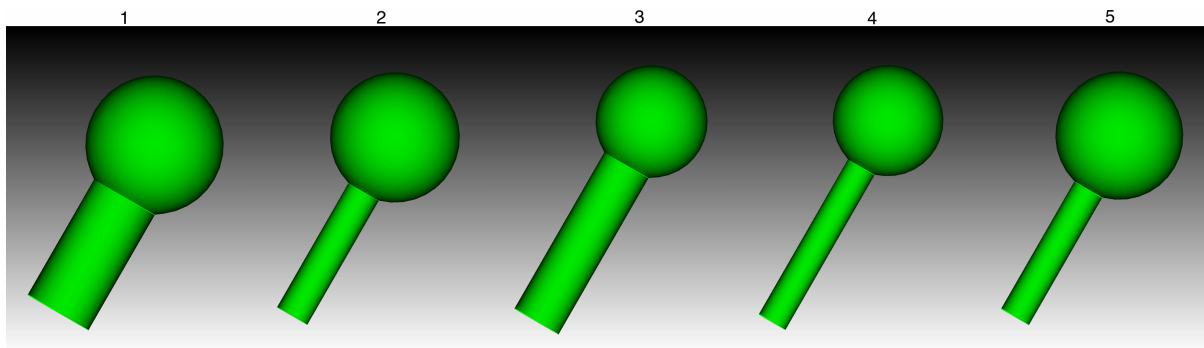


3. Cubic and Tetrahedral mesh comparison

We generated 5 geometries which consisted of a sphere attached to a cylinder to approximate dendritic spines. Sizes were constrained by data from [46] and chosen to represent a good range of between the given bounds of head (sphere) radius, neck (cylinder) length and neck radius (see figure below). For each geometry two cubic meshes were generated in MesoRD [19], and two adaptive tetrahedral meshes were generated in CUBIT [32], with the number of subvolumes in the cubic and tetrahedral meshes similar to each other in both the larger and smaller subvolume cases. The mesh statistics are given below, compared to the ideal values. All sizes are based on microns:



Spine #1:	Head radius: 0.285153	Neck radius: 0.144017	Neck length: 0.544474			
Mesh	Subvolume size	Subvolume #	Head volume	Neck volume	Head surface area	Neck surface area
Ideal	n/a	n/a	0.0958199	0.0354774	0.951852	0.492685
Cubic 1	0.035	3080	0.096383	0.0356720	1.43570	0.627200
Tetrahedral 1	adaptive	3052	0.0963011	0.0357806	0.957998	0.500006
Cubic 2	0.022	12432	0.0965987	0.0357773	1.44619	0.650496
Tetrahedral 2	adaptive	12527	0.0959651	0.0354396	0.953679	0.494545

Spine #2:	Head radius: 0.302343	Neck radius: 0.0808531	Neck length: 0.663360			
Mesh	Subvolume size	Subvolume #	Head volume	Neck volume	Head surface area	Neck surface area
Ideal	n/a	n/a	0.115655	0.0136236	1.12779	0.336997
Cubic 1	0.036	2768	0.115707	0.0134369	1.67962	0.373248
Tetrahedral 1	adaptive	2900	0.115879	0.0134746	1.13330	0.339520
Cubic 2	0.022	12164	0.115467	0.0140554	1.71336	0.464640
Tetrahedral 2	adaptive	11885	0.115680	0.0134645	1.12921	0.336770
Spine #3:	Head radius: 0.254001	Neck radius: 0.115128	Neck length: 0.811319			
Mesh	Subvolume size	Subvolume #	Head volume	Neck volume	Head surface area	Neck surface area
Ideal	n/a	n/a	0.0680573	0.0337831	0.766707	0.586882
Cubic 1	0.033	2680	0.0687115	0.0275996	1.18483	0.627264
Tetrahedral 1	adaptive	2718	0.0677749	0.0338201	0.767768	0.594308
Cubic 2	0.020	13016	0.0682880	0.0358400	1.16160	0.768000
Tetrahedral 2	adaptive	12582	0.0680161	0.0336910	0.767281	0.588878
Spine #4	Head radius: 0.312020	Neck radius: 0.0863628	Neck length: 1.00114			
Mesh	Subvolume size	Subvolume #	Head volume	Neck volume	Head surface area	Neck surface area
Ideal	n/a	n/a	0.127099	0.0234585	1.19952	0.543254
Cubic 1	0.039	2576	0.128129	0.0246767	1.80086	0.632736
Tetrahedral 1	adaptive	2571	0.126159	0.0230094	1.19926	0.547544
Cubic 2	0.021	16216	0.127061	0.0231155	1.80457	0.677376
Tetrahedral 2	adaptive	16528	0.127319	0.0232958	1.20201	0.544621

Spine #5	Head radius: 0.258623	Neck radius: 0.0647370	Neck length: 0.588977			
Mesh	Subvolume size	Subvolume #	Head volume	Neck volume	Head surface area	Neck surface area
Ideal	n/a	n/a	0.0724037	0.00775449	0.827130	0.239569
Cubic 1	0.030	2992	0.0721440	0.00864000	1.23120	0.288000
Tetrahedral 1	adaptive	2993	0.0721540	0.00769663	0.828733	0.241968
Cubic 2	0.019	11504	0.0721018	0.00680413	1.24184	0.268584
Tetrahedral 2	adaptive	11142	0.0724302	0.00764397	0.828225	0.239811