Measurement of circular dichroism and structural chemical research of d(CG)$_6$ and d(TA)$_6$

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ABSTRACT

It was known that d(CG)$_6$ became left-handed Z-DNA by a theoretical calculation. We carried out a CD measurement of d(CG)$_6$ at room temperature. B-Z transition was occurred when I raised the concentration of Mg salt. In addition, I confirmed that the Mg salt concentration caused B-Z transition by the lower concentration under the existence of cobalt hexamine. Structure of d(TA)$_6$ is not known. We performed the CD measurement of d(TA)$_6$ at low temperature. Structure changed from B type when I raised the Mg salt concentration in an existence of cobalt hexamine. I am examining structure now.

INTRODUCTION

It is known that d(CG)$_6$ becomes left-handed Z-DNA by a theoretical calculation. Structure of d(TA)$_6$ is not known. I can suppose structure of DNA from form of a curve of a CD spectrum when I perform the CD measurement of DNA solution. There is a structural gene (exon + intron) deciding a transcription control domain and structure of protein to regulate transcription to a gene of eucaryote. There are a promoter, an enhancer, a part called a silencer in a transcription control domain. There are transcription initiation point and a TATA box in a promoter. There is a TATA box to about 25-37 base pair of transcription initiation point of upper reaches. RNA polymerase and at least six kinds of basic transcription factors (GIF) participate in a transcription start. TF II D is the most important in things (GIF) of a basic transcription factor. TF II D consists of TATA combination protein (TBP) and several kinds TBP accompanying factors (TAF). I form many protein complex TATA combination protein (TBP) of TF II D is connected in a TATA box of a promoter, and to call a complex (PIC) before start transcription, and this lets you start transcription. Alexander Rich is said to be a regulation switch of gene expression by a specification part of B-DNA doing reversible change in Z-DNA, but it is difficult to prove existence of Z-DNA in the living body. However, a TATA box has structure of left-handed Z-DNA because a purine base, coming polynucleotide of a pyrimidine base take Z type conformation in turn if the salt concentration is high; it is thought that is very likely to be it. I can estimate solution structure of d(TA)$_6$ by performing the CD spectrum measurement of d(TA)$_6$ in the condition that is almost a solution condition of crystallization. At first I performed the CD spectrum measurement of d(TA)$_6$ for the purpose of clarifying crystal structure of d(TA)$_6$.

RESULTS AND DISCUSSION

Melting temperatures of d(CG)$_6$ were more than 60 degrees Celsius, but because a melting temperature of d(TA)$_6$ was 10.8 degrees Celsius, d(CG)$_6$ performed the CD measurement at room temperature, and d(TA)$_6$ performed the CD measurement at low temperature (4 degrees Celsius). When I raised the Mg salt concentration without adding cobalt hexamine to measurement solution and measured a CD spectrum of d(CG)$_6$, I measured it at room temperature.

When I added cobalt hexamine to measurement solution and raised the Mg salt concentration and measured a CD spectrum of d(CG)$_6$, I measured a CD at room temperature by J-820CD.

I added powdery MgCl$_2$ to measurement solution to raise cacodylate buffer (pH = 7.0, 10 mM) solution of d(CG)$_6$, the concentration of Mg$^{2+}$ of measurement solution. I added cobalt hexamine to cacodylate buffer (pH = 7.0, 10 mM) solution of d(CG)$_6$, measurement solution and raised the Mg salt concentration and measured a CD spectrum of d(CG)$_6$.

When I added cobalt hexamine to measurement solution and raised the Mg salt concentration and measured a CD spectrum of d(TA)$_6$, I measured a CD at 4 degrees Celsius. It is a result when Figure 1 gives the Mg salt concentration is raising without adding cobalt hexamine to measurement solution, and it measured a CD spectrum of d(CG)$_6$ at room temperature. The measured value (mdeg) of a CD spectrum revised it with a value of HT (V), and d(CG)$_6$ shows a state at the age of B-DNA in a blue line, and it is thought that a red line is Z-DNA. It is a result when Figure 2 adds cobalt hexamine to measurement solution, and it raises the Mg salt concentration, and it measured a CD spectrum of d(CG)$_6$ at room temperature. The measured value (mdeg) of a CD spectrum revised it with a value of HT (V). At
concentration 600 μM of Co^{3+} we raised the concentration of Mg^{2+}. It is thought that a dotted line part is B-DNA. It is thought that the red line spread to Ζ-DNA as for the solid line at transition points from B-DNA to Ζ-DNA. It is a result when Figure 3 adds cobalt hexamine to measurement solution, and it raises the Mg salt concentration, and it measured a CD spectrum of d(TA)$_{n}$ at 4 degrees Celsius. The measured value (mdeg) of a CD spectrum revised it with a value of HT (V), At concentration 600 μM of Co^{3+} we raised the concentration of Mg^{2+}. A dotted line is B-DNA. From form of a curve of a CD spectrum of a white line is thought to be not be typical form in B-DNA and as for the solid line at transition points from B-DNA to Ζ-DNA. I am examining structure of d(TA)$_{n}$ when I raised the concentration of Mg^{2+} now.

![Figure 1](image1.png)

**Figure 1** CD curve of d(CG)$_{n}$ with raising only Mg$^{2+}$ concentration. Dotted line shows B-style d(CG)$_{n}$ and white line shows Ζ-style d(CG)$_{n}$.

![Figure 2](image2.png)

**Figure 2** CD curve of d(CG)$_{n}$ with adding cobalt hexamine and raising Mg$^{2+}$ concentration. Dotted line shows B-style d(CG)$_{n}$ and white line shows Ζ-style d(CG)$_{n}$. Solid line shows transition state of B-style and Ζ-style d(CG)$_{n}$.

![Figure 3](image3.png)

**Figure 3** CD curve of d(TA)$_{n}$ with adding cobalt hexamine and raising Mg$^{2+}$ concentration. Dotted line shows B-style d(TA)$_{n}$, White line shows unknown structure of d(TA)$_{n}$. Solid line shows transition state of B-style and Ζ-style d(CG)$_{n}$.

**CONCLUSION**

A CD measured d(CG)$_{n}$ at room temperature. B-Ζ transition when I raised the Mg salt concentration. In addition, I confirmed that the Mg salt concentration caused B-Ζ transition by the lower concentration under cobalt hexamine existence. Structure of d(TA)$_{n}$ is not known. d(TA)$_{n}$ performed the CD measurement at 4 degrees Celsius. Structure changed from B type when I raised the Mg salt concentration in a cobalt hexamine existence. I am examining structure now.

**REFERENCES**