PET & Metabolism: Hints

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The purpose of this case study is to model perfusion in vessels. One is expected to be able to model a vessel distribution and study various properties affecting a PET image.

1. Understand the interplay between the arterial input function (AIF) and the vessel distribution. Try out other synthetic AIF profiles like a square function ($f(x) = \{1$, for $0 < x < k$ and 0 elsewhere$\}$), a downward ramp ($f(x) = \{-ax + b$, for $0 < x < k$ and 0 elsewhere$\}$), etc.

2. Vary the *expected vessel density*, diffusion and vessel parameters in the oxygen map generation, and the parameters determining the tracer development.

3. Try to determine the most significant parameters and observe how the tracer activity (and consequently the time activity curve, TAC) varies with these parameters.

4. The simulated vessel distribution is a 2D orthogonal view, cutting orthogonally through the vessels. Can we choose a more realistic simulation? (e.g. a 3D block with vessels cutting through it at random orientations. How can one simulate the oxygen map and tracer development in such a case?)