



The University of
Nottingham

Multi-paradigm Simulation of Cellular Pathways

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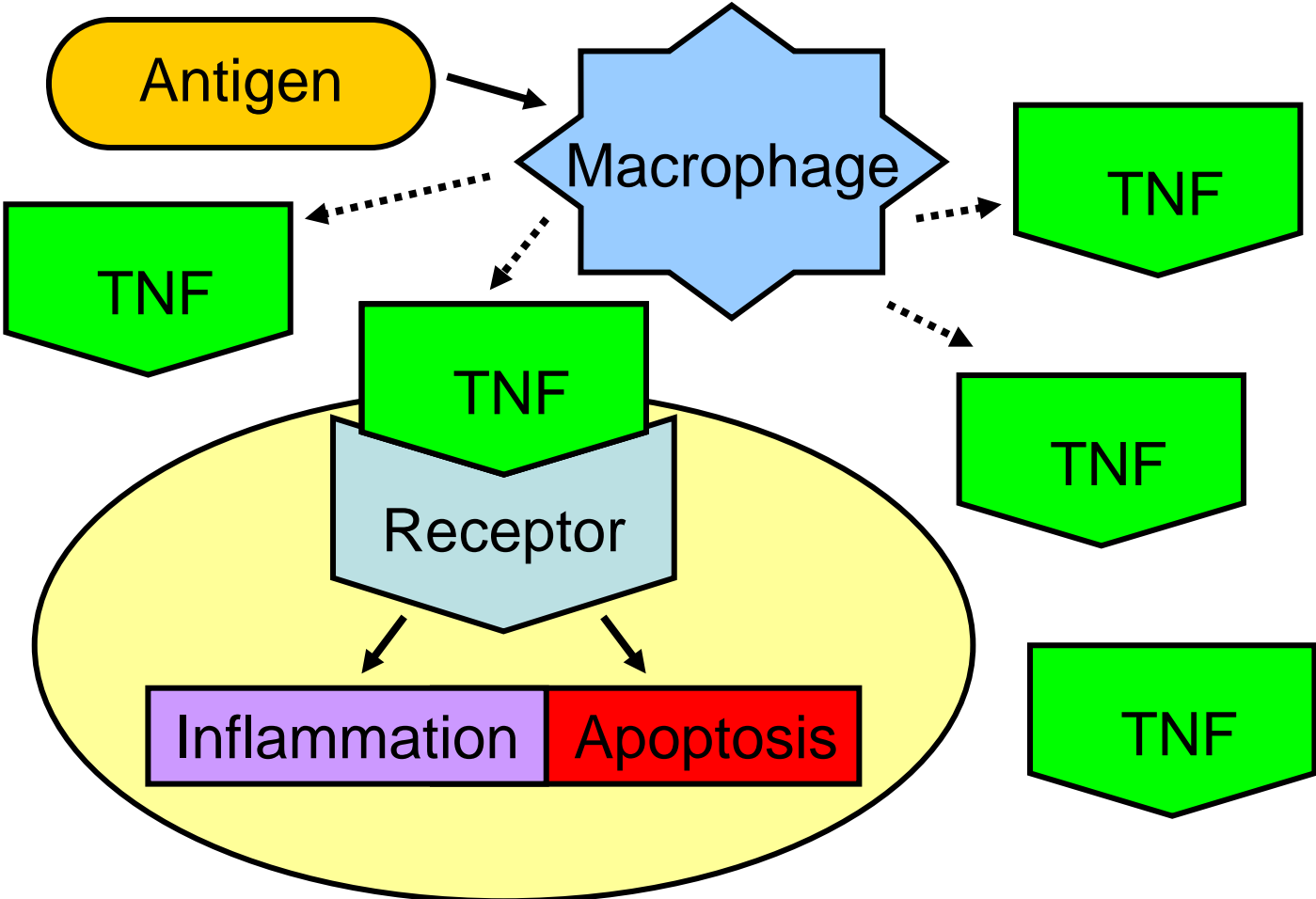
Background

- Overview
Past and current work
- Interests
Immune system, Computer modelling
- Software
BASIC, C, C++, .NET
- Research
TRAPS, Inflammation

TRAPS

- TRAPS (TNF receptor-associated periodic syndrome)
- A dominantly inherited disease which is a result of missense mutations occurring in TNFR1 (TNF Receptor 1) gene.
- As a result of these mutations, patients suffer from inflammation and bouts of fever.
- TNF is released by macrophages when they encounter infectious material. Initiate inflammation. Coined the 'master regulator' of inflammation.
- Mutation of TNF receptor increases levels of Apoptosis.

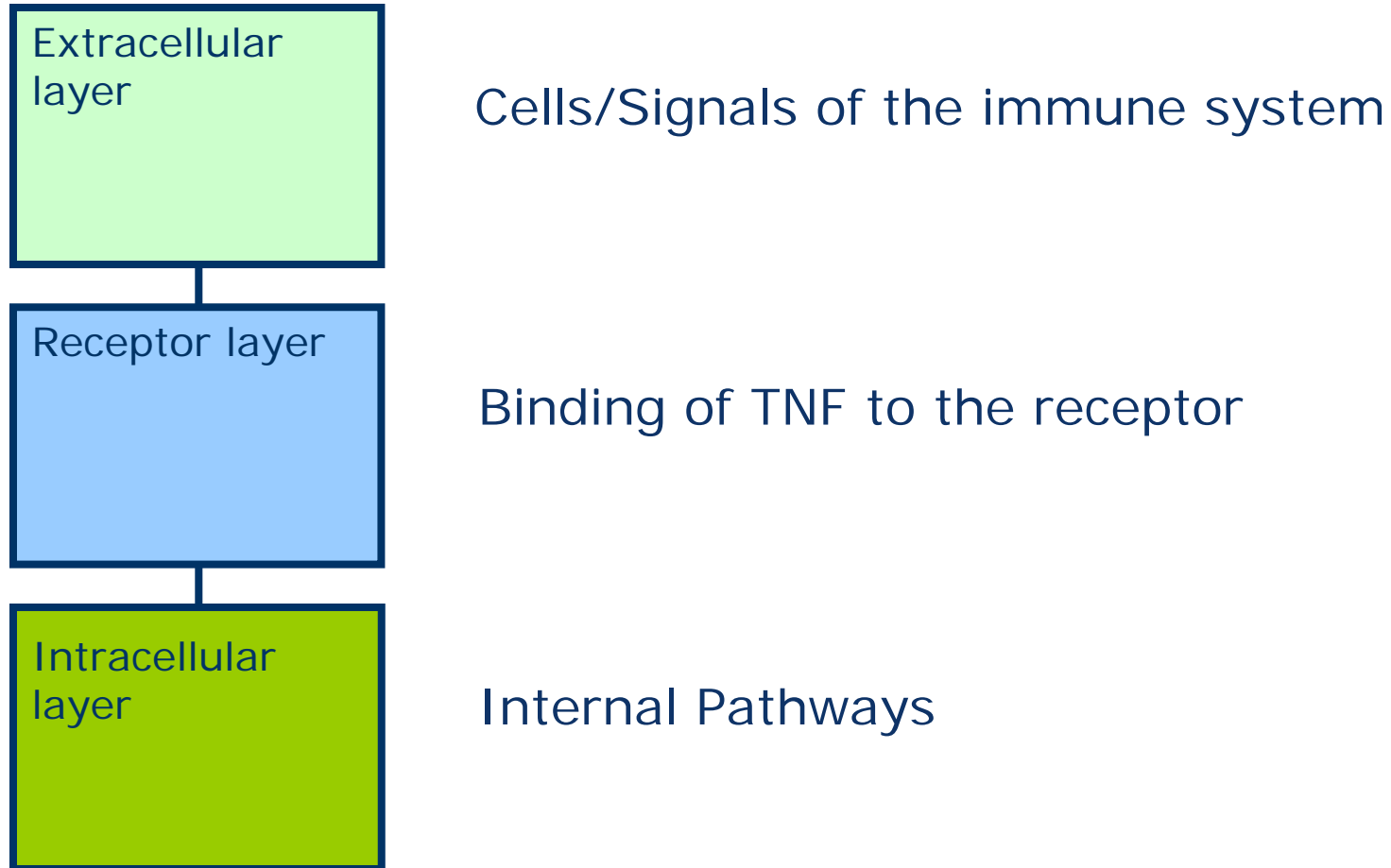
The Role of TNF



Why Model TRAPS?

- Understand the processes involved
Cells and messages
- Determine the scope of simulation
Limits, strengths and weaknesses
- Provide a useful tool
Pre-laboratory analysis
Starting point for further investigation

TRAPS components

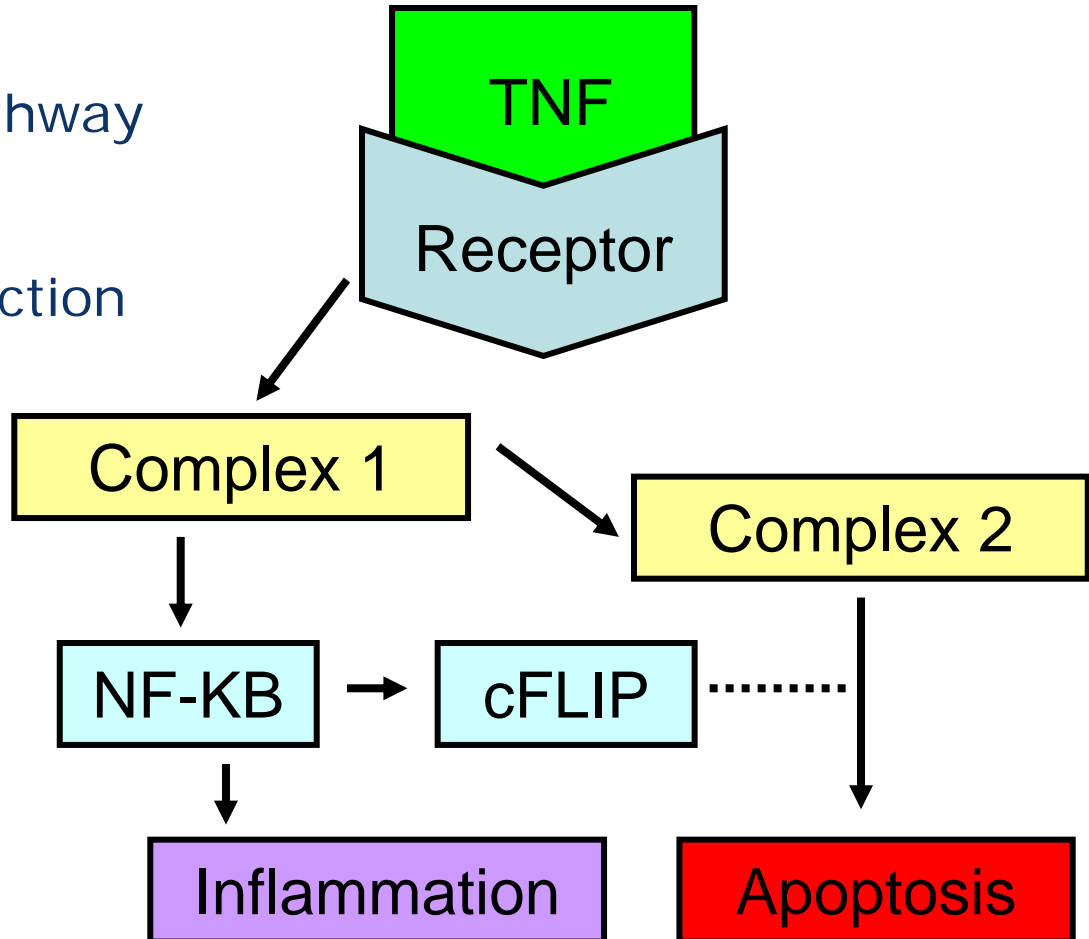


Extracellular components

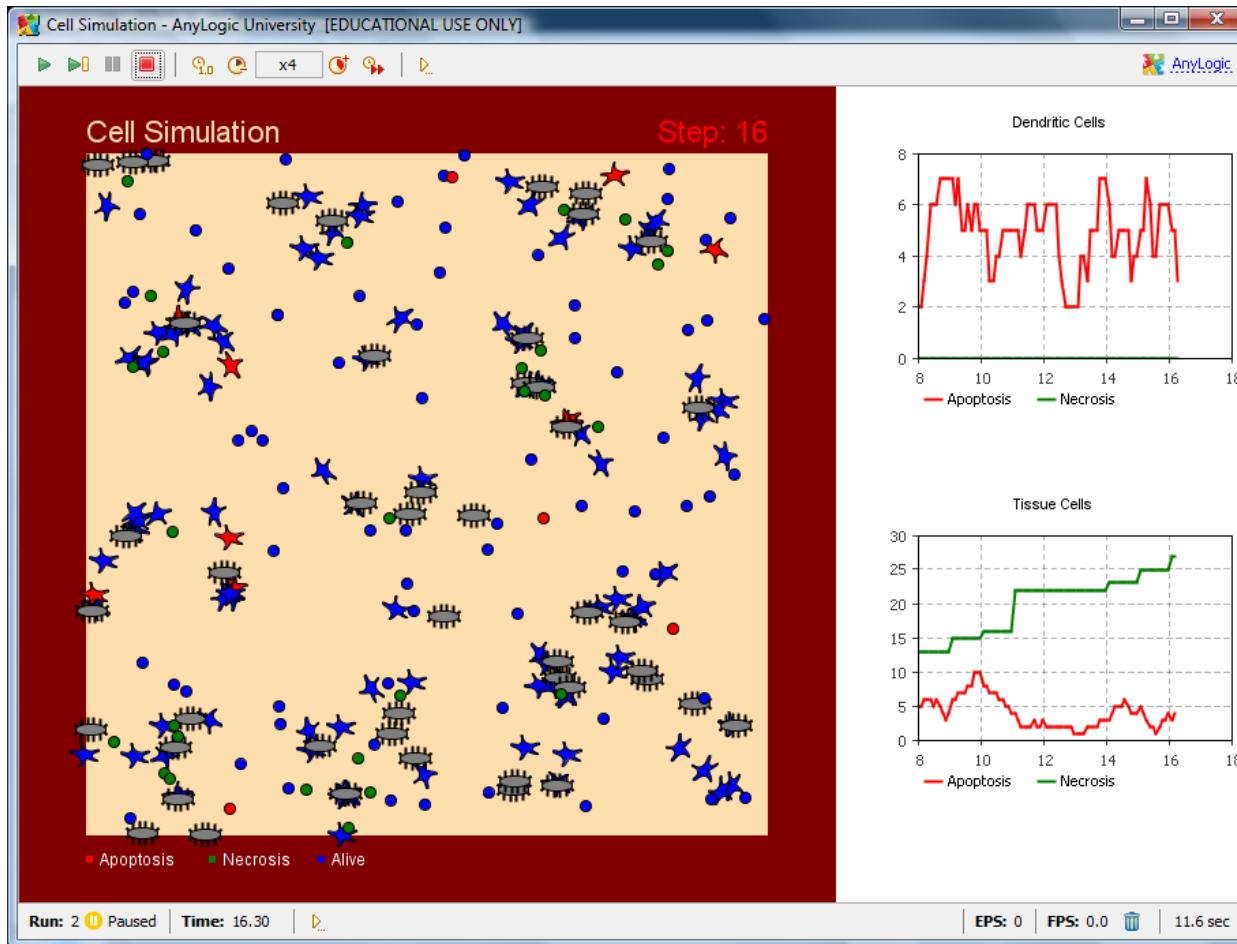
- Dendritic Cells
Surveillance, Antigen Presentation
- Macrophages
Scavenge, Antigen Presentation
- T Cells
Cell mediation
- Natural Killer Cells
Kill stressed cells
- B Cells
Generate antibodies

Receptor/Intracellular components

- TNFR1
Binding activates pathway
- NF-KB
Controls cFLIP production
- Inflammation
Kill stressed cells
- Apoptosis
Caspase-8
- cFLIP
Apoptosis inhibitor



Cell Simulation



- AnyLogic
- Agent Based
- Evaluation
- Results
- Parameters
- Logging



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Questions

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