

# Electric Health Record(EHR)-based intensive coaching program “TOGANE” prevents the progression of diabetic nephropathy in Japanese

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Disease management of diabetes using electric health record (EHR) is reported to improve quality of diabetes care. We have constructed and operated regional EHR since 2011. Diabetic patients more than 5,000 have been registered to our EHR. This EHR system consists of two mapping systems for disease management. First is a personal mapping system named "Case management MAP", which is a tool for case management of individuals to achieve optimized therapy using minimum data set for diabetes mellitus. Second is a regional disease management mapping system named "Regional disease management MAP", which is a tool to triage diabetic patients having a high priority for treatment from whole diabetic patients based on abnormal values of major minimum data set. The dietary salt restriction is reported to potentiate the renoprotective effects of angiotensin II receptor blockers (ARBs) in type 2 diabetes. The present study was performed to evaluate the effectiveness of EHR-based intensive coaching program "TOGANE (Team-Oriented Generous Assist for the patients with diabetic Nephropathy)" for preventing the progression of DN. Program "TOGANE" is mainly consist of the coaching tools and workflow by certified diabetes educator (CDE) and dietitian for the dietary salt restriction (6g/day) and blood pressure control in the treatment of diabetic nephropathy. In the program "TOGANE", lifestyle support is delivered by CDE and dietitian to the patients every visit. Each patient was also given a salt restriction recipe every visit. Primary outcome is changes in blood pressure and urinary protein/albumin excretion. In the present study, 174 diabetic patients at stage 2 DN were included. All patients were administered ARBs. The patients were divided to two groups, conventional therapy group (C) and conventional therapy plus the program "TOGANE" group (T). Number of the patients in group (C) was 86, while that in group (T) was 88. Study period is 1 year. Renal function (estimated GFR(eGFR), urinary albumin excretion, proteinuria) and several clinical parameters are determined at every two months. At the period of, one year, microalbuminuria of the patients of group (C) increased from 66.3 mg/g Creatinine (Cre) to 139.6 mg/g Cre (p<0.01), while that in group (T) did not change (69.4 mg/g Cre to 65.1 mg/g Cre). Thus, EHR-based intensive coaching program "TOGANE" can optimize renoprotective effect of the blockade of the RAS and thereby contribute to prevent the progression of DN in Japanese.

## 【Introduction】

The increase in diabetic patients and its complications requires intensive disease management of diabetes worldwide. In Japan, whereas patients requiring renal dialysis due to diabetic nephropathy(DN) represent only about 4% of total diabetic patients, their medical costs account for more than 40% of the total healthcare costs for diabetic patients, amounting to 13.7BUSD. The shortage of medical resources has become a serious problem in Japan. Disease management of diabetes using electric health record (EHR) is reported to improve quality of diabetes care. We have constructed and operated regional EHR since 2011. The dietary salt restriction is reported to potentiate the renoprotective effects of angiotensin II receptor blockers (ARBs) in type 2 diabetes. As the dietary salt intake in Japan (11-13g/day) is reported to be significantly higher than those (7-9g/day) in foreign countries, dietary intervention to decrease salt intake seems to be important for preventing the progression of DN in Japan. The present study was performed to evaluate the effectiveness of EHR-based intensive coaching program "TOGANE (Team-Oriented Generous Assist for the patients with diabetic Nephropathy)" for preventing the progression of DN.

## 【Materials and Methods】

1.EHR  
We have constructed and operated regional EHR since 2011. Diabetic patients more than 5,000 have been registered to our EHR. This EHR system consists of two mapping systems for disease management. First is a personal mapping system named "Case management MAP", which is a tool for case management of individuals to achieve optimized therapy using minimum data set for diabetes mellitus. Second is a regional disease management mapping system named "Regional disease management MAP", which is a tool to triage diabetic patients having a high priority for treatment from whole diabetic patients based on abnormal values of major minimum data set.

2.EHR-based intensive coaching program "TOGANE"  
Program "TOGANE" is mainly consist of the coaching tools and workflow by certified diabetes educator (CDE) and dietitian for the dietary salt restriction (6g/day) and blood pressure control in the treatment of DN. In the program "TOGANE", lifestyle support is delivered by CDE and dietitian to the patients every visit. Each patient was also given a salt restriction recipe every visit.

## 3. Subjects and study design

In the present study, 174 diabetic patients at stage 2 DN were included. All patients were administered ARBs. The patients were divided to two groups, conventional therapy group (C) and conventional therapy plus the program "TOGANE" group (T). Number of the patients in group (C) was 86, while that in group (T) was 88. Study period is 1 year. Renal function (estimated GFR(eGFR), urinary albumin excretion, proteinuria) and several clinical parameters are determined at every two months.

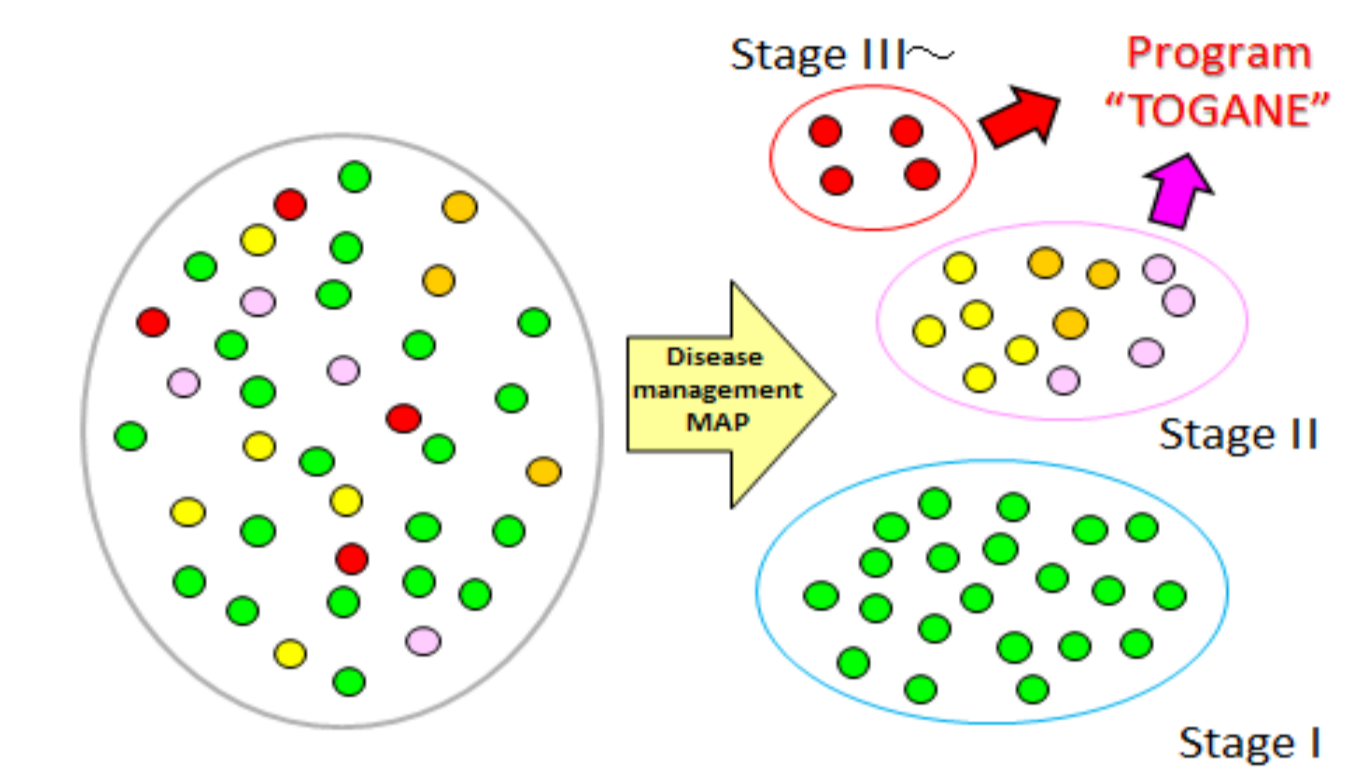
## 4. Statistical analysis

Statistical analysis was performed using the JMP® 9 software (SAS Institute Inc., Cary, NC, USA). All values are expressed as the means ± SEM. Values of p<0.05 were considered to indicate statistically significant differences.

## EHR-based Intensive Coaching Program "TOGANE"



## Triage of DN patient with disease management MAP



## Regional disease management MAP Minimum dataset and variance

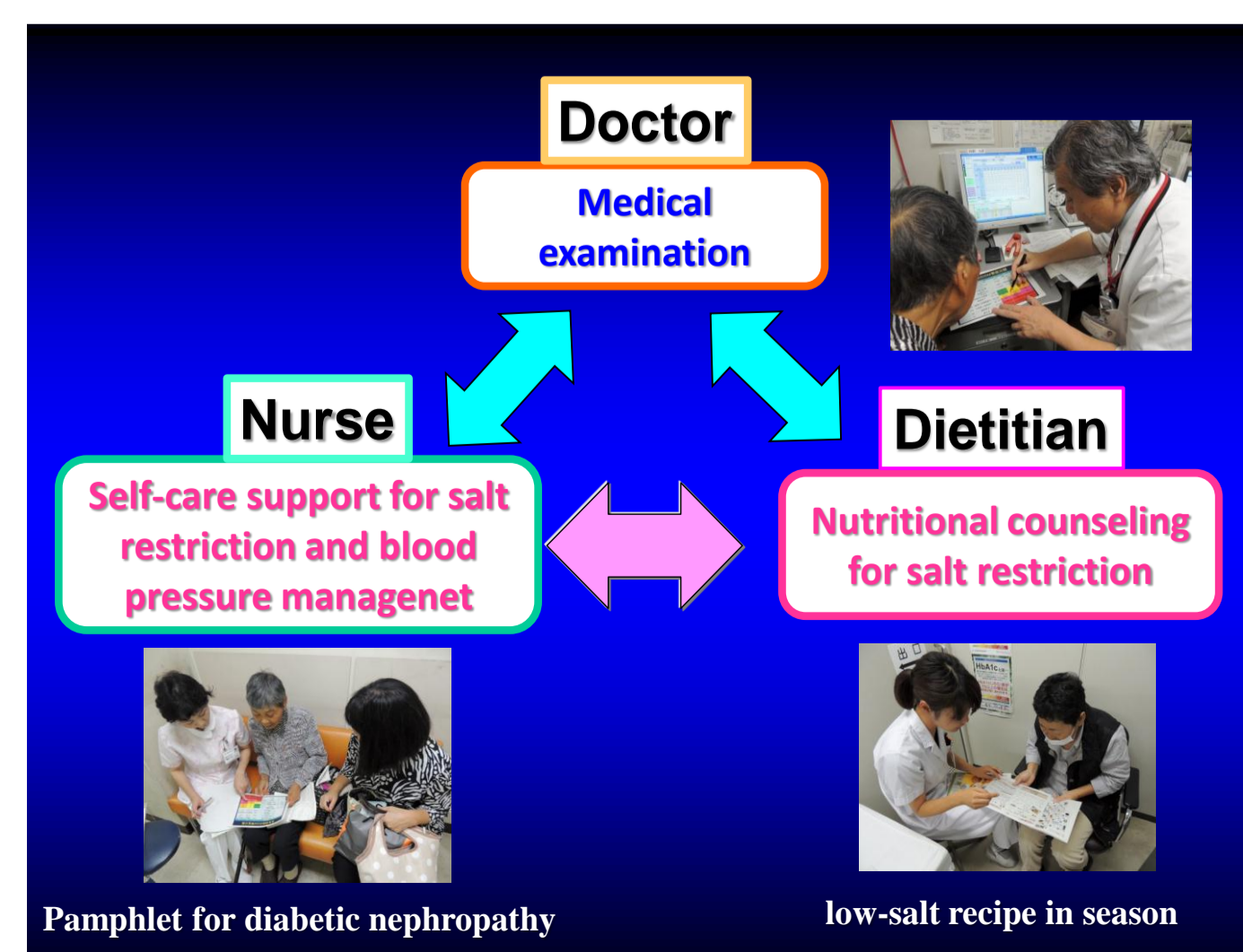
	Minimum data	Variance
DM	HbA1c	> 8 %
CKD	eGFR	< 50 ml/min/1.73m <sup>2</sup>
	Albuminuria	> 30 mg/gCre
	Urinary protein	> 0.5 g/gCre
CVD	Max IMT	≥ 1.5 mm



Background of the studied patients in Stage II Diabetic Nephropathy			
	Program "TOGANE" (T) group	Conventional Therapy (C) group	p value
Number of patients	86	88	
Age (year old)	66.0 ± 1.3	65.5 ± 1.3	0.772
Gender(male%)	54.7	54.6	0.988
Insulin therapy(%)	43.0	42.1	0.896
ARB (%)	100	100	1.000
CCB (%)	69.7	71.6	0.791
HbA1c(NGSP,%)	7.1 ± 0.1	7.2 ± 0.1	0.230
SBP(mmHg)	134.9 ± 15.1	139.2 ± 17.7	0.157
DBP(mmHg)	77.6 ± 1.3	79.9 ± 1.5	0.116
eGFR	75.2 ± 2.1	74.1 ± 2.1	0.713
U-Alb(mg/gCre)	69.4 ± 7.5	66.3 ± 6.5	0.756

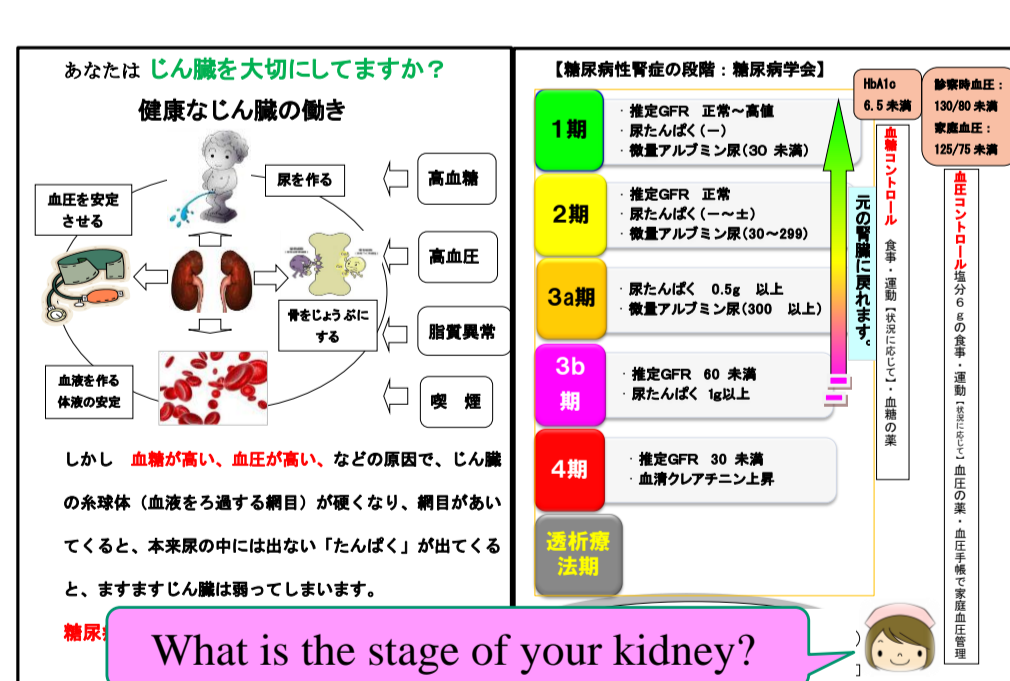
## Team-Oriented Generous Assist for the patients with diabetic Nephropathy

## The workflow of program "TOGANE"



## Coaching tools in program "TOGANE"

### Pamphlet for diabetic nephropathy



### The low-salt recipe in season



### Table for stage Classification

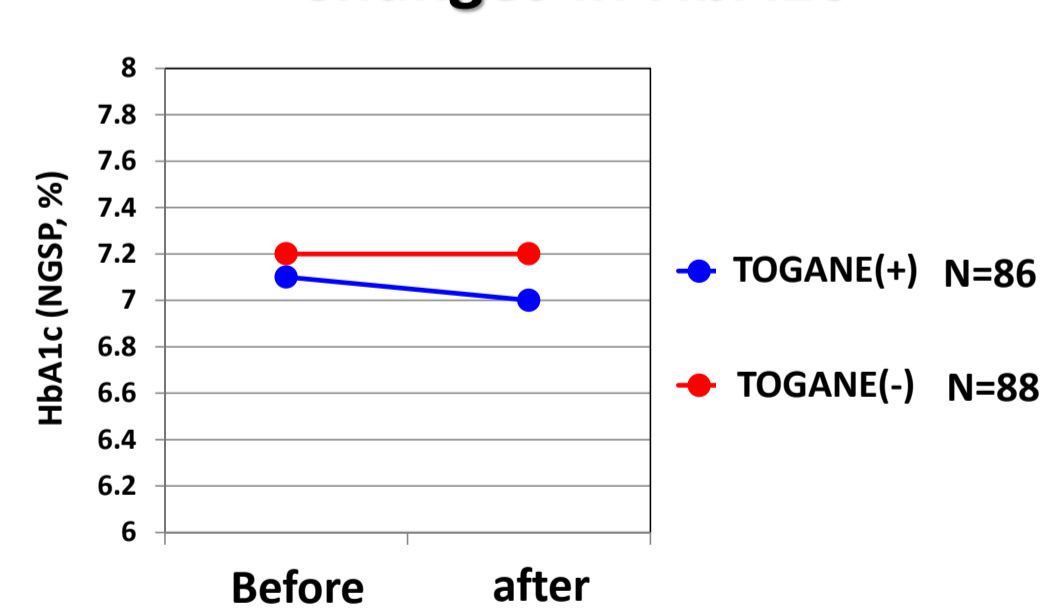
Program "TOGANE" diabetic nephropathy classification table			
Protein urine	尿蛋白尿	尿蛋白尿	尿蛋白尿
正常	微量アルブミン尿 (mg/day)	正常	顕性アルブミン尿 (mg/day)
軽度低下	30未満	30~299	300以上
中等度～高度低下	30~44	30~44	30~44
高度低下	15~29	15~29	15~29
腎不全	<15	<15	<15

### "AIUEO"(Japanese ABC)"Table for Low salt diet



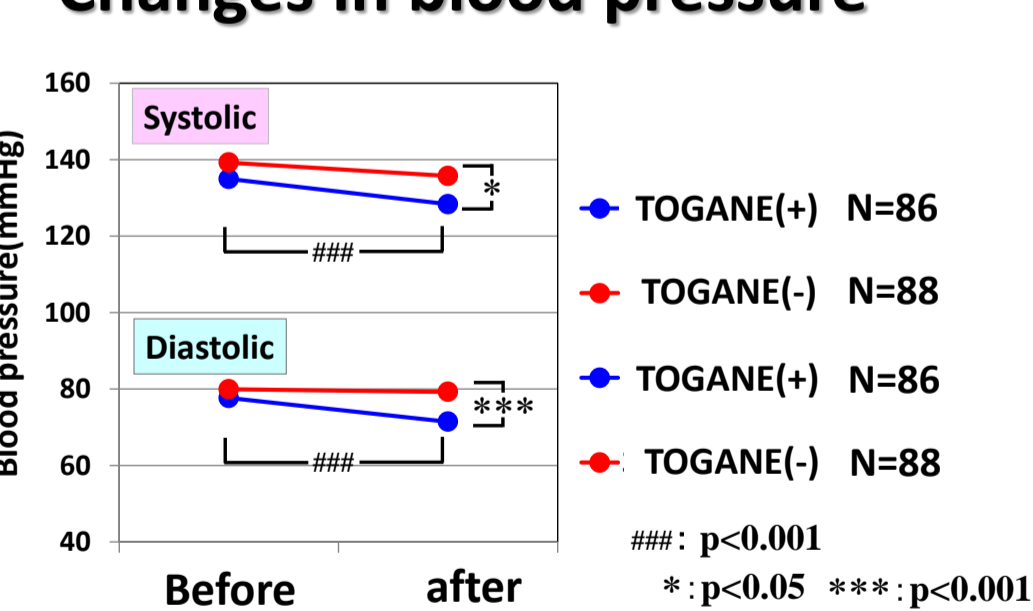
## 【Results】 Effect of program "TOGANE" on HbA1c, eGFR, albuminuria and blood pressure

### Changes in HbA1c



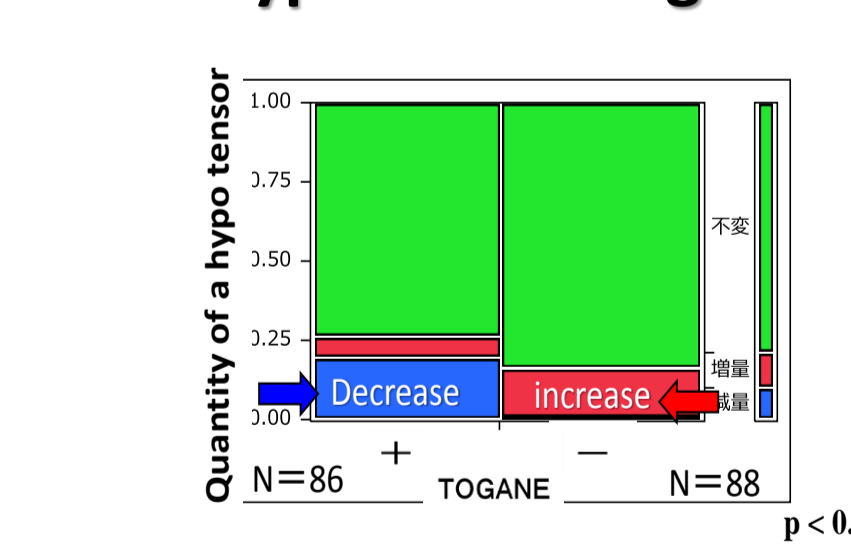
HbA1c did not change in both groups.

### Changes in blood pressure



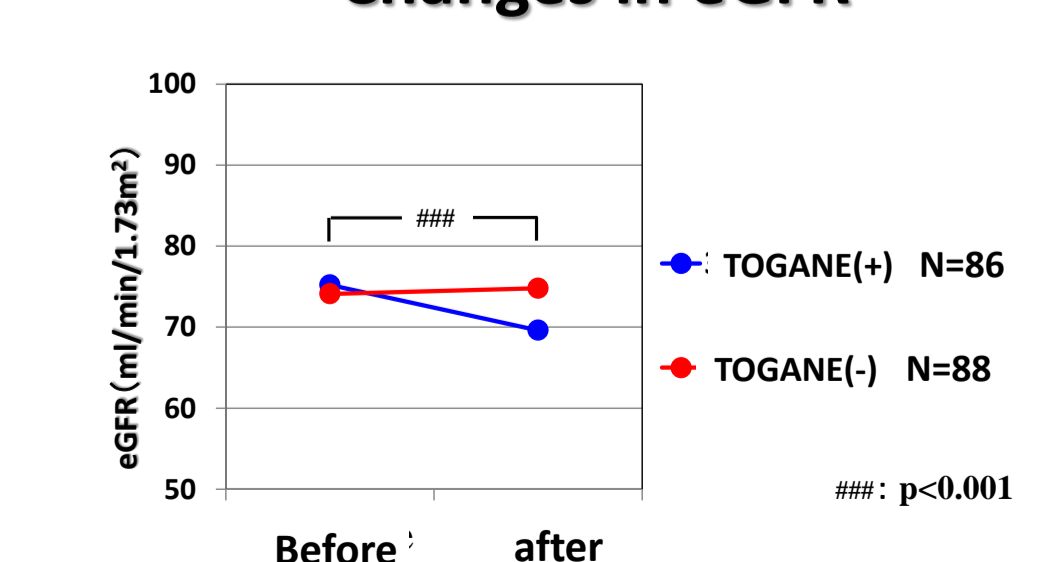
Blood pressure decreased in "TOGANE" group.

### Changes in daily doses of anti-hypertensive agents



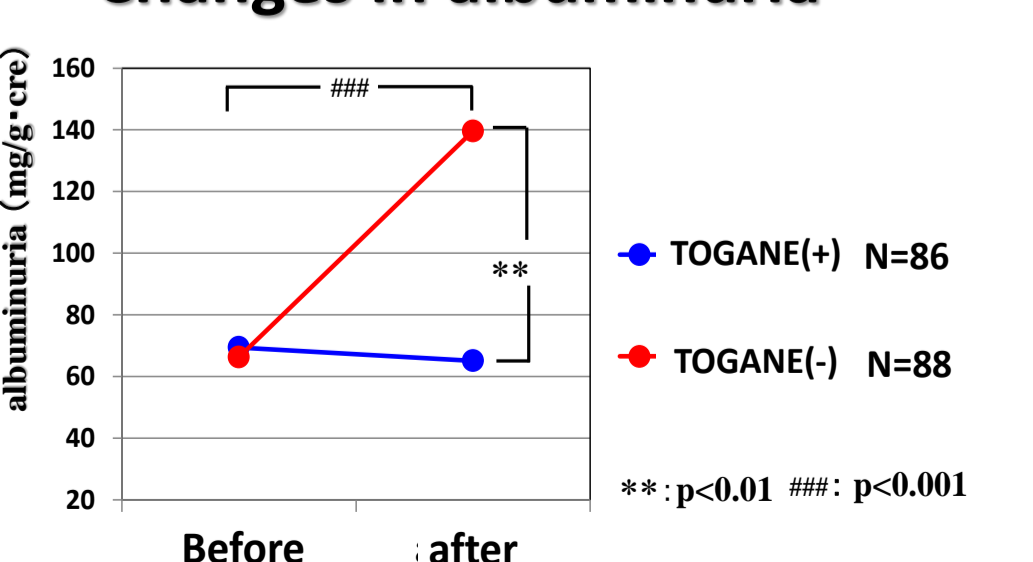
Quantity of a hypo-tensor decreased in "TOGANE" group.

### Changes in eGFR



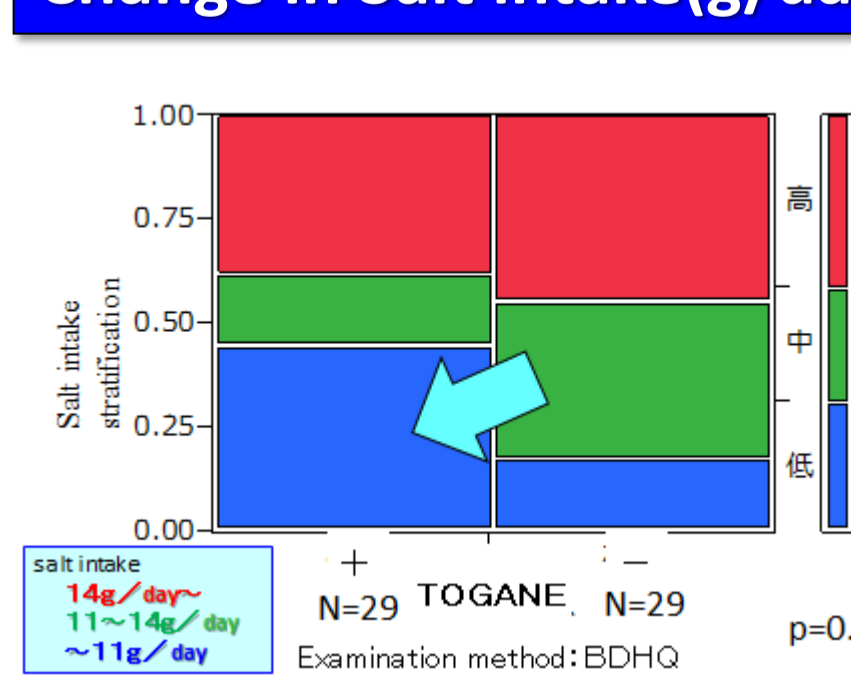
Hyperfiltration was improved only in "TOGANE" group.

### Changes in albuminuria



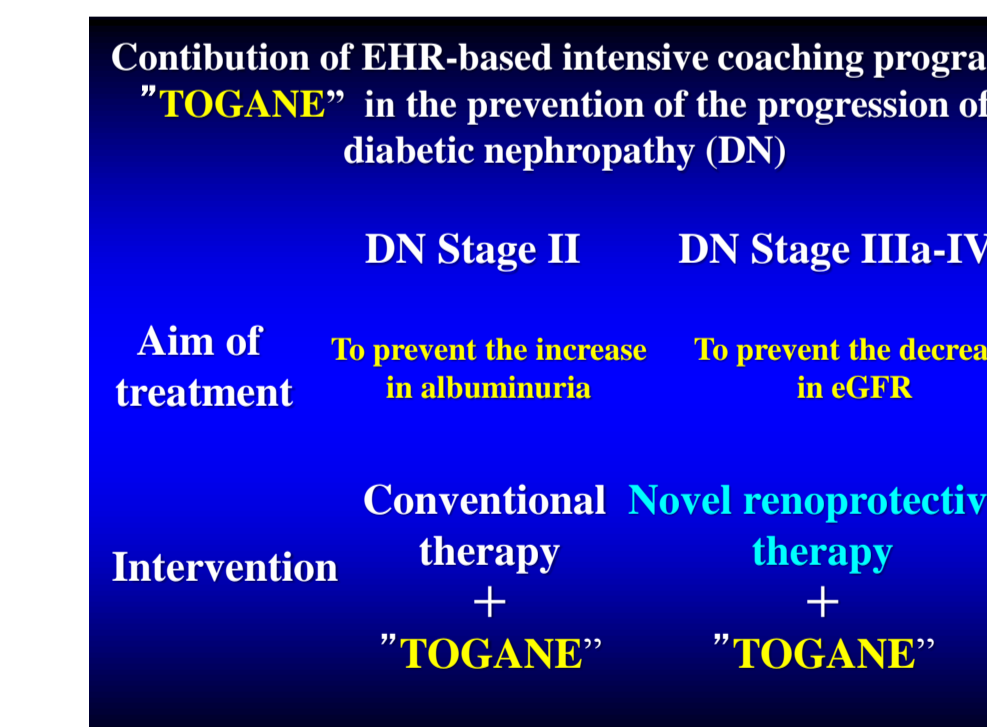
Albuminuria did not increase in "TOGANE" group.

### Change in Salt intake(g/day)



In "TOGANE" group, dietary salt intake is significantly lower than that in control group.

## 【Conclusion】



1. EHR is effective in order to determine the priority of the support to diabetic patients who need tertiary prevention.
2. The program "TOGANE" prevents an increase in albuminuria in diabetic patients who were treated with ARB through the reduction in dietary salt intake compared with the conventional treatment group.
3. The intensive coaching program "TOGANE" based on EHR optimizes the renoprotective effect of a blockade of RAS in the patients with DN.



Low-salt is essential in order to protect the kidney in diabetic patients.

## 【References】

1. A Low-Sodium Diet Potentiates the Effects of Losartan in Type 2 Diabetes :DIABETES CARE, VOLUME 25, NUMBER 4, 2002
2. Moderate dietary sodium restriction added to angiotensin converting enzyme inhibition compared with dual blockade in lowering proteinuria and blood pressure: randomised controlled trial. BMJ;343:d43662, 2011
3. Moderation of dietary sodium potentiates the renal and cardiovascular protective effects of angiotensin receptor blockers: kidney international, 2012