

KINARI-Web Case Study: Insulin, 4INS, 2HIU, 1TRZ

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One of the most important hormones, insulin carries messages to our cells describing the amount of sugar available. People with diabetes have an insulin deficiency, and rely on insulin replacement. This replacement insulin can be generated in a number of ways. Pig insulin (4INS) differs from human insulin (2HIU, 1TRZ) by only one amino acid. Because of their similarity, these forms are also recognized by our own cells. Insulin is a globular protein, with a hydrophobic core and three stabilizing disulfide bonds [2].

We demonstrate KINARI-Web [1] analysis on the insulin monomer (chains A and B) from three different PDB files: 1TRZ, 2HIU, and 4INS. Figure 1 shows the rigidity results of KINARI with default modeling options. 2HIU and 4INS both have a dominating rigid cluster. Because of structural differences, 1TRZ has more clusters.

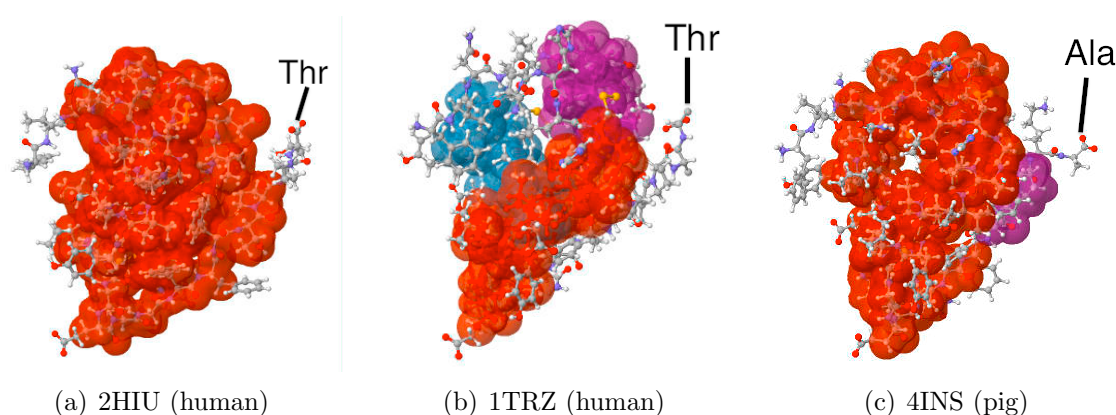


Figure 1: Rigidity results of three structures of the same protein, the hormone insulin. The two human structures are identical in sequence. The pig structure has one alanine instead of a threonine. Human cells are able to recognize the pig version of the insulin protein. Because of structural differences, the rigidity analysis of these three PDBs varies.

References

- [1] KINARI-Web server for rigidity analysis of proteins. <http://kinari.linkage.cs.umass.edu>, 2011.
- [2] David S. Goodsell. Insulin, RCSB PDB Molecule of the Month. DOI: 10.2210/rcsb_pdb/mom_2001_2, February 2001.