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LEUKAEMIA

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Cover art: Nik Spencer

Of all of the cancers that can wage war on the body, leukaemia — the general term for cancers of the blood — has a reputation for being among the least malevolent.

Most solid cancers are riddled with dozens of mutations, making it impossible to know which mutation set a cell on the wrong path, or which one to target. Leukaemia seems simpler: one type of the disease, chronic myeloid leukaemia (CML), can be traced to a single gene fusion (page S4). Scientists were able to develop a drug, imatinib, that exploits the errant gene, increasing the five-year survival for CML to more than 95%. Most children with acute lymphoblastic leukaemia (ALL) also survive.

As we show in this Outlook, however, these headline statistics belie the reality for many patients.

As CML patients develop resistance to imatinib, doctors turn to one drug after another (S7). For many leukaemias, doctors still reach for the same toxic treatments they used in the 1970s (S8). Survivors of childhood leukaemia still suffer severe, even life-threatening, complications from the harsh treatments (S14).

Progress towards new therapies has been slow. Some scientists have been able to cure leukaemia by engineering immune cells to destroy cancer cells, but in fewer than a dozen people so far (S17). Bone-marrow transplants and cord-blood transplants are options, but both have limitations (S16). Other promising candidate drugs target chemical tags on DNA that alter gene expression without changing the genetic code (S10).

Cancer stem cells, a subset of cancerous cells able to regenerate and seed new tumours, are also best understood in leukaemia (S12). These and other lessons learned from the study of leukaemia may be broadly applicable to all cancer research.

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Apoorva Mandavilli
Guest editor

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