Medical and dental collaborations in
Tokushima University Hospital
and Tokushima Dental Association

Toshihiko Nagata

Department of Periodontology and Endodontology,
Institute of Biomedical Sciences, Tokushima University Graduate School

COI Disclosure

Speaker: Toshihiko Nagata

The speaker has no financial conflict of interest
to disclose concerning this presentation.
Mortality rate due to DM in Tokushima prefecture

![Graph showing mortality rate due to DM in Tokushima prefecture from 1993 to 2008.](from Home page of Tokushima prefecture)

Diabetes (DM) mortality rates of Tokushima prefecture have been worst one in Japan for recent 14 years. Although “Campaign for decreasing DM” has been performed in Tokushima prefecture, the worst record is continuing.

In Tokushima University Hospital, Clinical Research Center for Diabetes and Diabetes Therapeutics and Research Center were established in 2007 and 2010 for the purpose of the decrease of diabetes patients in Tokushima prefecture.

Signs of DM-improvement in Tokushima prefecture

![Graph showing signs of DM-improvement in Tokushima prefecture.](Number of cases per 100,000 people)
Two important points concerning the relationship between diabetes and periodontal disease

1. Diabetes patients easily suffer from periodontitis and its condition tend to be severe.

2. The presence of periodontitis affects glycemic control of diabetes patients.

Diabetes • Periodontitis

Two-way relationship

Diabetes-associated periodontitis

A 42-yr-old man. Type 2 diabetes

A 50-yr-old man. Type 2 diabetes

*Severe gingival inflammation
*Multiple gingival abscess

*Marked bone resorption
*Delay of wound healing

Alveolar bone loss and tooth loss in patients with diabetes and nephropathy (Collaboration study with Kawashima Hospital in Tokushima)

DM: Outpatients with diabetes (n = 51)
DM+HD: Dialysis patients with DM-nephropathy (n = 32)
HD: Dialysis patients with renal diseases (n = 84)

DM + HD patient
First visit

After the initial therapy

**Periodontal therapy of a diabetic patient #1**
(66 year-old woman: type 2 diabetes, hypertension, breast cancer)

The change of HbA1c level before and after periodontal therapy

<table>
<thead>
<tr>
<th>Year</th>
<th>HbA1c</th>
<th>Rate of PD&gt;4mm</th>
<th>Rate of BOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>8.0</td>
<td>27.5%</td>
<td>40.0%</td>
</tr>
<tr>
<td>2013</td>
<td>5.4</td>
<td>7.4%</td>
<td>29.6%</td>
</tr>
</tbody>
</table>

Average HbA1c 6.52

Average HbA1c 5.45

First visit

After the initial therapy

**Periodontal therapy of a diabetic patient #2**
(57 year-old woman: type 2 diabetes, RA, hypertension, endocarditis)
The change of HbA1c level before and after periodontal therapy

HbA1c level decreased parallel to the number of bacteria in periodontal pockets

Treatment of periodontitis is associated with HbA1c reduction. (Meta-analysis)

Studies described a research population of type 2 diabetic patients in whom glycemic control improved after periodontal therapy compared with the control group.

(0.40% reduction of HbA1c after the therapy)
Guidelines “Periodontal therapy in diabetic patient” from Japanese Society of Periodontology

First edition 2009.6
Second revised edition 2015.3

A poster published in medical associations

To diabetic patients: When diet- and physical-trainings are not effective, it is necessary to doubt the possibility of periodontal disease. (Recommendation to check in dental office.)

Common risk factors
(Aging, Smoking, Stress etc.)

Diabetes
- Insulin resistance appears in various cells in the body
- Weakened immune system
- Delayed wound healing
- Insulin resistance appears in various cells in the body

Two-way relationship

Periodontitis
- Local factors invade in systemic circulation
- Local factors
  - Periodontopathic bacteria (LPS)
  - Interleukin
  - TNF-α
  - Prostaglandins
- Periodontitis affect diabetic conditions
- Diabetes patients easily suffer from periodontitis
- Local factors
  - Periodontopathic bacteria (LPS)
  - Interleukin
  - TNF-α
  - Prostaglandins

---

To diabetic patients: When diet- and physical-trainings are not effective, it is necessary to doubt the possibility of periodontal disease. (Recommendation to check in dental office.)
Periodontitis affect systemic conditions

Diabetes seminar

Diabetes-periodontitis seminar for patients with diabetes and their family (Tokushima University Hospital)

Oral Care Center in Tokushima University Hospital

- Oral care for medical admission patients before and after their medical surgery.
The effects of bedside oral care to patients before systemic surgeries

Oral surgery
Cardiovascular surgery
Oral care shorten the hospitalization
Digestive surgery
Pediatrics
Hematology

The location of Anan city, Tokushima prefecture

Medical and dental collaboration for diabetic patients in Anan city

2011.11.7 NHK 「Evening network・Oral health protects systemic condition」
Dentists introduce dental patients to medical doctors.

Clinical meeting by medical doctors, dentists, nurse and public health nurses

The introduction of patients, who show diabetic symptom, from dentists to medical doctors may be a good way for the increase of medical examination rate in diabetes.

Data was obtained from 865 dental patients (mean age 70.0).

Patients with high CPI score tend to have high HbA1c.
“Close to 20% of dental patients were found to have pre-diabetes as a result of dental-office screening”

(2015.5.15 MEDPAGE TODAY)

The introduction of patients, who show diabetic symptom, from dentists to medical doctors may be a good way for the increase of medical examination rate in diabetes.

Dentists may have a chance to find diabetic patients who do not know their glycemic conditions

1. Dentists recommend them to check in medical clinic from the health examination data and periodontal examination data. (The trial in Anan city)

2. Use of glucose-meter in dental office.

3. Study on the dental specific determination method for the screening of glycemic conditions

The study on the diagnosis of diabetic periodontitis using gingival crevicular fluid (GCF)

1) GCF collection using a paper strips (less-invasive method)

2) Dilution of GCF with PBS-based solution

3) Determination of marker proteins (ELISA)
### Results

1. Glycated albumin (GA) and calprotectin (CPT) in GCF were determined. High GA levels were detected in diabetic patients (DM and DM-P). High CPT level were detected in periodontitis patients (P and DM-P).

<table>
<thead>
<tr>
<th>Diagnostic markers</th>
<th>II</th>
<th>DM</th>
<th>P</th>
<th>DM-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total GA (μg/site)</td>
<td>4.2</td>
<td>18.0*</td>
<td>5.9</td>
<td>28.4*</td>
</tr>
<tr>
<td>GA concentration (μg/μl)</td>
<td>7.1</td>
<td>37.2*</td>
<td>2.8</td>
<td>25.5*</td>
</tr>
<tr>
<td>Total CPT (ng/site)</td>
<td>106.5</td>
<td>115.5</td>
<td>257.4**</td>
<td>236.4**</td>
</tr>
<tr>
<td>CPT concentration (μg/μl)</td>
<td>0.19</td>
<td>0.24</td>
<td>0.12</td>
<td>0.18</td>
</tr>
</tbody>
</table>

* Statistically significant difference from H, P (P<0.01).
** Statistically significant difference from H, DM (P<0.01).

2. There was a positive correlation between GA in GCF and HbA1c and GA in blood.

```
① Glycated albumin (GA) and calprotectin (CPT) in GCF were determined.
② High GA levels were detected in diabetic patients (DM and DM-P).
③ There was a positive correlation between GA in GCF and HbA1c and GA in blood.
```

( J. Periodontol 85: 1667-1675, 2014 )

### The determination of GA and CPT from GCF is useful for the diagnosis of diabetic periodontitis.

( J. Periodontol 85: 1667-1675, 2014 )

### Medical and dental collaborations for the diagnosis of diabetes and periodontitis

- Introduction of doubtful patients
- Correct diagnosis of diabetes
- Determination of biomarkers such as GA and CPT
- Non-invasive sampling
- Diagnosis of diabetic periodontitis (screening of diabetic condition)
- Early finding of diabetes
- Inhibition of diabetic complications