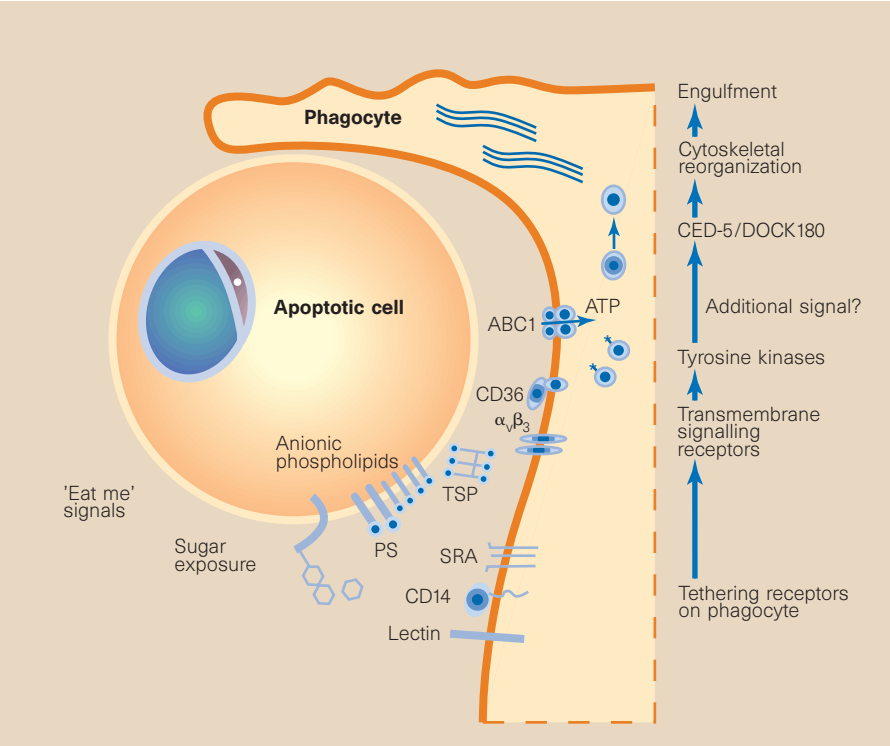

Figure 1 **A model of phagocyte engulfment of an apoptotic cell, which follows phagocyte recognition that the cell is to be destroyed. The figure shows the molecules already implicated in these processes, and the newly proposed[1,2] functions of CED-5 and CD14. TSP, bridging thrombospondin; SRA, class A scavenger receptor; PS, phosphatidylserine.**

61D3 antigen. It turns out to be CD14, a glycosylphosphatidylinositol- (GPI-) anchored protein of relative molecular mass 55K, which binds the lipid A portion of bacterial lipopolysaccharide to trigger phagocyte activation *in vitro* and the septic-shock syndrome *in vivo*. This is surprising, as various reports demonstrate that uptake of large numbers of apoptotic cells does not stimulate[16] and may even inhibit[5,17] release of pro-inflammatory mediators from macrophages.

However, CD14 may bind certain lipids without triggering phagocyte activation[18], including anionic phospholipids akin to those exposed by apoptotic cells[19], and Devitt and colleagues' transfection of COS cells confirmed that CD14 is directly involved in tethering apoptotic cells. Finding out how this GPI-linked molecule engages the 'non-inflammatory' signalling pathways triggered by phagocytic transmembrane receptors will throw new light on the properties of CD14, extending the medical importance of this molecule beyond its known participation in septic shock. Indeed, further characterization of phagocyte recognition and processing of apoptotic cells[20] *in vivo* may reveal specific defects of clearance in persistent inflammatory and autoimmune diseases, such as some types of arthritis, and could lead to new treatments.

The new reports[1,2] make an important contribution towards understanding a complex process (Fig. 1) — one in which partially redundant phagocyte molecules may first tether apoptotic cells, then trigger transmembrane signalling which leads to activation of CED-5 homologues and closure of the phagocytic coffin around the moribund cell. □

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Daedalus

High radiation levels

Last week Daedalus was designing a free-flying helicopter rotor based on the Crookes radiometer principle. Each blade is black on one side to absorb sunlight, and bright on the other to reflect it. In sunlight, the black faces warm up; impinging air molecules rebound from them with added momentum; their reaction spins the rotor. This solar-powered 'altoradiometer' will fly very high in the atmosphere, where the pressure is low enough for this thermal transpiration process to exert a useful force. Sadly, it loses lift at nightfall, and may drift down too low to regain power and height the next day.

Daedalus now has an improvement. He plans to replace the black surfaces on the rotor blades with a radioactive coating. Nuclear decay will then keep the surfaces warm. The craft will be independent of the Sun, and will fly as long as its isotope layer lasts. Furthermore, the rotor will gain added thrust from the recoil of its energetic emissions. Such a radioactive coating will be highly dangerous, but Daedalus is undaunted. Once launched in the stratosphere, his craft will fly indefinitely at a safe height. Only when its radioactivity has safely decayed will it descend harmlessly to Earth.

At first Daedalus saw his craft as merely an unmanned high-altitude research vehicle. Its radioactivity would generate a local aurora; at night it would be visible as a little glow drifting across the sky, giving spectroscopic details of the air around it. But he now sees it as a splendid ecological development. Much of the world's radioactive waste could be lofted up into the stratosphere on altoradiometers, where it would wander around doing no harm. Even better, it could repair the ozone layer. Nuclear radiation can convert oxygen to ozone far more efficiently than solar ultraviolet light. A swarm of altoradiometers drifting about through the ozone layer, their huge rotor blades contacting vast swathes of air, could generate ozone faster than it could be destroyed by halocarbon radicals wafting up from below. If their radioactive coatings were blackened to absorb sunlight, the resulting added oblique thrust during the hours of daylight would even tend to push them towards the poles, where the ozone is most depleted. Dedicated ecologists will be outraged at the thought of one wicked industrial menace being safely disposed of by countering another; but the rest of us will be well content.

David Jones