with blood cancer. From making a donation, to signing up for an event; from volunteering, or joining us as a corporate sponsor - please call 1800 500 088 or go to www.leukaemia.org.au to learn more.

*Last updated: April 2017*

## What are immunotherapies?

**Immunotherapies are a new class of treatments that work to harness the innate powers of the immune system to target cancer cells. Because of the immune system's natural ability to detect and destroy abnormal cells, these therapies may hold greater potential than current treatment approaches:**

- **to fight cancer more powerfully,**
- **to offer longer-term protection against the disease, and**
- **to benefit more patients with more cancer types.**

**Immunotherapies are a promising new strategy to treat myeloma. They may be used in combination with chemotherapy or on their own as a single agent.**

**Types of immunotherapies**
The main types of immunotherapy treatments that show promise in treating myeloma include:

**Monoclonal antibodies:** These are man-made versions of antibodies, which are proteins that are produced by the immune system to bind to alien substances, including damaged/infected cells, to tag them for destruction by the immune system. Antibodies can be very useful in identifying myeloma cells by attaching to a very specific part of the cell, making them more visible to the patient's immune system. An example of a monoclonal antibody currently available in Australia through clinical trials is daratumumab. This antibody binds to a protein called CD38, which is found on most myeloma cells. Daratumumab enhances the immune response through multiple mechanisms. By attaching to the myeloma cells, it marks them for destruction by natural killer cells and other cellular components of the immune system. In so doing, it also primes the immune system to search for and attack other myeloma cells. Daratumumab works on its own as well as in combination with other myeloma treatments. Other examples of monoclonal antibodies used in the treatment of myeloma include elotuzumab (which binds to a protein on myeloma cells called SLAMF7) and isatuximab (which, like daratumumab, is an anti-CD38 antibody).

**Immune checkpoint inhibitors:** Immune checkpoint inhibitors are a group of drugs that unleash an immune attack on cancer cells. Checkpoints are molecules that are present on specialised immune cells called T-cells. Some cancers can develop proteins on their surface that interact with these checkpoints to make the T-cells oblivious to their presence. Drugs that belong to the immune checkpoint inhibitor family block this interaction, thus removing the 'blinders' that prevent the T-cells from recognising the cancer cells, which in turn leads to an immune assault on the cancer cells by the T-cells.

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Examples of checkpoint inhibitors include pembrolizumab, nivolumab, durvolumab and tremelimumab. Some of these already have been shown to be highly effective in solid cancers, including melanoma and lung cancers, and they are being actively studied for myeloma.

**Vaccines**
In a similar way that vaccines can be used to boost the immune system's natural ability to attack certain bacterial or viral infections, cancer vaccines can be designed to stimulate an immune response against specific tumours. Vaccines for myeloma typically consist of either proteins that mimic those on the surface of myeloma cells, or immune cells that are pulsed with these myeloma associated proteins, which, when injected into the patients, can stimulate their immune response against myeloma. Early-phase clinical trials are looking at the role of vaccines in myeloma treatment.

## Immunotherapies under investigation

**Adoptive T-cell therapy**
T-cells are a type of white blood cell that circulates around our bodies and plays an essential role in establishing our immunity. Adoptive T-cell therapy involves removing a person's own T-cells which are then enhanced, in the lab, to have the ability to recognise cancer cells (either by genetically modifying these T-cells or growing them in a soup of cancer proteins and other immune cells). Once these 'modified' T-cells are injected back into the patient's body, they are primed and ready to attack the target cancer cells.

One very successful form of adoptive T-cell therapy is called CAR (chimeric antigen receptor) T- cells. These are T-cells that are harvested from the patient then genetically modified outside the body to grow a protein on their surface that can bind to particular cancer cells. CAR T-cells have had resounding success in acute B-cell lymphoblastic lymphoma and are showing great promise in early-phase clinical studies in myeloma. However, much more work and research needs to be completed before they are safe enough to be used in the clinic.

**BiTe therapies**
Another type of immunotherapy, which is under investigation for use in myeloma treatment, is Bi-Specific T-cell engagers (BiTe). These molecules are artificially engineered to consist of two protein arms, linked together. One arm can bind to the target cancer cells, and the other arm binds to a patient's own T-cells (i.e., 'bispecific'). This bispecific complex then can act as a binding link between the T-cells and the myeloma cells, forcing the two in close proximity which results in the T-cells recognising the myeloma cells as being foreign and mounting an attack on them. BiTe therapies, therefore, is a method of overcoming the ability of the myeloma cell to evade the detection of the body's immune system.

BiTe therapies already are in clinical use for B-cell acute lymphoblastic leukaemia and they are currently undergoing early-phase clinical studies in myeloma.

**The Leukaemia Foundation publishes the information booklets: *Myeloma — a guide for patients and families*; *Leukaemia, Lymphoma, Myeloma, MDS, MPN and related blood disorders; and Living with Leukaemias, Lymphomas, Myeloma, MDS, MPN and related blood disorders*.**

**For more information,** freecall 1800 620 420
email info@leukaemia.org.au or visit www.leukaemia.org.au