**Appendix**

Using rate constants (day-1) in table 2, we calculated the change in relative amounts of the Asp isomers in T6 peptide during a human life span. The change in relative amounts of the Asp isomers is described as solutions of simultaneous ordinary differential equations as follows:



where [La], [Lb], [Ls], [Da], [Db] and [Ds] are calculated relative amounts (%) of L-α-Asp, L-β-Asp, L-succinimide, D-α-Asp, D-β-Asp and D-succinimide and t is time (day). However, these simultaneous ordinary differential equations are too difficult to solve. Therefore this calculation was performed using the Runge-Kutta method as follows:

1. *Definition of functions based on simultaneous ordinary differential equations.*

We defined the function to calculate the slope during a short time

based on Eq. (1-1) - Eq. (1-6) as follows:



1. *Calculation of 4 sets of slopes from n step to n+1 step*

The slopes during the short time were calculated as follows:



where [La]n, [Lb]n, [Ls]n, [Da]n, [Db]n and [Ds]n are calculated relative amounts (%) of L-α-Asp, L-β-Asp, L-succinimide, D-α-Asp, D-β-Asp and D-succinimide at n step, n is steps, h is increment size of time in 1 step.

1. *Calculation of Mean slopes from n step to n+1 step*

The average value of slopes in the above (sLa1 - sDs4) was calculated as follows:



1. *Calculation of relative amounts of isomers for n+1 step using mean slopes*

The time at n+1 step is



Using mean slopes (SLa-SDs), the relative amounts of T6 isomers at n+1 step can be described as follows:



Where [La]n+1, [Lb]n+1, [Ls]n+1, [Da]n+1, [Db]n+1 and [Ds]n+1 are calculated relative amounts of L-α-Asp, L-β-Asp, L-succinimide, D-α-Asp, D-β-Asp and D-succinimide at n+1 step( t= (n+1)h).

Using Eq. (2-1) –Eq.(8-7) repetitively, we calculated relative amounts of isomers during a human life span. Then the unit of t (day) was converted to years, in order to display in a clearer manner.