Hypothesis / aims of study
Xeroderma pigmentosum (XP) is a rare autosomal recessive disease with cutaneous, ocular and neurological symptoms. XP is classified into a nucleotide excision repair-deficient type A–G and variant type (XP-V). XP is more prevalent in Japan (1:22000) than in the European and United States (1:250000) [1]. In Japan, about 500 patients with XP were existed. Approximately 50% of all Japanese patients with XP are diagnosed with XP-A and 25% are diagnosed with XP-V. It has been known that patients have high risk of skin cancer. However, it has not been well known that patients with XP-A develop neurological and cognitive dysfunction in childhood. The neurological disease advances in an orderly fashion through its successive stages, finally affecting the entire nervous system. Patients with XP-A develop voiding dysfunction because of neurological dysfunction. However, there is no detailed report about neurogenic bladder with XP-A. Therefore, we analyze four patients of neurogenic bladder associated with XP-A in Japan.

Study design, materials and methods
In this report, four Japanese patients with XP-A were obtained. The patients with XP-A were three boys aged 18, 16 and 15 years and a girl aged 13 years who complained of febrile urinary tract infection, voiding dysfunction, febrile urinary tract infection, and pollakiuria respectively. We investigated the voiding function in four patients with XP-A in Japan. Patients’ informed consent was obtained.

Results
Case 1: The 18-year-old boy had febrile urinary tract infection because of a large amount of residual urine, and he had bilateral hydronephrosis. Cystometry was performed to investigate his voiding function. The compliance was low such as 2ml/cm H2O, and bladder capacity was very small such as 120ml (Figure). Some medical treatment could not improve the voiding dysfunction. Therefore, performing clean-intermittent-catheterization (CIC) by his mother was introduced to decrease residual urine. However, it was very difficult to perform CIC by mother because lower-extremity contracture was very developed. Finally, cystostomy was performed, and febrile urinary tract infection could become prevented. Case 2: The 16-year-old boy had voiding dysfunction. Residual urine was more than 100ml, and asymptomatic pyuria was recognized. Treatment with distigmine bromide and prazosin hydrochloride was performed, and the boy made urination possible and improved asymptomatic pyuria. Case 3: The 13-year-old girl had pollakiuria. The girl was sister of case 1. Residual urine, pyuria in urine analysis, and hydronephrosis were not recognized. She could not receive treatment with an anticholinergic drugmedical treatment because of astriction. Therefore, periodical follow-up was performed for the girl. Case 4: The 15-year-old boy had febrile urinary tract infection. Cystometry was performed, and indicated low compliance bladder and detrusor sphincter dyssynergia [2]. These all four patients with XP-A had already neurological dysfunction in their early childhood, and they were condemned to a wheelchair.

Interpretation of results
The onset of neurological dysfunction in patients with XP-A was recognized in their early childhood. However, detection of voiding dysfunction in patients with XP-A was usually beyond the onset of neurological dysfunction (table). Furthermore, the type of voiding dysfunction in patients with XP-A might become low compliance bladder and detrusor sphincter dyssynergia.

Concluding message
Since present day patients that are diagnosed early and well protected from sunlight suffer minimal skin problems and are living longer than in the past, neurological problems associated with XP becoming of relatively greater importance in XP families and focus of future research. Patients with low compliance bladder have high risk of febrile urinary tract infection and renal dysfunction. Therefore, periodic evaluations of voiding function in patients with XP-A should be initiated in their early childhood. Furthermore, the edification is very important that patients with XP-A could become neurogenic bladder.

Table: The age of onset in neurological dysfunction and that of urological consultation

<table>
<thead>
<tr>
<th>Case</th>
<th>XP type</th>
<th>Neurological dysfunction</th>
<th>Urological consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>XP-A</td>
<td>5 (years old)</td>
<td>18 (years old)</td>
</tr>
<tr>
<td>2</td>
<td>XP-A</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>XP-A</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>XP-A</td>
<td>5</td>
<td>15</td>
</tr>
</tbody>
</table>

Figure: Cystometry in the 18-year-old boy with XP-A. The compliance was low such as 2ml/cm H2O.
References

Specify source of funding or grant
None

Is this a clinical trial?
No

What were the subjects in the study?
HUMAN

Was this study approved by an ethics committee?
Yes

Specify Name of Ethics Committee
Ethics Committee of Nishibeppu National Hospital, Oita, Japan

Was the Declaration of Helsinki followed?
Yes

Was informed consent obtained from the patients?
Yes