**Steps to reproduce Figure 8 of main manuscript.**

**Construct the HNSCC model from the model equations given in the filename ‘HNSCC\_model\_equation’.**

**For Figure 8(a-b)**

1. Set the value of barrier building CAF proportion (alpha) =0.5
2. Load the parameter set for given alpha and from the document ‘HNSCC\_parameters\_OPN’. Store it in a vector P.
3. Set the initial condition (y\_0) for simulation as

y\_0=[5.6304; 7.6874; 8.0805; 3.9277; 7.5001; 0.1805; 0.8207; 2.5095; 0; 7.9163; 7.5867; 8.0238; 6.3413; 0.4928; 9.4814; 6.1741; 9.7238; 7.2642; 5.0844; 8.1333; 7.8140; 1.8921; 0.9877; 5.9869];

1. Simulate the HNSCC model with for the following values of OPN clearance rates (C\_OPN)

C\_OPN[100 1000 2000 5000 7000 10000 50000], with anti-PD1=2 .

1. Plot the inaccessible tumor cells vs accessible tumor cells normalized by their carrying capacities.
2. Repeat the same procedure by setting the LIF clearance rate: 5\*10^4

**For Figure 8(c)**

1. Set the value of barrier building CAF proportion (alpha) =0.5
2. Load the parameter set for given alpha and from the document ‘HNSCC\_parameters\_OPN’. Store it in a vector P.
3. Set the initial condition (y\_0) for simulation as

y\_0=[654.8; 354.5; 1227.8; 1997.2; 860.0; 1789.7; 29.3; 704.7; 0; 1615.7; 1287.4; 1536; 1395.2; 222.9; 314; 925.6; 1869.7; 1109.7; 521.1; 1011.7; 1468.4; 1724.2; 429.1; 117];

1. Simulate the HNSCC model with for the following values of OPN clearance rates (C\_OPN)

C\_OPN[ 500 1000 5000 7000 10200 40000 80000 160000 200000 500000], with anti-PD1=2 .

1. Plot the steady state value of immune accessibility index with respect to OPN clearance rate for the following LIF clearance rate=[0 50 100 200 400 500].