Angus Dalgleish attended Harrow County Grammar School and studied medicine at the University College Hospital, where he obtained an intercalated BSc in Anatomy, where he became interested in cancer. After being a junior hospital doctor, he became a Medical Officer at the Flying Doctor Service in Mount Isa, where he was taught how to fly so he could visit remote communities in the outback. He then moved to Brisbane and trained in general medicine and began to specialise in cancer treatment. He completed all his training for a cancer physician in Sydney and moved back to London to commence a research project on how viruses can cause cancer and how the immune system can affect this process. At that time, the virus that caused AIDS had just been discovered and he made several seminal discoveries on this agent, including how it entered the cell and caused immune suppression. He then became an MRC Senior Fellow at the Northwick Park Clinical Research Centre, where he first used Thalidomide to treat rare autoimmune diseases and HIV. He proposed that this drug should be used as a basis to design new drugs that could be used to treat chronic diseases and cancer, and performed basic research on these agents, as well as being the first to administer the lead agent, Lenalidomide, to humans. This drug has been shown to be highly effective in the treatment of myeloma and lymphoma, and is one of the most best-selling drugs in the world today. He was awarded the Joshua Lederberg prize in 2011 for this work.

Upon moving to St. George's as a Professor of Oncology, he became very interested in harnessing the immune response against cancer and performed many early studies with cytokines and early cancer vaccines. This work led to the discovery that chronic inflammation reduces the immune response, which eventually leads to cancer, and that boosting the immune response is an essential component in the management of cancer. More recent work demonstrated that low doses of numerous agents, including non-cytotoxic drugs, can have a very beneficial effect on the immune system and he has recently published studies showing that drugs derived from the cannabis plant, known as cannabinoids, can sensitise cancer to other treatments. He has currently been awarded a significant grant for the discovery of an optimal agent, or a combination of agents, for future clinical trials.