

# No life without death: the role of apoptosis in cancer

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Cells in an organism constantly receive signals telling them to do, or not to do certain things. These signals are in the form, usually, of small molecules that reach the cells via the surrounding fluid (either from neighbouring cells, or via the bloodstream). The small molecules bind to a cell-surface receptor, which is the start of a chain of protein-catalysed reactions leading eventually to gene activation or deactivation in the cell nucleus. In the case of the so called CD95 receptor, which is involved in “programmed cell death”, or apoptosis, the receptor must first assemble into clusters with similar receptors in order to become active.

The activation of a cell-surface receptor by clustering is a common mechanism in biology; many receptors are “inactive” as individual molecules. The receptors have their ligand-binding region outside the cell membrane, and their signal-transducing region inside the membrane (intracellular). When they come together, these signal-transducing regions become activated, and they start a chain reaction called a signalling cascade, involving many proteins in a so called signalling pathway.

CD95 induces apoptosis upon functional association of several receptors in the cell membrane (a process known as oligomerisation). When CD95 binds a certain cytokine (cellular signaling molecule) similar to Tumor Necrosis Factor (TNF), it starts to oligomerise at the cell surface, and thereby activates its intracellular region. But which components of the signalling cascade come after CD95? A caspase (a type of protease) was identified as the next component, and this caspase sets off a chain reaction involving other proteases. The caspase is assisted by another protein, and together these proteins form a “death-inducing” complex with the CD95 receptor.

The CD95 death system seems to play a role in the death of infected liver cells in hepatitis, in the way cancer cells respond to chemotherapy, in T cell death in AIDS, and T cell tolerance in cancer.

Reference:

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