

Common chemical highly toxic to blood cell precursors

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Benzene is one of the most widely used chemicals in the world. Credit: Yang MingQi

Malaysian scientists have provided evidence that a widely used chemical is more toxic to certain blood cell precursors in the bone marrow than to others.

Benzene is among the most widely used chemicals in the world. It is mainly used to make materials such as plastics, rubbers, dyes, detergents and pesticides. It can also be found in automobile and industrial fumes. Its toxic effects on [blood cells](#) are well documented and it's known to cause different kinds of leukaemia, multiple myeloma and non-Hodgkin lymphoma. However, the exact mechanisms involved in its toxicity are not yet understood.

Researchers from Universiti Kebangsaan Malaysia built on previous research that shows that [benzene](#) is metabolized in the liver, then its metabolites are further metabolized in the [bone marrow](#) to produce 1,4-benzoquinone (1,4-BQ), which is known for its toxic effects on blood cells. The team studied the effects of 1,4-BQ on "haematopoietic stem cells" (HSCs are stem cells found in the bone marrow that can give rise to any kind of blood cell) and "haematopoietic progenitor cells" (each HPC in the bone marrow can differentiate into only one specific type of blood cell) in mice.

The researchers exposed mouse bone marrow cells to different concentrations of 1,4-BQ and found it induced cytotoxicity that leads to suicidal cell death, or apoptosis. They also found that 1,4-BQ was more toxic to HSCs, myeloid progenitors (which give rise to red blood cells and platelets, among others) and B cell lymphoid progenitors than it was to T cell lymphoid progenitors. They also found that 1,4-BQ was more toxic to progenitors that give rise to a single group of blood cells than it was to progenitors that give rise to multiple groups.

No studies to-date have compared the toxic effects of 1,4-BQ exposure on different haematopoietic progenitors, the researchers say.

Although benzene itself is not likely to be toxic to blood cells, scientists believe its metabolites are. This study provides an experimental system to further understand how benzene metabolites impair the regulation of haematopoietic [stem cells](#), the researchers say.

Provided by ResearchSEA

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