Apoptosis pathways and drug targets
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Defects in the expression or function of proteins with either pro-apoptotic (induced in cells) or anti-apoptotic (gain or loss) effects can cause a cancer or contribute to the pathogenesis or progression of several diseases. The clinical needs of most of these diseases have not yet been met. They include diseases that are characterized by inappropriate cell loss (tumours, heart failure, Alzheimer's, Parkinson's and diseases that are associated with excessive cell accumulation (cancer) or failure to eradicate aberrant cells (autoimmunity). The emerging knowledge about proteins that are involved in apoptosis, including their biochemical mechanisms and three-dimensional structures, has provided a foundation for drug discovery.

### Therapeutic leads:

- Ca²⁺
- et al
- Proc. Natl Acad. Sci. USA
- Cancer Res.
- TRAILR1: HGS-ETR1
- pan-TRAILR: TRAIL

### Chemical leads:

- TRAIL §: Genentech Inc./Amgen Inc.
- pan-TRAILR §: TRAIL

### Chemical leads:

- BCL2 derivatives
- Bcl-2 antisense (Genasense)
- Survivin antisense (AEG35156/GEM640) §

### Chemical lead:

- PML oncogenic signals

### Chemical lead:

- PML/REX1 (PI3K/PKB) Preclinical 71

### Chemical lead:

- HA14-1 analogues | CPM-1285 analogues Raylight Chemokine Pharmaceuticals Inc. BCL2 Preclinical 3,4 | 5

### Chemical lead:

- HA22-8 analogues | N-7-octadecylcarbonate | API-2

### Chemical lead:

- NU-7441 analogues | O-phenylalanine

### Chemical lead:

- SI-9 analogues | P15

### Chemical lead:

- S1-21 analogues | 1,25-diiodo-3-thyronine

### Chemical lead:

- S-1 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-3 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-4 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-5 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-6 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-7 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-8 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-9 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-10 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-11 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-12 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-13 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-14 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-15 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-16 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-17 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-18 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-19 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-20 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-21 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-22 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-23 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-24 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-25 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-26 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-27 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-28 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-29 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-30 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-31 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-32 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-33 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-34 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-35 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-36 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-37 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-38 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-39 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-40 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-41 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-42 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-43 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-44 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-45 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-46 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-47 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-48 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-49 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-50 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-51 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-52 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-53 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-54 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-55 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-56 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-57 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-58 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-59 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-60 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-61 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-62 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-63 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-64 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-65 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-66 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-67 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-68 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-69 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-70 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-71 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-72 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-73 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-74 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-75 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-76 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-77 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-78 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-79 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-80 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-81 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-82 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-83 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-84 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-85 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-86 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-87 analogues | 2-deoxy-D-glucose

### Chemical lead:

- S-88 analogues | 2-deoxy-D-glucose