We present the application of superresolution microscopy to analyze the distribution of pharmaceuticals within living cells. By a combination of Structured Illumination Microscopy (SIM) and Spectral Position Determination Microscopy (SPDM) in one setup, we have obtained the density distribution of labeled pharmaceuticals within the cell at a substantially enhanced resolution. We used a time lapse approach using SIM to track the fluorescent drug molecules in 3D and to study the temporal evolution of this distribution. As the drug distribution can be studied by both SIM and SPDM, after the time lapse in SIM we determined the ultimate location of the individual drug molecules inside the cell from an SPDM snapshot with accuracy about 10 fold better than the conventional diffraction limit. As an application example, we investigated the uptake behavior of various drugs used to treat age related macular degeneration by human retinal pigment epithelium cells.