PP 1

Proteomic Analysis of Oletf Rats, Type 2 Diabetic Animal Model

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Background and Aims. *The OLETF (Otsuka Long-Evans Tokushima Fatty) rat is a useful animal model of type 2 diabetes with obesity. This rat has a feature induced diabetes after 18 weeks.*
Materials and Methods. *To understand proteins related with diabetes, total proteins, from liver, muscle, fat and pancreas of 6-week (normal) and 18-week (diabetic) OLETF rats, were analyzed by two-dimensional gel electrophoresis.*
Results. *According to the comparative analysis of proteins differentially expressed in normal and diabetic OLETF rat's tissues, diabetic pancreas have 200 proteins 3-fold more over expressed and 120 proteins 3-fold more repressed than normal. Among these proteins, while expression of Rho GDP dissociation inhibitor (GDI)-·, phosphatidylethanolamine-binding protein and peroxiredoxin-2 increased, alpha-amylase, caldecrin precursor, nuclear hormone precursor, carboxypeptidase B, bile salt activated lipase precursor, protein disulfide isomerase precursor and chymotrypsin B was decreased. Furthermore, liver, muscle and fat tissue showed the increased protein expression at 89, 72 and 170 spots, respectively, at the diabetic condition and decrease of many proteins in diabetes.*
Conclusion. *Such findings might provide some information to understand the molecular mechanism and develop new drugs for diabetes.*

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PP 2

mRNA Expression of Genes Associated with Hepatic Gluconeogesis is Not Changed in Liver Specific IGF-I Deficient Female Mice

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Background and Aims. *Liver specific IGF-I deficient mice (LID) in which IGF-I production in the liver is abolished by using the Cre/loxP recombination system have low serum IGF-I levels and high GH concentrations, and show insulin resistance and impaired glucose tolerance. We previously reported that mRNA expression of genes involved in hepatic gluconeogenesis such as glucose-6-phosphatase (G6Pase), peroxisome proliferator-activated receptor-g coactivator-1 (PGC-1a) and Foxo1 were decreased in bGH transgenic mice, which have high serum IGF-I and high GH concentrations.*

Materials and Methods. *mRNA levels of these genes, were studied using real-time RT-PCR in liver tissues of LID mice and their age-matched wild-type controls (female, 3 months, 8 per group). Mice were allowed to feed freely and liver tissues were collected. mRNA level was expressed as fold difference, compared to wild-type mice.*

Results. *IGF-I mRNA was markedly decreased in LID mice (0.08 fold, $P < 0.001$). mRNA levels of the gluconeogenic enzyme G6Pase gene were not different between LID and wild type mice. Neither expression of PGC-1a, a key transcription co-factor for hepatic gluconeogenesis, nor Foxo1 showed differences between LID and wild-type mice. mRNA levels of sterol regulatory element binding protein-1c, that correlates with lipogenesis in liver showed no difference either in LID mice.*

Conclusion. *These findings demonstrate differences of gene expression associated with hepatic gluconeogenesis between LID female mice with chronically high GH and low IGF-I, and bGH transgenic male mice chronically having high GH with high IGF-I.*

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PP 3

Effect of Large Amount of Alcohol Intake on Insulin Secretion in Non-Obese NIDDM Rats

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Background and Aims. *The effect of chronic alcohol intake on the glucose metabolism has been debated. Heavy alcohol consumption may have the detrimental effects on long-term diabetic complications such as neuropathy and hypertension. But, moderate alcohol consumption may lead to enhance insulin sensitivity and have glucose lowering effect. So, we fed large amount of alcohol to non-obese NIDDM rats to clarify the effect of chronic alcohol drinking on insulin secretion and pancreatic beta cell morphology.*

Materials and Methods. *We made male newborn (12 hours old) Sprague-Dawley diabetic rats by streptozotocin (75mg/kg, intraperitoneal injection). At 14 weeks of age, diabetic groups were confirmed by intraperitoneal glucose tolerance test(30%D/W, 2g/kg). Diabetic groups were divided into two groups-group I fed with 10% alcohol (8g/kg/day) and group III fed with saline for 8 weeks. Control groups were also divided into two groups - group II and IV in the same way above. At 22 weeks of age, we determined the serum insulin level and weight changes among 4 groups. We determined the islet area, beta cell area and the ratio of beta cell to islet area by the image analyzer.*

Results. *In group I, weight was significantly decreased after alcohol feeding. But other groups showed significant weight gain after alcohol or water feeding. Serum insulin levels were significantly decreased after alcohol or water feeding in group I, II and group III. In group I, serum insulin levels were more decreased, but not significant. In the light microscopic findings of pancreas, both islet and beta cell area were lower in group I rather than group II, III and IV. In group I, II and III, the ratios of beta cell to islet area were lower than those of group IV.*

Conclusion. *In conclusion, in non-obese NIDDM rat models, large amount of alcohol intake induced more weight loss and decreased the insulin secretion. In addition, it impaired pancreatic beta cell morphology.*

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PP 4

The Establishment of Methodology For Detecting and Analyzing Ultradian Oscillations of Insulin Secretion and Its Usage in Clinic

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Background and Aims. *This study aimed to establish the methods for detecting and analyzing ultradian oscillations of insulin secretion, study the characteristics of ultradian pulses distribution which include time, frequency, amplitude, coordination with glucose and rhythm. Furthermore we can expose the characteristics of ultradian pulses in overweight subjects with normal glucose tolerance and IGT subjects.*
Materials and Methods. *Study was performed in 19 middle-age normal volunteers. 6 overweight and 3 IGT subjects. Blood samples were taken every 15 minutes, and blood glucose, insulin, C-peptide of every time point were measured. Standard diet was used in the study. A two-compartment model was used to derive insulin secretion rates (ISR) from peripheral C- peptide concentration, and then analyze the characteristic of ISR curve include timing, amplitude , rhythm and concomitancy with glucose.*
Results. *1) Ultradian oscillations of insulin occurs 2 to 4 pulses after each meal , 3 to 4 pulses during the night and 12 to15 pulses in whole 24-hours.The first insulin pulse always occurs 30 to 60 minutes post meal. 2) The 24-hours average ISR amplitude of normal, overweight and IGT group were 357.21±11.36, 819.68±37.21, 665.64±53.29 pmol/min respectively. The total amount of insulin produced during the 24 hours was 334.24±89.67,769.60±213.66 and 663.79±340.52 nmol respectively. Normal group was lower than overweight and IGT groups. 3) The 24-hours average insulin clearance rate were 1) 15±0.19 ,1.03±0.47 and 0.97±0.05ml·min-1·m-2 respectively. IGT subjects were obviously lower than normal subjects. 4) The cross-correlation function were 0.72±0.11,0.80±0.11 and 0.51±0.11 respectively. IGT group was obviously lower than the other two groups. 5) Spectral analysis and auto- correlation function were performed to study the rhythmic pattern of the ISR which suggest insulin pulse was markedly disrupted in IGT subjects.*
Conclusion. *1) The method for detecting and analyzing ultradian oscillations of insulin secretion was successfully established in Chinese. 2) The occurring numbers and time of insulin ultradian oscillations are not statistically significant among normal, overweight and IGT groups. 3) Insulin secretion is increased in overweight and IGT groups. Diminished insulin clearance may be a contributory factor in IGT subjects with marked hyperinsulinemia. 4) The rhythm and concomitancy coefficient of ISR and glucose was lower in IGT .This feature probably play a role in diabetes onset and may be a marker that islet beta cell has been damaged earlier.*

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PP 5

Novel Insulin Sensitivity Index Derived from Oral Glucose Tolerance Test

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Background and Aims. *Whole body insulin sensitivity (Si) can be measured with the Glucose Clamp (GC) technique, which is regarded as a gold standard. However, this method is laborious and expensive. The Oral Glucose Tolerance Test (OGTT) is much simpler and less costly and is a commonly used method for measuring glucose kinetics and insulin sensitivity under physiological conditions. However, a major drawback of OGTT is that the rate of glucose appearance (Ra) is unknown. The aim of this study was to develop a novel insulin sensitivity index using the OGTT data and the minimal model with compensation for the rate of appearance of orally administered glucose into plasma (Si-AMM). The Ra is described in terms of glucose absorption. The proposed model is called "the Absorption Minimal Model" (AMM).*

Materials and Methods. *In this study, 137 subjects with various degrees of glucose tolerance (normal glucose tolerance (NGT), impaired glucose tolerance test (IGT), and diabetes mellitus (DM)) underwent a glucose clamp and 75-g OGTT. The proposed approach was validated with the clamp measurements. Si-AMM was also compared with other indexes that are frequently used to measure insulin sensitivity during an OGTT.*

Results. *The comparison between mean values of insulin sensitivity Si-GC and Si-AMM showed that Si-AMM was a good representative of Si-GC. The correlation between the two indexes was high and satisfactory ($r = 0.89$, $p<0.0001$). Moreover, the relationship between the proposed index and the rate of glucose sorption was confirmed by testing the proposed index on different databases.*

Conclusion. *The AMM approach could be a powerful tool for estimating insulin sensitivity to assess the efficacy of a given therapy in diabetic patients.*

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PP 6

Relationships Homocycteine and Insulin Resistance in Type 2 Diabetic Offspring

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Background and Aims. *Insulin resistance associated metabolic abnormalities and elevated homocysteine levels are risk factors for cardiovascular disease (CVD). We examined relationships between homocysteine levels and insulin resistance (Homa IR) in type 2 diabetic offsprings*

Materials and Methods. *Subjects ages: 18-30 years in type 2 diabetic offspring. We measured Body mass Index (BMI), Waist circumference (WC) and Blood Pressure (BP). After 10 hours fasting was measured fasting blood glucose, insulin, trigliceride, HDL-C, homocysteine and 2 hour Post Prandial blood glucose (after OGTT with 75 g glucose).*

Results. *The study in 50 type 2 diabetic offsprings, age: 23.64±3.11 years, 20% had hyperhomocysteinemia, 34% had insulin resistance, 10% had hyperhomocysteinemia with insulin resistance. There are correlation homocysteine with BMI (kg/m2): r= 0.29, p= 0.03*, WC (cm): r= 0.30, p=0.03*, Diastolic BP(mmHg): r= 0.28, p=0.04*, and no correlation homocysteine with insulin resistance (Homa IR).*

Conclusion. *In type 2 diabetic offspring, homocysteine was both associated with BMI, WC and diastolic blood pressure may partially account for increased risk of CVD, no associated homocysteine with insulin resistance. The further study is needed for associated homocysteine to CVD.*

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PP 7

Cardiovascular Risk Factors in Subjects with Insulin Resistance

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Background and Aims. *Insulin resistance is closely linked to several cardiovascular risk factors. The aim of the study is to evaluate the relationship between insulin resistance, measured by HOMA, and cardiovascular risk factors.*

Materials and Methods. *The study is a cross-sectional study. The subjects were the participants of East Indonesian Diabetic Epidemiology Group (EIDEG) screening program for diabetes. Known diabetic patients were excluded from this study. Blood pressure (BP) and BMI were measured in all subjects. Lipid profiles, OGTT, and insulin levels were performed after 12-hours fasting. HOMA value was divided into quartiles, and those belongs to the upper quartile were classified as insulin resistance. Statistical analysis was performed by either one-way ANOVA or Chi-square analysis, and conducted with SPSS for Windows 13.0 software (SPSS, Inc.).*

Results. *We studied 307 non-diabetic individuals, 197 males and 110 females. Fasting plasma glucose, systolic and diastolic BP, BMI, and triglycerides were significantly increasing with the HOMA quartiles ($p < 0,001$). The lowest quartile of HOMA value was 0.04-1.03 and the highest was the fourth quartile 2.67-14.9. Lowest fasting glucose was 4.7 + 0.6 mmol/L being in the first HOMA quartile and the highest was 5.7 + 1.7 mmol/L being in the fourth. For systolic BP was 125.1 + 23.4 mmHg and 144.1 + 27.6 mmHg, and diastolic BP was 82.1 ± 11.1 mmHg and 90.4 ± 13.1 mmHg. For BMI were 23.4 + 3.2 kg/m2 and 26.9 + 4.3 kg/m2, and for triglycerides were 136.7 + 70.3 mmol/L and 193.6 + 88.8 mmol/L.*

Conclusion. *There was a significant correlation between levels of fasting plasma glucose, systolic and diastolic blood pressure, BMI, and triglycerides with the HOMA values.*

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PP 8

The Effects of the IR or HG on the GFAT Activity in Vivo and in Vitro*

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Background and Aims. *The hexosamine biosynthesis pathway (HBP) is one of the glucose metabolic pathways with the key enzyme glutamine:fructose-6-phosphate amidotransferase (GFAT). On the process of the diabetes development, insulin resistance (IR) is happened much early before the hyperglycemia (HG). This work observed the effects of HG or IR on the GFAT activity, respectively.*

Materials and Methods. *The HG animals were stimulated by alloxan in ICR mice. The IR animals were induced by high-caloric diet in C57BL/6N mice. The IR model (IR-HIRc) was set up by the administration of the long-action insulin in HIRc cells. The GDH method was used to measure the GFAT activity. The insulin sensitivity was measured by the insulin tolerant test (ITT) in vivo, and by the insulin-induced glucose uptake in vitro. The insulin signal pathway was analysed by western blot.*

Results. *In HG mice model, the blood glucose concentration was over 300 mg/dl; and comparing with control, the level of serum fructosamine was increased 15.9%, the renal GFTA activity was enhanced 32.8%. After the administration with insulin (s.c.) for 21 days, these increased concentrations of serum fructosamine and the renal GFTA activity were resiled 9.7% and l9.4%, respectively, however, the blood glucose concentration was undulate significantly during the day with insulin treatment. In IR mice induced by high caloric diet, the blood glucose concentration was normal; and comparing with the control feeding normal diet, the level of the area under the curve (AUC) in ITT was increasted 38.1%, and the renal GFTA activity was enhanced 26.6%. In IR-HIRc cells, the ability of insulin-induced glucose uptake was decreased 21.1ÿ and the GFTA activity was increased 49.7% comparing with the HIRc control. Meanwhile, the expression of IRS-1 and MEK was up-regulated, but insulin-induced p-MEK was down-regulated. These changes in insulin signal pathway were reversed after the GFAT activity was inhibited by azaserine, a kind of GFAT inhibitor.*

Conclusion. *IR was more baneful to the HBP over-flux than HG in vivo, however HBP is one of the glucose metabolic pathways. The over-flux of HBP might down-regulate insulin sensitivity by IRS-1*
-MEK
-MAPK pathway in IR-HIRc cells.

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PP 9

D-Glucose Enhances PTP1B Gene Transcription in Hepatocytes

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Background and Aims. *Protein tyrosine phosphatase 1B (PTP1B) has been suggested to be a negative regulator of the insulin recceptor signal transduction pathways. It has been reported that PTP1B is upregulated in various tissues in diabetes and insulin resistant state. However, the regulatory mechanism of hepatic PTP1B expression in diabetic state remains unclear. In this study, we investigated the effect of glucose on PTP1B transcription in cultured hepatoma cells.*

Materials and Methods. *For a reporter gene assay, a DNA fragment of the promoter region of PTP1B gene (-1059/+22) was amplified using a PCR method, and the DNA fragment was introduced into the firefly luciferase expression vector. Transient transfection into HuH7 cells was performed using a cationic lipid method, and luciferase activity was determined at 24 hrs after transfection. For statistical analyses, data were compared by one-way ANOVA with Fisher's protected least significant difference test. P values less than 0.05 were considered significant.*

Results. *D-glucose enhanced PTP1B promoter activity in a dose-dependent manner. However, L-glucose or mannitol showed no effect on PTP1B promoter activity. Protein kinase C (PKC) inhibitors, bisindolylmaleimide and Ro 31-8220, significantly inhibited the transactivation by D-glucose. The transactivation was completely abrogated by mithramycin, an inhibitor of Sp1. PTP1B promoter has no TATA box, and there are three Sp1 sites in the promoter region (S1: -248/-234, S2: -123/-111, S3: -52/-38). We therefore introduced nucleotide substitution mutations to assess the significance of these Sp1 sites. The disruption of S2 or S3, but not of S1, significantly decreased both the basal promoter activity and the transactivation by D-glucose.*

Conclusion. *It has been reported that Sp1 activation by PKC is one of key mechanisms in regulation of several gene expression. Our data suggest that D-glucose enhances PTP1B transcription through Sp1 activation by PKC, and the two Sp1 sites in the upstream region (-123/-111 and -52/-38) are crucial for the transactivation of PTP1B gene by D-glucose.*

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PP 10

Transient Overexpression of AMPK via Adenoviral Gene Therapy Ameliorates Insulin Resistance in Type 2 Diabetic Oletf Rats

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Background and Aims. *AMP-activated protein kinase (AMPK) has been proposed to regulate the activities of key enzymes of lipid synthesis and metabolism and to improve insulin sensitivity. The Otsuka Long-Evans Tokushima Fatty (OLETF) rat is an established animal model of human type 2 diabetes that exhibits chronic and slowly progressive hyperglycemia and hyperlipidemia and is accompanied by progressive fibrosis in the islets. We have investigated the effects of AMPK on overt type 2 diabetic rats via adenoviral-mediated gene expression.*

Materials and Methods. *Forty-two weeks of aged overt type 2 diabetic rats (n=7) were administered intravenously with adenoviral-mediated AMPK gene (Ad.AMPK). Adenoviral-mediated lacZ gene was used for control group (n=7). Expression of Ad.AMPK was confirmed by RT-PCR and Western blot analysis. AMPK activity was measured by expression of phosphorylated acetyl CoA carboxlyase (ACC). Intravenous glucose tolerance test (IVGTT) was performed at 1 week after Ad.AMPK administration. Blood samples were collected from the tail vein for measurement of insulin, glucose, triglyceride and free fatty acid at before injection of Ad.AMPK and 1 week after injection.*

Results. *Administration of Ad.AMPK showed high expression of AMPK in liver for 1 week and then decreased to level of control rats. Ad.AMPK injected rats showed high activity of AMPK via phosphorylation of ACC. For transiently high expressed period, Ad.AMPK injected rats improved insulin resistance via IVGTT and HOMA index. In addition, concentration of plasma triglyceride decreased in Ad.AMPK injected rats. However, concentration of free fatty acid did not change significantly in 1 week of Ad.AMPK administration.*

Conclusion. *These results suggest that intravenous administration of Ad.AMPK may play important role in liver and the effect of AMPK ameliorate the status of overt diabetes via glucose sensing and insulin sensitization.*

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PP 11

Fulminant Autoantibody-Negative and Typical Type 1B Diabetes Phenotypes in a Korean HLA Identical Dizygotic Twin

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Background and Aims. *Type 1 diabetes is a heterogeneous familial disorder resulting from an interplay of genetic, environmental, and autoimmune factors. Although some genes such as HLA and CTLA-4 have been elucidated about their association in pathogenesis, the detail genetic background causing type 1 diabetes is unclear. In addition, genetic predisposition may play a permissive role but not causal in pathogenesis. Since Imagawa et al (2000) described 11 cases of fulminant autoantibody-negative type 1B diabetes mellitus as a novel subtype of type 1 diabetes, over two hundreds of additional cases have been reported. Although they all were characterized as abrupt onset, elevated serum exocrine pancreatic enzymes and negative autoantibodies, several reports suggested that some specific HLA types might also be involved in destruction of islet cells.*
Materials and Methods. *A 35-year-old man (Index twin), relatively healthy and only suffered from flu-like symptoms a week before, was admitted to our hospital with diabetic ketoacidosis. His arterial blood gas parameters were as follows: pH 7.30, pCO2 37 mmHg and bicarbonate 17 mmol/L. The serum levels of glucose (39.6 mmol/L), BUN/Cr (28/1.5 mg/dl) and fructosamine (356 µmol/L, RR 205~285) were elevated, but HbA1c (5.4%) was within normal range. Both serum and urinary ketone were strongly positive. Fasting serum and 24-hour urine C-peptide level were below detection limit at 0.1 ng/ml and 10 µg/day, respectively. All diabetes-related autoantibodies were negative. Although his dizygotic twin brother (case 2) was diagnosed as type 1 diabetes with high glucose (336 mg/dl), HbA1c (9.5%) and low C- peptide (0.20 ng/ml) 2 years ago, currently he is under well management with low dose insulin injection (10 units/day). He was also negative for any diabetes-related autoantibodies.*
Results. *This dizygotic twins and a normal sister all had the same haplotypes of HLA-DRB1*0405/*0701, DQA1*0201/*0303, DQB1*0401/*0202, suggesting that these haplotypes are associated with fulminant type 1 diabetes as previously described by Imagawa.*
Conclusion. *Just as monozytotic twin studies showed, this report suggests that HLA genes as well as environmental factors, or non-germ line-inherited variations (e.g., imprinting, T-cell receptor polymorphisms, somatic mutations) might contribute to the development of fulminant type 1 diabetes.*

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PP 12

The Relationship between Latent Autoimmune Diabetes in Adults and HLA- DQ DR Gene

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Backgrounds and Aims. *The relationship between Latent Autoimmune Diabetes in Adults and HLA- DQ0DR gene were studied in this paper.*

Materials and Methods. *The genotypes of HLA-DR and DQ in 60 healthy controls ,41 patients with type 1 diabetic ,39 patients with LADA were determined by PCR-SSP techniques. The metabolic index C-peptide level and serum antibodies were measured in all subjects.*

Results. *(1)The frequencies of HLA-DR4, HLA-DQ*0301, HLA-DQB1*0201 were significantly higher in LADA patients than other groups. (2) HLA-DR3, DR4, HLA-DQA1*0301, DQB1*0201 are positive associated with type 1 diabetes; HLA-DR15, HLA-DQB1*0601 are negative associated with type1 diabetes. (3) The frequencies of HLA-DQB1*0601 were significantly higher in LADA patents compared with that in patients with type 1 diabeticÿP< 0.05.*

Conclusion. *There are difference genetic background among the LADA and type 1 diabetes. It maybe influences the progression of the diabetes.*

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PP 13

Evaluation of Growth in a Series of Childen and Adolesence With Type 1 Diabetes Mellitus

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Background and Aims. *Through most important criteria for evaluating the status of health in children, is growth pattern. Diabetes is commonest Endocrine and metabolism disorder of children and adolescence with important complications. Our goal is to investigate the growth status of diabetic children and adolescence.*
Materials and Methods. *Growth data collected in a longitudinal/cross sectional way between2000 and 2002 in 131 diabetic subjects (52 males, 79 females) were available for analysis of height and weight. The individual growth carve of each patient was compared to growth standards.P values < 0.05 were considered statistically significant*
Results*. The result shows a significant difference between height and weight of two groups (p=0/05). In addition, there is a significant difference between height and weight velocity in both boys and girls test group and control group (p=0/05). This study also shows that there is more abnormality in height and weight growth rate in children who had diabetes before 5 years old in compare to those who had after this age(p=0/05). In children who had complications of diabetes, the abnormalities of growth were more than those without complications. This study also shows that using NPH and regular insulin 2 times a day, would be effective in reducing the abnormalities in compare with those who had used NPH insulin one or two per day.*
Conclusion. *As diabetes is a chronic disease and also a systemic disorder, it can decrease velocity of height and weight growth rate in children and adolescence so control of children focusing on different criteria of diabetes and its complications, can be preventive.*

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PP 14

Elevated Homocysteine as a Risk Factor for the Development of Diabetes in Women with a Previous History of Gestational Diabetes Mellitus: A 4-Year Prospective Study

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Background and Aims. *To investigate the potential use of the plasma homocysteine level as a predictor of diabetes in women with a previous history of gestational diabetes mellitus (GDM).*
Materials and Methods. *At 6 weeks postpartum, baseline examination was performed in 177 GAD negative subjects. Seven subjects who were diagnosed with diabetes at baseline were excluded from further evaluation, and 170 subjects with normal or impaired glucose tolerance at baseline were followed annually over 4 years. The follow-up examinations included 2-hour 75g oral glucose tolerance tests (OGTTs), lipid profiles, homocysteine levels, anthropometric measurements, history taking, diet and life style. During the OGTTs, insulin and glucose levels were assayed every 30 minutes. Plasma homocysteine levels were determined by ion-exchange chromatography.*
Results. *Of the 170 women, 18 (10.6%) converted to diabetes during the 4-year follow-up period. Mean age, BMI, fasting insulin and total cholesterol at baseline(6 weeks postpartum test) were similar in the three study groups (i.e., normal, impaired glucose tolerance, and diabetes). Fasting glucose levels, insulin/glucose ratios, and homocysteine levels were significantly higher in the diabetic group ($P < 0.05$). Higher glucose at the time of the diagnosis of GDM and higher homocysteine levels at baseline were independently associated with the onset of postpartum diabetes. These relationships were independent of age, BMI, and family history of diabetes.*
Conclusion. *This prospective study identified the homocysteine level as a significant risk factor for development of diabetes in women with previous GDM.*

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PP 15

Antenal and Historical Factors as the Predictors of Glucose Intolerance among the Women with Prior Gestational Diabets Mellitus (PGDM)

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Background and Aim. *Women with prior gestational diabetes mellitus (PGDM) are at high risk of progression to impaired glucose tolerance (IGT) and eventual type 2 diabetes mellitus (Type 2 DM) in their later life. The aim of this study was to assess the antenatal and historical factors associated with postpartum glucose intolerance (IGT/Type 2 DM) in women with PGDM.*

Materials and Methods. *This was a cross-sectional study. A standard 75g 2-hour OGTT was performed in a multiethnic cohort of women with PGDM (1989 to 2003) in University Malaya Medical Center (UMMC) from July 2002 to September 2004. Body mass index (BMI), fasting lipid profile and blood pressure were obtained. Data pertaining to the index pregnancy with gestational diabetes were obtained from the hospital medical record and by interviewing the subjects.*

Results. *A total of 343 women with PGDM, mean age of 38.3±5.4 years old were recalled for the postpartum assessment. The prevalence of type 2 DM and IGT were 16% and 21%. The prevalence of type 2 DM was higher than the background female population in Malaysia (8.3 %). There was no significant difference in age between the groups ($p>0.05$). Gravida, para, family history of diabetes, frequency of GDM, fasting plasma glucose at diagnosis, 2-h plasma glucose level at diagnosis, duration lapse since index pregnancy with GDM, BMI at diagnosis, blood pressure at diagnosis, insulin treatment for GDM and birth weight of the offspring were found to be significant different between the normal glucose tolerance (NGT) and the subjects with glucose intolerance ($p<0.05$). In contrast, gestation age and maternal age at diagnosis were not significantly different between the groups ($p>0.05$). Among the factors, predictors of postpartum glucose intolerance were gravida (RR=1.20; $p<0.05$), para (RR=1.25; $p<0.05$), fasting plasma glucose at diagnosis (RR=1.52; $p<0.05$), 2-hour plasma glucose at diagnosis (RR=1.30; $p<0.05$), duration lapse since index pregnancy with GDM (RR=1.00; $p<0.05$), BMI at diagnosis (RR=1.11; $p<0.05$), diastolic blood pressure at diagnosis (RR=1.03; $p<0.05$) and birth weight of the offspring (RR= 2.149; $p<0.05$). However, adjusted multivariate regression showed that only 2-hour plasma glucose at diagnosis (OR=1.26; $p<0.05$), BMI at diagnosis (RR=1.09; $p<0.05$) and birth weight of the offspring (RR=1.97; $p<0.05$) were independently predictive for postpartum glucose intolerance.*

Conclusion. *Women with PGDM had increased prevalence of glucose intolerance (IGT/ Type 2 DM) in their later life. Postpartum glucose intolerance was highly associated with the 2-hour plasma glucose at diagnosis, BMI at diagnosis and birth weight of the offspring. Therefore, regular follow up with OGTT is very important for this high risk group.*

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PP 16

Plasma Concentrations of Resistin are Higher in Women with Gestational Diabetes Mellitus and Gestational Impaired Glucose Tolerance than in Normal Pregnant Women

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Background and Aims. *Resistin may play an important role in explaining insulin resistance. But, animal and human studies currently show conflicting results. Moreover the relationship between circulating resistin levels and gestational diabetes mellitus (GDM) is unknown. The aim of this study was to compare the concentrations of resistin in women with GDM, gestational impaired glucose tolerance (GIGT), and normal glucose tolerance (NGT). Also we investigated the factors affecting circulating resistin levels in pregnant Korean women.*

Materials and Methods. *We studied 129 pregnant women who underwent 100 g oral glucose tolerance test (OGTT) during 24-28 gestational weeks. Based on the OGTT results, participants were stratified into three groups: (1) NGT (n=40); (2) GIGT (n=45); and (3) GDM (n=44). Plasma concentrations of resistin were determined by enzyme-linked immunosorbent assay. The levels of plasma adiponectin and leptin were also measured. Fasting glucose levels, lipid profiles, and insulin levels were determined by standard methods. We used fasting baseline blood samples during 100 g OGTT for the determinations of the parameters. We considered fasting insulin levels, homeostasis model assessment of insulin resistance (HOMA-IR), and Triglyceride/ High density lipoprotein cholesterol ratio (TG/HDL ratio) as markers of insulin resistance.*

Results. *We found that mean plasma resistin levels were significantly higher in women with GDM and GIGT than in women with NGT (GDM 5.1+/-2.7, GIGT 5.1+/-3.0, vs. NGT 3.4+/-1.8 ng/mL, P < 0.01). There were no significant differences of plasma adiponectin and leptin concentrations among 3 groups. Fasting insulin, HOMA-IR, TG/HDL ratio were higher in women with GDM than in women with NGT or GIGT. We observed that plasma resistin concentrations were positively correlated with the area under curve for glucose (AUCG) during the 100 g OGTT (r=0.28, P<0.01) and negatively correlated with HDL-cholesterol (r=-0.2, p<0.05). In multiple regression analysis with resistin as the dependent variable, plasma glucose levels obtained 2h after oral administration of 100 g glucose and fasting TG levels were the significant predictors for resistin levels (glucose: beta=0.023, p<0.001; TG: beta=0.009, p<0.05; R2=0.76).*

Conclusion.In summary, women with GDM and GIGT exhibit significantly elevated plasma concentrations of resistin compared with women with NGT. Also, a significant positive association was found between the resistin levels and AUCG. Our findings suggest that resistin may be involved in the development of gestational glucose intolerance in Korean women.

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PP 17

Prevalence Changes and 6-Year Incidence of Type 2 Diabetes and Impaired Fasting Glucose in Korean Rural Population

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Background and Aims. *To estimate the prevalence change of diabetes and impaired fasting glucose(IFG) and to determine the 6-year incidence and the risk factors for the development of diabetes in a Korean rural area.*
Materials and Methods. *Initially a total of 1119 subjects (424 men and 695 women) aged 31-99 years were recruited in 1997. A baseline clinical data and various laboratory values were obtained. 6 year later, we visited the same area and measured the similar parameters in 814 (316 men and 498 women) of which 558 were original participants and rest 256 were new joiners. Incidence and risk factors of diabetes were analyzed in 518 subjects. Diabetes was defined according to the American Diabetes Association criteria.*
Results. *Age and sex adjusted prevalence of diabetes in 1997 was 6.9%, which increased up to 11.8% in 2003 measuring 51% increase. The prevalence of IFG in 1997 was only 2.1%, which alarmingly increased up to 15.8%. The age- and sex adjusted incidence rate of diabetes was 16.3 per 1000 person-year. Fasting plasma glucose, post load 2 hr glucose, abdominal circumference and albuminuria acted as independent risk factors in multivariate logistic regression analysis.*
Conclusion. *There had been a marked increase in the prevalence of diabetes during 6 years, and the alarmingly increase in IFG, a prediabetic status, called for urgent preventive measures for diabetes. Fasting and postload 2 hr glucose, abdominal circumference and albuminuria independently predicted the development of diabetes in Korean rural population.*

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PP 18

The Assessment of Glucose Tolerance and Insulin Resistance in Obese Chinese Children

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Background and Aims. *To assess glucose tolerance and insulin resistance in obese Chinese children using different indexes.*

Materials and Methods. *.Fasting plasma glucose (FPG) was performed in 65 children and oral glucose tolerance test (OGTT) was performed in 115 children with body mass index (BMI) of 23 kg/m2 and above. Diabetes, impaired glucose tolerance (IGT), impaired fasting glucose (IFG) were defined using the WHO and ADA criteria. HbA1c was checked and pancreatic beta-cell function (HOMA-B) and insulin resistance (HOMA-IR) was assessed using the homeostasis model assessment.*

Results*. .IFG was detected in 14 children. Five and twenty-eight children had 120 min plasma glucose (PG) ≥11.1 and 7.8-11.1 mmol/L respectively. FPG failed to identify 2 out of 5 diabetic children identified through OGTT. Acanthosis nigricans had a significant effect on fasting glucose, fasting insulin and HOMA-IR.*

Variable	Severity of acanthosis nigricans			P-value (ANOVA)
	Nil (n = 22)	Mild (n = 69)	Moderate (n = 18)	
BMI (kg/m^2)	28.6 ± 4.6	28.9 ± 4.7	29.6 ± 6.5	0.80
Fasting PG (mmol/L)	4.8 ± 0.4	5.1 ± 0.8	5.5 ± 1.2	0.04
Fasting insulin (uU/L)	18.0 ± 10.7	27.1 ±17.7	32.2 ± 15.8	0.02
HOMA-B	303.1 ± 231.4	399.0 ± 328.2	414.4 ± 309.4	0.40
HOMA-IR	3.9 ± 2.4	6.3 ± 4.3	7.8 ± 4.0	0.006

Conclusion. *Glucose intolerance is common in obese Chinese children. Impaired glucose tolerance was found in 15.5% (28/180) and undiagnosed type 2 diabetes in 2.7% (5/180).*

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PP 19

Prevalence of Newly Diagnosed Diabetes Mellitus in Clinical Practice

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Background and Aims. *The prevalence of diabetes mellitus is increasing worldwide. The purpose of screening is to identify asymptomatic diabetes. Screening can be done in the community or in a clinical setting among individuals at high risk for diabetes. Detecting diabetes in the clinics is low cost, more effective, the aim of this study is to asses the prevalence of diabetes mellitus in clinical setting.*

Materials and Methods. *East Indonesian Diabetes Epidemiology Group consists of physicians from their private practice as well as in the clinics. For practical reasons high risk group consist of age > 45 years, or < 45 years with obesity BMI > 25 kg/m2, family history of diabetes (parents or siblings), hypertension, women with history of large baby (> 400 gram) Random capillary blood glucose using reflectance meter (GlucoDr) were performed when they come to see their physicians. Random blood glucose of < 100 mg/dl is normal, 100 – 199 mg/dl is possible diabetes, and > 200 mg/dl is diabetes mellitus. Those with blood glucose of 144 – 199 were followed by OGTT and those with > 200 mg/dl were asked to do the fasting plasma glucose. Complete physical examinations were done to all subjects.*

Results. *During 24 months (March 2003 – March 2004), thirty physicians participate in this study. During the screening 4121 subjects can be covered, 2227 males and 2593 females. Newly diabetes mellitus was diagnosed in 821 subjects or 19.8%, more females compared to males, 468 females (18.1 %), males 346 (15, 5 %). There was no significant different in BMI between normal and diabetic patients. The incidence of diabetes mellitus increasing with age, around 50% of them was found in the age > 55 years old.*

Conclusion. *The frequency of newly diagnosed diabetes mellitus in the clinics is high, more females than males. The incidence of newly diagnosed diabetes mellitus increased with increasing age group*

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PP 20

Prevalence of Diabetes Mellitus and Impaired Fasting Glucose According to Anthropometric Characteristics an Dietary Habits

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Background and Aims. *The study is based on the National Health and Nutrition Examination Survey in Korea(1998). With these data, we want to predict the prevalence of diabetes mellitus(DM) and impaired fasting glucose(IFG), By investigating anthropometric characteristics and dietary intake habits, we also wanted to analyze any significant correlation between those factors and the prevalences of DM and IFG.*
Materials and Methods. *The study group was comprised of 8,166 people, a representative group of Koreans, who had undergone a health check-up and food intake survey among the total 39,331 members of 12,189 families who were surveyed.*
Results. *The final results are as the follows. 1) The peak prevalence of DM was 15.92% among women in their sixties and 18.21% among men in their fifties, and that of IFG was found to be 16.27% of women in their seventies and 14.09% of men in their sixties. 2) When analyzing the eating habits and the prevalences of DM and IFG, we found that women with more glucose intake had a lesser risk of DM, but this was of no statistical significance. 3) In men, age, total cholesterol, triglyceride(TG), and hypertension(HTN) were revealed as meaningful factors and in women, age, TG, and HTN were revealed as meaningful factors. As to the IFG, in females, age and TG were meaningful factors, and in males, age, TG, the waist/hip ratio (WHR), and body mass index (BMI) were meaningful factors.*
Conclusion. *Although this study could not demonstrate meaningful correlation between diet habits and DM, the prevalence of IFG and the recent increase in the prevalence of DM in Koreans, owing to alterations in their diet habits, demands further organized group study for a better understanding of their relationship*

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PP 21

Evaluation of Relationship between Diabetic Retinopathy and Nephropathy in Type 2 Diabetic Patients

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Background and Aims. *to evaluate the prevalence of diabetic retinopathy in diabetic patients with nephropathy and nephropathy in diabetics with retinopathy. To determine correlation of severity of diabetic retinopathy with nephropathy.*

Materials and Methods. *in this cross sectional study type 2 diabetic patients were screened for diabetic nephropathy and diabetic retinopathy by evaluation of 24h urine albumin and indirect ophthalmoscopy.110 patients who had retinopathy or nephropathy include to the study.*

Results. *of 110 patients , 51 patients (51.8%) had microalbuminuria, 29 patient(26.3%) had macroalbuminuria and 24 patients (21.8%) without nephropathy. 62 patients (56.3%) had NPDR, 25 patients (22.7%) had PDR and 23 patients (20.9%) without retinopathy.*

There was significant correlation between severity of retinopathy in NPDR stage and severity of nephropathy (P= 0.000) but was not in PDR stage (P= 0.675). Prevalence of nephropathy in retinopathic patients was 72.4% (P= 0.002). Prevalence of retinopathy in microalbuminuria was 66.6% and in macroalbuminuria was 86.2% (P= 0.002).

Conclusion. *with progression of nephropathy from microalbuminuria to macroalbuminuria retinopathy progress in NPDR stage but not in PDR .*

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PP 22

Prevalence of the Metabolic Syndrome and ITS Relation to Vascular Complications in T2DM

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Yupin Benjasuratwong, Pongamorn Bunnag,
Chardpraorn Ngarmukos, Natapong Kosachunhanun,
Wannee Nitiyanant, Sathit Vannasaeng,
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Background and Aims. *1) to demonstrate prevalence of the Metabolic Syndrome in T2DM and 2) to study the association of the Metabolic Syndrome and vascular complications of T2DM*
Materials and Methods.The subjects in The Thailand Diabetes Registry who had data available for diagnosis of the metabolic syndrome according to the WHO criteria were selected. All the diagnostic criteria for the metabolic syndrome were based on WHO guideline excepted for obesity, the IOTF–WP(BMI ^{3}25 kg/m2) criteria was employed. The associations between metabolic syndrome and vascular complications were analyzed.
Results. *There were 5,180 patients out of 8,394 diabetic subjects (61.7%) having metabolic syndrome. The highest risk of the syndrome is BMI more than 30 kg/m2, which 20.3 fold of whose BMI less than 23 kg/m2. The patients with Metabolic syndrome had higher prevalence of diabetic nephropathy(33.1%), retinopathy(25.6%), and CHD(9.8%) comparing with who did not have the syndrome. There was no correlation between the metabolic syndrome and cataract, blindness, lower limb amputation and cerebrovascular accident.*
Conclusion. *The prevalence of metabolic syndrome in Thai diabetic patients is very high and it was strongly associated with BMI of the subjects. Microvascular complications and coronary heart disease were 2-4 fold higher in diabetic patients with the metabolic syndrome.*

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PP 23

Trends in Prevalence of Metabolic Syndrome and Insulin Resistance in a General Japanese Population: The Hisayama Study

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Background and Aims. *Metabolic syndrome and insulin resistance are important risk factors for coronary artery disease. The prevalence of metabolic syndrome, insulin resistance and risk factors for these conditions has increased steadily in Western countries over the last two decades but few data exist for Japan. The goal of this analysis was to estimate the age-specific prevalence of metabolic syndrome and insulin resistance along with their trends over the period of time in a Japanese population from a semi-rural area using two cohorts assembled in 1988 and 2002.*

Materials and Methods. *The Hisayama study is a prospective cohort study of cardiovascular diseases ongoing in the Town of Hisayama in southern part of Japan. We established several cohorts at different time in this town. For the present study, we used the 3rd and 4th cohort assembled in 1988 and 2002, respectively. For metabolic syndrome we used both International Diabetes Federation criteria for Japanese population (IDF-J) and Japanese definition (set by Japanese Society for Internal Medicine), and for insulin resistance we used the HOMA formula [(HOMA-IR= (FIRI in mU/L x FPG mmol/L)/22.5), HOMA-IR>2.5 considered as insulin resistant].*

Results. *There were 2,412 and 2,752, subjects (aged 40 to 79 years) evaluated in 1988 and 2002, respectively. The overall prevalence of metabolic syndrome increased from 21.6% in 1988 to 24.1% in 2002 based on IDF-J definition, and from 15.2% to 19.3% based on Japanese definition, respectively. Respective figures for insulin resistance were 15.7% and 27.5%. The syndrome was more prevalent ($p<.05$ for all cases) in males than females in both 1988 and 2002 based on both IDF-J and Japanese definitions. Same was true for insulin resistance in 2002 (31.6% vs 24.3%, $p<0.01$), but not in 1988 (16.4% vs 15.2%, $p=0.45$). Insulin resistance showed an upward trend in 2002 compared to that in 1988 within all age and sex-specific strata. Metabolic syndrome also showed the similar trend in the elderly (aged 60 to 79 years) in either sex.*

Conclusion. *The findings of our study suggest that the prevalence of metabolic syndrome increased during 14 years, especially in the elderly, and the similar trend was observed for the prevalence of insulin resistance in middle aged as well as in the elderly in the general Japanese population.*

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PP 24

Is Hyperuricemia Another Facet of the Metabolic Syndrome?

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Background and Aims. *Hyperuricemia is commonly associated with obesity, glucose intolerance, hypertension, dyslipidemia, and atherosclerotic cardiovascular disease. The resemblance of the metabolic syndrome and hyperuricemia has led to the suggestion that hyperuricemia is a part of the metabolic syndrome. The purpose of the study is to examine the role of serum uric acid (UA) in the diagnosis of the metabolic syndrome in middle-aged Chinese men.*

Materials and Methods. *In total, 393 male participants, aged 45 to 60 years old, were recruited from a professional health evaluation program. Anthropometric measurements and blood pressure (BP) were taken after an overnight fast. Fasting blood samples were collected for the measurements of glucose, UA, and lipid profile. Logistic regression models were fitted to examine the relationship between UA and the diagnosis of metabolic syndrome. Factor analysis was performed to explore the relationship between UA and the components of the metabolic syndrome.*

Results. *The metabolic syndrome was present in about 20 % of the participants. The diagnosis of the syndrome was significantly associated with waist circumference (WC), glucose, Log triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), systolic BP and Log liver enzyme levels. However, UA levels were short of predictive power for the diagnosis of the syndrome in the stepwise logistic regression models. In factor analysis, UA aggregated with body mass index, WC, glucose, Log TG and HDL-C as a metabolic factor. Systolic and diastolic BP were loaded on a second factor separately. The model loaded with UA explained a similar proportion of the total variance (56.9 %) as did the model loaded without UA (62.5 %).*

Conclusion. *Our results suggest that UA is not required for the diagnosis of the metabolic syndrome. The contribution of UA as an additional component of the syndrome seems to be insignificant. We proposed that hyperuricemia may not be an important facet of the metabolic syndrome.*

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PP 25

Impact of Metabolic Syndrome on the Development of Chronic Kidney Disease in a General Japanese Population: The Hisayama Study

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Background and Aims. *Metabolic syndrome has been linked with various atherosclerotic diseases, but has not been evaluated sufficiently as a risk factor for the development of chronic kidney disease (CKD) in the general population. We examined the impact of metabolic syndrome on the development of CKD in a prospective cohort study in a Japanese community.*

Materials and Methods. *In 1988, a screening survey for the present study was performed in Hisayama Town in southern part of Japan. We followed a total of 1,441 town residents (592 men and 849 women) without CKD, aged 40 years or over, for 5 years and examined the effects of the metabolic syndrome, defined by the modified National Cholesterol Education Program Adult Treatment Panel III criteria, on the development of CKD. CKD was defined as glomerular filtration ratio < 60 mL/min/1.73m2, which was estimated using the simplified prediction equation derived from the Modification of Diet in Renal Disease study. The multivariate-analysis was performed using logistic regression analysis, in which we used age, sex, baseline glomerular filtration ratio, proteinuria, serum albumin, hyperinsulinemia, serum total cholesterol, hemoglobin, regular alcohol intake, and current smoking as confounding factors.*

Results. *At baseline examination, the crude prevalence of metabolic syndrome was 25.4% in our subjects. During the follow-up period, 88 subjects experienced CKD. The age- and sex-adjusted 5-year cumulative incidence of CKD was 4.8% in subjects without metabolic syndrome and 10.2% in subjects with metabolic syndrome: the difference was statistically significant (P< 0.01). The age- and sex-adjusted 5-year cumulative incidences of CKD linearly increased with elevating numbers of metabolic syndrome components. The multivariate-adjusted odds ratio for CKD in subjects with metabolic syndrome compared to those without metabolic syndrome was 1.96 (95% confidence interval, 1.16-3.30). Relative to the reference group of subjects having d"1 metabolic syndrome component, the multivariate-adjusted odds ratios for CKD in subjects having 2, 3, or 4d" metabolic syndrome components were 1.03 (0.55-1.94), 1.73 (0.90-3.35), and 2.51 (1.18-5.32), respectively.*

Conclusion. *Our findings suggest that metabolic syndrome is an independent risk factor for the development of CKD in the general Japanese population. A clinical trial is needed to clarify whether the effect of preventing and treating metabolic syndrome will result in an improved renal prognosis.*

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PP 26

The Association Study of FOXC2 Gene C-512T Polymorphism with Metabolic Syndrome in Chinese

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Background and Aims. *The transcription factor FOXC2 has been show to counteract obesity, hypertriglyceridaemia, and diet-induced insulin resistance in rodent and the FOXC2 gene is a candidate gene for type 2 diabetes, obesity and insulin resistance. We investigated whether the variation contribute to the genetic basis of Metabolic Syndrome in Chinese, and the relationship between the variation with glucose and lipid metabolism, body fat and its distribution and resting energy expenditure in Chinese.*

Materials and Methods. *Polymerase chain reaction-restriction fragment length polymorphism(PCR-RFLP) was used to test the genotype of FOXC2 gene C-512T variation in 199 individual with normal glucose tolerance(NGT) and 205 patients with type 2 diabetes(T2DM). All subjects were treated with oral glucose tolerant test (OGTT), plasma glucose (serum insulin) C-peptide and free fatty were tested in OGTT test (lipid profile were tested in the fasting blood) BMI was calculated after height and weight were measured (waist) hip and thigh were measured. Fat percent (fat mass) fat free mass were measured by Bioelectrical Impedance Analysis (regional body fat were measured by Magnetic Resonance Imaging and were expressed as abdominal visceral body fat mass(VA))subcutaneous fat area(SA) and femoral fat area(FA). Resting energy expenditure was measured by indirect calorimeter. The diagnosis criterion of Metabolic Syndrome adopted the Chinese Diabetes Society recommended criterion.*

Results. *1) The allele frequencies of FOXC2 C-512T variant was different with other Caucasians population; but similar with Japanese population; 2) FOXC2 C-512T allele distribution differ between Metabolic Syndrome male and non-metabolic syndrome male, the odd radio for the T allele carriers was 1.568ÿ95% CI 1.014^ÿ2.424 ÿ. 3) In NGT males, The FOXC2 C-512T variant was associated with WHR, WFR, VA and FA, the T allele carriers had higher WHR,WFR,VA, but lower FA; The FOXC2 C-512T variant was associated with HDL-C and LDL-C , the T allele carriers had higher LDL-C, but lower HDL-C; 4) In the visceral obesity male, the T allele carriers had higher LDL-C, FIN, 2hIN and HOMA-IR; 5) The relationship between FOXC2 C-512T variant with resting energy expenditure in NGT subjects was not found in Chinese population.*

Conclusion. *The FOXC2 C-512T variant maybe associated with Metabolic Syndrome in Chinese male, the T-allele increased the risk of Metabolic Syndrome of male, The FOXC2 C-512T variant was associated with fat distribution and dyslipidemia of NGT male, the T allele carriers had higher VA; The FOXC2 C-512T variant was associated with insulin resistance in visceral obesity male.*

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PP 27

Significant Linkage of Susceptibilty Locus of Metabolic Syndrome in Chinese Families with Diabetes and/or Impaired Glucose Regulation is Located at Chromosome 6Q21-Q24

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Background and Aims. *The aim of this study is to perform a genome-wide search for susceptibility loci to metabolic syndrome (MS) in Chinese diabetic families.*
Materials and Methods. *Participants were recruited as the pedigrees with type 2 diabetes/impaired glucose regulation in Shanghai. Medical histories, anthropometric parameters, blood pressure, fasting lipid profile, and levels of glucose, insulin and C-peptide during the OGTT were collected. According to the WHO, NCEP-ATP b!, and IDF definitions for MS, three MS affected sibpairs groups were yielded from the participants. The MS-WHO group included 100 families with 144 affected sibpairs; the MS- ATPIII group included 98 families with 136 affected sibpairs and the MS-IDF group included 61 families with 83 affected sibpairs, respectively. A total of 388 fluorescent-labeled microsatellite markers were genotyped on the autosomes and X chromosome among these individuals. Linkage analyses were performed by MERLIN (v 0.10.2).*
Results. *Nonparametric multipoint analyses in these three groups revealed that the highest linkage evidence for MS was all detected in the same region, located on chromosome 6q21-q24 at 128.93cM (logarithm of odds [LOD] = 5.29, 3.77, 3.79). Analyses on individual components of MES in each group strengthened our findings on the linkage analysis results of MS. Nominal evidence for linkage with MS was also observed on chromosomes 3p14.1, 3q11.1, 3q24, 6p12.3, 6q14.1, 11p14.2, 21p11.2, and 21q21.1.*
Conclusion. *Our study strongly suggested that chromosome 6q21-q24 harbored a MS susceptibility locus in the Shanghai Chinese pedigrees with diabetes/ impaired glucose regulation. We also found that the definition for the MS may affect the linkage level.*

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PP 28

Does Body Mass Index Predict Overweight in Native Asian Indians?: A Study from Northern Indian Population

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Background and Aims. *Body mass index (BMI) has been considered as a gold standard for defining overweight and obesity and in western population it has correlated with percent body fat. However, data in native Asian-Indians regarding body mass index and percent body fat is conflicting and question has been raised to redefine the BMI cut off values in these subjects.*

Materials and Methods. *One hundred and fifty healthy volunteers (79 men and 71 women aged 18-78 and 23-75 years respectively) were recruited for the study. Clinical examination was performed to exclude any systemic disease. Anthropometric measurements were done and percentage body fat was calculated from skin fold thickness.*

Results. *The BMI for men was 24.96 kg/m2 (± 3.85) and for women was 25.75 kg/m2 (± 4.39). Percentage body fat calculated by skin fold thickness was 21.94% (± 5.92) in men and 35.15% (± 5.77) in women. Receiver operating characteristic (ROC) curve analysis showed a higher sensitivity (92%) and higher negative predictive value (95%) for the cut-off value of the BMI (25 kg/m2) in identifying subjects with overweight with percentage body fat of more than 25% in men. However, in females a BMI of 23.9 kg/m2 had a sensitivity of 84% and negative predictive value of 62% thereby decreasing the misclassification by 13% with body fat percentage of more than 30% as compared to conventional BMI cut off of more than 25 kg/m2. A comparison of body fat data amongst Caucasians, Blacks and migrant ethnic Asians revealed inconspicuous differences in men.*

Conclusion. *Native north Indian men had comparative BMI and percentage body fat as that of their western counterparts.*

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PP 29

Thailand Diabetes Registry: Clinical Status and Vascular Complications of Diabetes Patients

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Background and Aims. *Diabetes Mellitus is a growing public health problem worldwide and also Thailand. We conducted a multi-center registry of diabetic patients in 11 tertiary care hospitals and medical schools across country to examine present clinical status of these patients. The data base was designed for future longitudinal studies and cross-sectional analyses for various aspects correlation between risk factors and diabetic complications.*

Materials and Methods. *A registration of 9,419 diabetic patients expected to follow-up at least one year at 11 diabetic clinics in tertiary diabetic clinics in Bangkok and major provinces was performed form April to December 2003. Individual Demographic data including education and socioeconomic status were collected. Physical examination for complications screening and laboratory results within six months were recorded in the data base. Prevalences of diabetes complications were examined and percentages of achievement in metabolic control were calculated based on the ADA guideline.*

Results. *A registration of 9,419 diabetic patients expected to follow-up at least one year at 11 diabetic clinics in tertiary diabetic clinics in Bangkok and major provinces was performed form April to December 2003. Individual Demographic data including education and socioeconomic status were collected. Physical examination for complications screening and laboratory results within six months were recorded in the data base. Prevalences of diabetes complications were examined and percentages of achievement in metabolic control were calculated based on the ADA guideline.*

Conclusion. *The majority of the patients in this registry had unsatisfactory control of diabetes and other risk factors for development of long term complications. Screening for early retinopathy and nephropathy also was insufficient. There should be additional process or system to improve care for diabetes.*

PP 30

TDR*2: The Etiology, Glycemic Control and Prevalence of Microvascular Complications in Thai Chailhood and Adolescents Diabetes Mellitus

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Chaicharn Deerochanawong, Thanya Chetthakul, Petch Rawdaree,
Sirinate Kritiyawong, Yupin Benjasuratwong, Pongamorn Bunnag,
Chardpraorn Ngarmukos, Natapong Kosachunhanun, Nattachet Plengvidhya,
Rattana Reelawattana, Thongchai Prathipanawatr, Chulaluk Komoltri,
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Background and aims: *Diabetes has become a major health issue in most countries around the world, including Thailand. Childhood and adolescents onset of diabetes has been recognized as a low incidence in our country. An inadequate awareness and lack of expertise among health care professionals may impact on local management approaches and influence standard of care. Therefore, we aim to identify the diabetic patients who diagnosed at age of onset less than 18 year for an etiology, age at diagnosed , duration of disease, family history, glycemic control and microvascular complications.*

Material and methods: *A cross-sectional, multicenter registry of 9419 diabetic patients in 11 tertiary care hospitals and medical schools across country were conducted from April to December 2003. Individual demographic data, Laboratory results and complications were recorded in the database.*

Results: *There were total 250 out of 9419 (2.66%) diabetic patients who were diagnosed before age of 18 years. The etiology of diabetes included T1DM (78%), T2DM (18.4 %) and other type (3.6%). Fifty-eight percents were taken care by pediatric endocrinologists and the rest of 42 % by adult endocrinologists. The age at diagnosed, duration, family history and glycemic control were shown in the table below.*

	Type 1	Type 2	Other type
No (%)	195 (78%)	46 (18.4%)	9 (3.6%)
Age at entry (yr)	15.3(1.6-44.8)	22.1(11-62)	15.2(13.6-47)
Age at diagnosis(yr)	9.9 (0.2-18)	13.1(8-18)	12.1 (5.2-17.8)
Duration of disease (yr)	5 (0.05-35)	6.7(0.05-46)	3.6(0.3-29.3)
Mean HbA1C(%)	9.3 ± 2.5	9.7 ± 2.6	8.6 ± 4
Family History(%)	44/ 195 (22.56%)	23/46 (50%)	3/9 (33.3 %)

In T1DM, the percentage of subjects not screening for nephropathys retinopathies and peripheral neuropathys were 70.3 % and 14.4 % , and in T2DM were 52.2 % and 10.9 % respectively. However the prevalence of retinopathys and nephropathys in T1DM in this study group had statistically significant increased after 10 years of diagnosed and also had statistically significant increased in T2 DM of this study group after 15 years of diagnosed, but not in other parameters.

Conclusion: *Childhood and adolescents onset of diabetes in Thai population was counted to 2.66% comparing with to adult diabetes and the prevalence of T2DM diabetes is as high as 18.4%. The majority had unsatisfactory glycemic control and insufficient of microvascular complications screening, especially nephropathies. The real concern for the management of this disease need to be evaluated.*

Full text. e-Journal: *http://www.medassocthai.org/journal*

PP 31

TDR*4: Prevalence and Risk Factors Associated with Lower Limp Amputation in Thai Diabetes

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Petch Rawdaree, Gobchai Puavilai, Natapong Kosachunhanun,
Wannee Nitiyanant, Sathit Vannasaeng, Nattachet Plengvidhya,
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Background and Aims. *Diabetes increases the risk of foot ulcer and lower-extremity amputation which account for considerable morbidity, mortality and health care expenditures. Preventive strategies should be applied to the high risk subjects. The objective of the study is to determine the prevalence and risk factors associated with foot amputation in Thai diabetes.*

Material and Methods. *A cross-sectional, multicenter, hospital-based diabetic registry were carried out from April to December 2003. Baseline characteristics and risk factors for amputation were analysed from 9,419 diabetic patients. Peripheral vascular disease was defined as absent or diminished DP and PT on palpation to palpation in the same limb.*

Results. *The prevalence of foot amputation was 1.5%(142 cases). Most of patients with foot amputation were type 2 diabetes(95.8%). Mean diabetes duration was 16 $\pm$ 8.9 years. There were 123 of 556 (22.1%)patients with history of foot ulcer undergone foot amputation. The following characteristics were significantly associated with foot amputation: age, education, duration of diabetes, peripheral vascular disease, systolic blood pressure and HDL-cholesterol. Univariate associations of risk factors(odd ratio,[95% confidence interval],p value) revealed higher risk of amputation in patients with age more than 50 years(2,[1.2-3.4],0.001), level of education under master degree (6,[3.0-12.2],<0.001),duration of diabetes which increased with 10-14.9 years(2.8,[1.3-5.3]<0.001),15-19 years(6.7,[3.6-12.5],<0.001) and > 20 years(6.6,[3.6-12.4],<0.001), peripheral vascular disease(19.2,[13.5-27.3],<0.001), systolic blood pressure higher than 140 mmHg (1.6,[1.2-3.2],<0.001) and HDL-cholesterol level less than 35 mg/dL in male and less than 40 mg/dL in female (2,[1.4-3.2],< 0.001)*

Conclusion. *Patients at risk for foot amputation had higher age, lower level of education, longer duration of diabetes, peripheral vascular disease, higher systolic blood pressure and lower HDL-cholesterol. Preventive strategies should be considered in these groups of patients. However, interpretation of data have many limitations such as a few number of patients with amputation and lacking data of neuropathy which is a very significant risk factor for foot amputation.*

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PP 32

Macrovascular Risk Aggravated in the Chinese Patients with Diabetes - A Survey on the Diabetic Complications and Related Risk Factors in the 4845 Diabetic Patients

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Background and Aims. *To investigate the prevalence of the chronic diabetic complications and the relative risk factors change before and after 97 - diagnostic criteria of diabetes approved.*
Materials and Methods. *4845 diabetic patients finished the complication assessment were analyzed for the changes of the micro- and macrovascular risk factors. All these patients were checked for body weight, BMI, waist circumference, waist hip ratio, blood pressure, ECG, retinopathy, neuropathy, albuminuria, peripheral artery pulse, fasting and post-meal blood glucose, insulin, HbAlc, lipids and renal function, based on the multidisciplinary team. Diet and hypoglycemic treatment were also investigated. The patients were divided into two groups according the time their complications screening, Group A (1993 - 1997)and Group B (1998-2003).*
Results. *The age for 90% of these patients were 40 yrs and over. The fasting and post-meal blood glucose was over 10 mmol/l, 13 mmol/L and HbA1c over 8.5% in 35.1%050.8% and 60.5% of these patients. The hypoglycemic treatment compliance was poor in one forth of them, including 17.5% uncontrolled their diet. 12.4% were treated with insulin. There were 31.9%, 11.1%, 26.3%, 2%, 54.5% patients with ischemic heart disease, cerebral vascular disease, unpalpable the dorsalis pedis pulse and/or posterior tibial pulse, gangrene, hypertension. There were significant differences in retinopathy, postural hypertension, tachycardia (heart rate over 90/min), nephropathy (including microalbuminuria), high creatinine level (over 133 umol/L) in the Group A and Group B (32.6% vs.21.6%; 22.9% vs.7.8%; 20.4% vs.17.3%; 28% vs.25%; 3% vs.1.5%).Blood pressure (137 + 26/75 + 13 vs. 132 + 20/132 + 20 mmHg) and the waist circumference (86.6 + 9.7 and 88.3 + 9.8 cm) were significantly different in Group A and Group B. The percentage of the patients with central obesity (waist circumference > 80 cm for female and >85 cm for male) and with BMI over 28 kg/m2 changed from 58.1%(female), 60.8%(male) and 18% from Group A to 72.5%, 70.1% and 26% from Group B, respectively. HbA1c level was lower in the Group B than Group A (9.0 + 2.4% vs. 8.4 + 2.3%; p< 0.000).*
Conclusion. *Macrovascular risk aggravated in the Chinese patients with diabetes — a survey on the diabetic complications and related risk factors in the 4845 diabetic patients*

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PP 33

Non-Traditional Cardiovascular Risk Factors are Significant Predictors of Microvascular and Macrovascular Complications in Diabetes Mellitus

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Background and Aims. *The relationship between non-traditional cardiovascular risk factors like homocysteine & hsCRP and coronary artery disease has been well studied in diabetes mellitus (DM). However their association with microvascular complications is less well established. Aims: To study the associations of homocysteine and hsCRP as well as endothelial adhesion molecule ICAM-1 with microvascular and macrovascular complications in type 2 DM.*

Materials and Methods. *We conducted a cross-sectional study of patients having a comprehensive yearly assessment of DM complications, in the diabetes center of our institution from September 2004 till June 2005. The assessment included clinical and biochemical studies. Albuminuria was assessed by urine albumin-creatinine ratio. Retinopathy was detected by fundal photography. Neuropathy was assessed by monofilament and neurothesiometer measurements . Peripheral Artetial Disease (PAD) was diagnosed if ankle-brachial index was < 0.9. Ischemic heart disease and cerebrovascular disease were noted based on history. Fasting blood was taken in 124 patients who consented for blood tests and analysis was done for ICAM, hsCRP and homocysteine apart from fasting lipids, glucose and HBA1C.*

Results. *238 patients were assessed. There were 98 female and 140 male patients. 180 patients were Chinese (75.2%), 23 were Indians (9.7%) and 30 Malays (12.6%). Mean age was 58.2 +/- 14.5 years. Mean duration of diabetes was 10.19 +/- 8.75 years. Mean BMI was 26.08 +/- 4.33 kg/m2, mean HBA1C was 8.31+/-1.67%, mean LDL cholesterol 2.67+/-0.79 mM/L, and mean ACR was 145+/-379.2 mg/mg . Mean hsCRP was 0.43 +/ -1.04 mg/dL , mean homocysteine 14.40 +/- 6.78 mmol/L and mean ICAM levels 356.58 +/- 127.11 ng/ml. 108 patients (45 %) had microvascular complications and 28 patients (11.7%) had macrovascular complications . Compared to those patients without macrovascular disease, those with macrovascular disease had higher hsCRP (0.55 vs 0.30 p=0.019), and higher homocysteine (20.30 vs 13.20 p< 0.001) , but insignificantly higher ICAM levels . (364.39 vs 339.23 p=0.574) . Patients with microvascular complications had statistically significant higher homocysteine (15.06 vs 12.34 p=0.044) compared to those without these complications . However those with microvascular complications had higher hsCRP which just failed to reach statistical significance(0.40 vs 0.265 p=0.046) . Even though ICAM levels were higher (362 vs 329 , p=0.201) , it was not statistically significant .*

Conclusion. *Nontraditional cardiovascular risk factor homocysteine was significantly associated with microvascular and macrovascular complications and hsCRP was a predictor of macrovascular diseases . ICAM-1, marker of endothelial dysfunction is not significantly associated with diabetic complications .*

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PP 34

Association between Waist Circumference and Glucose, Lipid Profile and Vascular Complications in Elderly Korean Type 2 Diabetic Patients

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Background and Aims. *Obesity is major determinants of type 2 diabetes in adults and the prevalence of type 2 diabetes is increase with age. With aging there is decrease of body weight and thus decline obesity by criteria of body mass index(BMI) in elderly. So it is unclear whether obesity is as potent factor of elderly type 2 diabetes. There were suggests that central fat distribution(waist circumference) is powerful predictor of adult diabetes. For examine the influence of central obesity on diabetes in elderly patients, a careful appraisal of body composition should be made, taking into account not simply body weight as reflective of obesity but also consideration of waist circumference or waist hip ratio(WHR), as abdominal obesity. The aim of this study was to compare elderly diabetic patient's body fat composition with middle-aged patients and investigate the association between BMI, waist circumference, WHR, and % body fat in elderly diabetic patients and evaluate the role of central obesity to glucose and lipid metabolism and vascular complications in elderly Korean type 2 diabetic patients.*

Materials and Methods. *We difined elderly patients are over than 65 years old and who waist circumference is over than 90 cm in men and 80 cm in women were obesity. Lean body mass and % body fat were measured in a bioimpedance analysis using DSM(Direct Segmental Measurement by 8-point electrode) method (InBody 3.0, Biospace, Seoul, Korea) in two hundred five type 2 diabetes. We measured patient's height, weight, BMI, waist circumference, WHR and blood pressure. Laboratory parameters such as fasting blood glucose, HbA1c and lipid profile were included in this study.*

Results. *In 95 elderly diabetic patients, compare with middle-aged diabtic patients, has similar BMI but increased waist circumference($p<0.002$), WHR($p<0.001$), and decreased lean body mass($p<0.001$). In pearson corrleations, waist circumference was corrleated with BMI($r=0.927$, $p<0.001$), WHR($r=0.851$, $p<0.001$), % body fat($r=0.519$, $p<0.001$), total cholesterol($r=0.255$, $p<0.013$), triglyceride($r=0.365$, $p<0.001$), and LDL-cholesterol($r=0.271$, $p<0.012$) in elderly diabetic patients. In obese elderly diabetic patients has increased tirglyceride($p<0.007$), and LDL-cholesterol($p<0.038$), and more coronary artery disease($p<0.004$) compare with lean elderly patients.*

Conclusion. *In elderly type 2 diabetic patients are more central obesity even though same weight compare with middle-aged patients, and waist circumference was highly correlated with body fat composition and lipid profile. In obese elderly patients have abnormal lipid profile and more cardiovascular disease. In elderly Korean type 2 diabetics, waist circumference has relates lipid abnormality and vascular complication development.*

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PP 35

Analysis of the Body Mass Index of the Newly Diagnosed Type 2 Diabetic Patients and Its Temporal Trends in South Korea

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Background and Aims. *Asian, including Korean, type 2 diabetic patients have been characterized as non-obese, different from Caucasian subjects. The criteria for the diagnosis of obesity became different between Asian and Western populations. This study was performed to know the percentage of obese type 2 diabetic patients based on Asian criteria and to compare it with the Caucasian data.*
Materials and Methods. *Our study subjects were the newly diagnosed type 2 diabetic patients visited Maryknoll General Hospital at the year of 1991, 1996 and 2001. The maximum BMIs (Body Mass Index) were calculated from the heaviest life-time body weight, and the current BMIs from the values obtained at their first visit to our institution. Obesity was defined as the body mass index greater than 25kg/m2.*
Results. *The numbers of the study subjects were 157 in the year of 1991, 176 in 1996 and 275 in 2001, respectively. The mean values of the maximum BMIs were not significantly different among the year of 1991, 1996 and 2001. The mean values of current BMIs were also not significantly different. The percentages of obesity based on their life-time maximum BMI in type 2 diabetic patients in 1991, 1996 and 2001 were 64.3%, 69.0% and 66.9%, respectively. The percentages of the obese type 2 diabetic patients with their current BMIs were 31.8%, 39.8% and 43.6% in 1991, 1996 and 2001, respectively. And these values showed statistically significant increases over time (p= 0.016).*
Conclusion. *The percentage of the obesity in type 2 diabetic patients at the time of life-time maximum body weight was 60-70%, but the percentage at the time of diagnosis decreased to 30-40%. The percentages of obese type 2 diabetic patients at the time of diagnosis significantly increased during the past 10 years. The mean value of BMI of Korean type 2 diabetic patients was lower than Caucasians, but the percentages of the obese type 2 diabetic patients in Korean and Caucasian, and the temporal trends were strikingly similar. These data showed that the Korean type 2 diabetic patients are as obese as Caucasians, when they meet their own diagnostic criteria for obesity.*

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PP 36

Prevalence and Risk Factors of Diabetes Mellitus and IGT in Major β Thalassemia Patients

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Background and Aims. *Thalassemia is the most prevalent genetic disorder in Iran and all over the world. Frequent transfusions improves the general well being, but carry the risk of Iron intoxication in these patients. Diabetes mellitus is a ferquent complication.*

Materials and methods. *A total of 195 major β thalassemia patients refferd to Ahvaz University thalassemia research center were prospectively evaluated for the prevalence of diabetes mellitus and impaired glucose tolerance and their risk factors. A questionery include: Age, sex, duration and regularity of chelation therapy and liver and spleen size ,were filled out for each patients. Serum fasting blood glucose level, oral GTT test, plasma ferritin level and liver function tests were assessed in each patients.*

Results. *The prevalence of impaired glucose tolerance was 19% (37 of 195 patients) and that of diabetes was 16.4% (32 of 195). Studied patients were 97 female and 98 male. Mean age was 14.9 ± 6.07 years (age rang was 5 to 36 years). IGT began from 7 years and peaked in 14-16 year, diabetes began from 14 years and peak prevalence was between 17 to 24 years.*

The predisposing factors for IGT and diabetes found in transfusion dependent β thalassemia patients, were serum ferritin cencentration ($P<0.04$), family history of diabetes mellitus ($P<0.05$), duration and regularity of chelation therapy ($P<0.002$, $P<0.005$ respectively), high liver enzymes ($P<0.05$) and hepatospelenomegalia ($P= 0.000$).

Conclusion. *IGT and diabetes have a relatively high prevelance (19 and 16.4% respectively)in studied population. Early and regular chelation therapy reduces the body Iron burdon and helps protect against IGT and diabetes mellitus. Regular blood glucos evaluation recommended in patients with major β thallassemia after seven years.*

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PP 37

Dietary Habits, Nutrient Intake in Patients with Newly Diagnosed Korean Type 2 Diabetes

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Background and Aims. *The objective of this study was to investigate dietary habits and nutrient intake in patients with newly diagnosed Korean type 2 diabetics.*
Materials and Methods.257 subjects were enrolled from Eulji diabetes center from August 2003 to December 2004 and interviewed about dietary behaviors such as meal regularity, skipped meals, frequency and amount of snack, smoking and alcohol. Also, we assessed total daily nutrient intakes by 24-hour dietary using a computerized dietary analysis program.
Results. *In patients with newly diagnosed type 2 diabetes, 32.1% skipped meal and 45.9 % had irregular meal time (01 hour difference). Also, the frequency of them was negative correlated with ages (P00.01). 65% of male diabetic patient had been drunk at least a time per week. Frequency of alcohol drinking was positively correlated with skipping meals(P00.01) and higher amount smoke(P00.01). Mean dietary intake of calories were higher (120±13%) than that of calories prescribed for type 2 diabetes. These findings are a cause of increased dinner calorie intake (33.6%) and snack calorie intake (13.2%). Calories of carbohydrate, protein and fat ratio was 61:18:21, respectively. Male diabetic patients had higher protein intake ratio, but female had higher carbohydrate intake ratio(p00.05).*
Conclusion. *These data show that more than 45% of patients with newly diagnosed type 2 diabetics had irregular meal. Also, higher dinner intake and snack intake ratio induce overeating. Therefore, designing intensive diabetes education should be considered for newly diagnosed type 2 diabetic patients.*

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PP 38

Cardiovascular Risk-Related Markers in Diabetes with Different Duration or Retinopathy

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Background and Aims. *Increased cardiovascular disease is the major risk to cause morbidity and mortality in the complication of diabetes mellitus. Cardiovascular risk-related markers in type 2 diabetes mellitus with different diabetic duration or diabetic retinopathy have not well understood.*
Materials and Methods. *Serum and urine samples for biochemical and immunology analysis were collected from 204 normal subjects and 257 type II diabetes mellitus patients, the latter of which were further classified by diabetic duration or with or without retinopathy.*
Results.Glycosylated hemoglobin A1c, triglyceride, lipase, free fatty acid, albumin creatinine ratio, lactate dedrogenase, high sensitive C-reactive protein, and homocysteine were significantly increased but high density lipoprotein cholesterol and bilirubin were significantly decreased in diabetes mellitus, compared with normal subjects. Lactate dedrogenase in diabetes mellitus patients with duration longer than 20 years and homocysteine in patients with duration longer than 10 years was significantly higher than those with duration shorter than 5 years. Homocysteine was significantly increased in diabetes mellitus with retinopathy, compared with diabetes mellitus without retinopathy.
Conclusion.*Homocysteine was the key factor to show the elevation in diabetes mellitus patients with retinopathy and diabetes mellitus with longer than 10 years diabetic duration. Hence, we suggest that the homocysteine can be kept as a predictor and/or prognostic factor of diabetes from complication of cardiovascular diseases.*

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PP 39

Prevalence of Skin Manifestations in Diabetic Patients Reffered to Ahvaz University Diabetes Center

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Diabetes Mellitus is one of the endocrine disorders that invloved many organs in the body. Many of diabetes patients show cutaneous mainifestations. This study is performed to assess the prevelance of different skin manifestations in diabetic patients reffered to Ahvaz Jondishapour University Diabetes Center

Material and Methods. *All diabetic patients (type 1 and type 2) refferd to our diabetes center since 2003 to 2004 enrrold in this study. A questionery include: age, sex, type of diabetes, duration of disease, antidiabetic medication and last HbA1C, was filled out for each patient. Careful physical examination for detection of skin disorders was done in each patient. Hematologic, serologic, culture and biopsy of skin were performed when it were nessesery.*

Results. *One hundred patients (70 femals & 30 males) enrolled in this study. Mean age was 51 years (age range between 9 to 80 year). Duration of diabetes was between one month to 30 years (mean duration 8 year). 83 patients had type 2 & 17 patients type 1 diabetes mellitus. 92% of patients had at least one skin manifestation. The most common skin manifestations were: skin dryness 60%, hiar loss 56% proritus 46% diabetic neuropathy (24%), diabetic dermopathy (22%), acrocordon (22%), fungal infections(22%), bacterial infections (7%), nail changes (13%), accantosis nigricans in (6%), xantoma (4%), diabetic bulla (3%), skin thickening (3%) viteligo (7%), robeosis (2%) and necrobiosis lipoidica in 1% of patients.*

No any casses of anular graneloma and perforating disease and cutaneous advers reactions of oral hypoghycemic agent were seen. Lipoathrophyia in site of insulin injection was detected in 2 of 18 patients used insulin. There were no significant correlation between type of diabetes and HbA1C, and skin manifestations.

Conclusin*. skin manifestations had high prevalence in studied group. Skin examination is recommended in fallow up visits of diabetic patients.*

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PP 40

TDR* 7: Prevalence and Characteristics of Patients with Diabetic Nephropathy

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Nattachet Plengvidhya, Supawadee Likitmaskul, Chaicharn Deerochanawong,
Sompongse Suwanwalaikorn, Sutipong Wacharasindu, Thongchai Prathipanawatr,
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Background and aims. *Diabetic nephropathy (DN) is a serious complication of diabetes associated with increased morbidity and mortality. The spectrum of this complication ranges from the presence of microalbuminuria to overt nephropathy and ultimately end-stage renal disease. Current evidence suggest that aggressive intervention in the early stage can prevent or delay progression of DN. The objective of this study is to identify the prevalence, associated factors and characteristic of patients with DN in our registry.*
Material and methods. *A cross-sectional, multicenter, hospital-based diabetic registry was carried out from April to December 2003. Diabetic patients in diabetic clinics of 11 tertiary centers were registered. Diabetic nephropathy was defined as the presence of at least two out of three positive microalbuminuria (urine albumin to creatinine ratio between 30-300 mg/g), positive dipstick proteinuria or creatinine levels equal or greater than 2 mg/dl. One center which did not perform urine microalbumin measurement was excluded from analysis.*
Results. *The total number of subjects available of analyses was 4,875 (1764 males and 3,111 females). The prevalence of diabetic nephropathy was 41% (microalbuminuria 19.7% and overt nephropathy 21.3%). The number of patients who had renal insufficiency (serum creatinine $\geq$ 2 mg/dl) and end-stage renal disease requiring renal replacement therapy was 373 (7.65%) and 24 (0.49%) respectively. By multivariate analysis, factors associated with diabetic nephropathy were age, duration of diabetes, male sex, smoking, systolic blood pressure, HbA1c, dyslipidemia (hypercholesterolemia, hypertriglyceridemia and low HDL-C) and the presence of diabetic retinopathy. Nearly half (47%) of patients with nephropathy also had diabetic retinopathy. Prevalence of ischemic heart disease and cerebrovascular disease in patients who had nephropathy was 11.5% and 6.6% respectively. Mean HbA1c (SD) in patients with nephropathy was 8.2 (2.6)%. Only 25% of patients had HbA1c of less than 7%. Sixty-four percent of patients had blood pressure of $\geq$140/90 mmHg. Eighty-four per cent of patients received at least one antihypertensive drug. However, the target blood pressure of less than 130/80 mmHg could be achieved in only 18% of these patients. The mean (SD) number of antihypertensive drugs was 1.7 (1.1). The percentage of patients who received one, two or at least three antihypertensive drugs was 32.6, 27.5 and 24% respectively. The choice of antihypertensive drugs were ACE inhibitors (43.2%), diuretics (37.3%), calcium channel blockers (35.2%), beta blockers (25.7%), angiotensin receptor blockers (ARBs) (18%) and alpha 1-blockers (6.2%). Nearly 60% of patients received either ACE inhibitors or ARBs while only 1.3% received both ACE inhibitors and ARBs.*
Conclusions*. Diabetic nephropathy was very common in Thai diabetic subjects. Diabetic nephropathy was associated with increasing age, long duration of diabetes, high systolic blood pressure and poor metabolic control. The prevalence of hypertension was very high in these patients. Although antihypertensive drugs was prescribed in most patients, target blood pressure could be achieved in very few of them. 60% of our patients received either ACE inhibitors or ARB. The overall picture of diabetic nephropathy in this survey suggests the seriousness of the problem and prompts aggressive intervention to reduce the overall morbidity and mortality.*

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PP 41

Correlation of Impairment of Erythrocyte Deformability with Diaetic Nephropathy

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Background and Aims. *Reduced deformability of red blood cells (RBCs) may play an important role on the pathogenesis of chronic vascular complications of diabetes mellitus. However, available techniques for measuring RBC deformability often require washing process after each measurement, which is not optimal for day-to-day clinical use at point of care. The objectives of the present study are to develop a device and to delineate the correlation of impaired RBC deformability with diabetic nephropathy.*

Materials and Methods. *We developed a disposable ektacytometry to measure RBC deformability, which adopted a laser diffraction technique and slit rheometry. The essential features of this design are its simplicity (ease of operation and no moving parts) and a disposable element which is in contact with the blood sample. We studied adult diabetic patients divided into three groups according to diabetic complications. Group I comprised 57 diabetic patients with normal renal function. Group II comprised 26 diabetic patients with chronic renal failure (CRF). Group III consisted of 30 diabetic subjects with end-stage renal disease (ESRD) on hemodialysis. According to the renal function for the diabetic groups, matched non-diabetic groups were served as control.*

Results. *We found substantially impaired red blood cell deformability in those with normal renal function (group I) compared to non-diabetic control (P = 0.0005). As renal function decreases, an increased impairment in RBC deformability was found. Diabetic patients with chronic renal failure (group II) when compared to non-diabetic controls (CRF) had an apparently greater impairment in RBC deformability (P = 0.07). The non-diabetic cohort (CRF), on the other hand, manifested significant impairment in red blood cell deformability compared to healthy control (P = 0.0001).*

Conclusion. *The newly developed slit ektacytometer can measure the RBC deformability with ease and accuracy. In addition, progressive impairment in cell deformability is associated with renal function loss in all patients regardless of the presence or absence of diabetes. In diabetic patients, early impairment in RBC deformability appears in patients with normal renal function.*

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PP 42

Risk Factors for the Development of Diabetic Nephropathy in Japanese Type 2 Diabetic Patient: A Seven-Year Retrospective Study

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Background and Aims. *The purpose of this retrospective study was to investigate the risk factors for the development of diabetic nephropathy in type 2 diabetic patients.*
Materials and Methods. *A sixty-seven type 2 diabetic patients (aged 40-72) were examined over a seven-year period to evaluate the risk factors leading to development to persistent proteinuria. Blood pressure, HbA1c levels, serum levels of creatinine (s-Cr), total cholesterol (TC), and triglycerides (TG) were measured over a seven-year period.*
Results. *Twenty-four of 67 patients developed persistent proteinuria during the period of the study. Among the factors at the first visit, significant correlations were observed between the development of persistent proteinuria and mean systolic blood pressure (SBP) ($p<0.001$), mean diastolic blood pressure (DBP) ($p<0.001$), mean HbA1c ($p<0.02$). No significant correlation was found with the mean s-Cr, mean TC, and mean TG levels. To evaluate the role of blood pressure, patient with first-year SBP above 135 mmHg was compared to those of patients with that below 135 mmHg. Eleven of 30 patients developed to persistent proteinuria in the patient with a first-year SBP above 135 mmHg. This value was significantly higher ($p<0.001$) than that of the patients with a first-year SBP below 135 mmHg. Furthermore, patient with first-year DBP above 80 mmHg was compared to those of patients with that below 80 mmHg. Seventeen of 28 patients developed to persistent proteinuria in the patient with a first-year DBP above 80 mmHg. This value was significantly higher ($p<0.001$) than that of the patients with a first-year DBP below 80 mmHg. To evaluate the role of glycemic control, patient with first-year HbA1c levels above 6.5% was compared to those of patients with that below 6.5%. Fourteen of 30 patients with a first-year HbA1c levels above 6.5% developed to persistent proteinuria. This value was significantly higher ($p<0.001$) than that of the patients with a first-year HbA1c levels below 6.5%.*
Conclusion. *Our study demonstrated that the importance of blood pressure and glycemic control as risk factors for persistent proteinuria in type 2 diabetic patients. Moreover, we found that the SBP, DBP, and HbA1c levels at the first-year also influenced the development of persistent proteinuria during the next several years.*

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PP 43

Is Urinary Alpha Glutathione S-Transferase a Useful Marker for Monitoring of Angiotensin Converting Enzyme Inhibitor or Angiotensin Type 2 Receptor Blocker Treatment in Diabetic Nephropathy?

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Background and Aims. *Glutathione S-transferase (GST) is confirmed in renal proximal and distal tubules in human kidney. Damage of these parts of nephron result in leakage of the GST into urine. We previously reported that quantitative analysis of alpha GST in urine could be useful marker for monitoring proximal tubular injury cause of diabetic nephropathy, and that low-dose of angiotensin converting enzyme inhibitor (ACE-I) or angiotensin type 2 receptor blocker (ARB) can reduce UAE levels in normotensive type 2 diabetic patients with microalbuminuria without exerting a systemic hypotensive effect. In this study, we measured urinary alpha GST in diabetic patients, in order to clarify whether alpha GST can be a useful marker for monitoring of ACE-I or ARB treatment in diabetic nephropathy.*

Materials and Methods. *Fifty-five type 2 diabetic patients with microalbuminuria were selected, and divided randomly into two groups; the ACE-I group received 2 mg/day of temocapril during 12 weeks, while the ARB group received 20 mg/day of termisartan during 12 weeks. Glycemic control, renal function, urinary albumin excretion (UAE), N-acetyl â-D glucosaminidase (NAG), â2-microglobulin (â2-MG), and alpha GST were measured during treatment period.*

Results. *The UAE levels in ACE-I group fell significantly from 134±58 ìg/min to 102±52 ìg/min ($p<0.01$), similarly in ARB group fell significantly from 134±52 ìg/min to 102±42 ìg/min ($p<0.01$). The alpha GST levels in ACE-I group fell significantly from 12.8±4.9 ng/min to 10.3±4.3 ng/min ($p<0.05$), similarly in ARB group fell significantly from 12.6±5.9 ng/min to 9.7±4.8 ng/min ($p<0.05$). The glycemic control, renal function, NAG, and ,2-MG remained unchanged throughout the study.*

Conclusion. *These results suggest that alpha GST could be a useful marker for monitoring of the ACE-I and ARB treatment in type 2 diabetic nephropathy.*

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PP 44

Urinary Alpha Glutathione S-Transferase is an Important Marker of Tubular Injury in Patients with Diabetic Nephropathy

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Background and Aims. *Glutathione S-transferases (GST) are a family of multifunctional enzymes that play an important role in the cellular detoxification and excretion of numerous physiological and xenobiotic substances. GST is confirmed in renal proximal and distal tubules in human kidney. Damage of these parts of nephron should result in leakage of the GST into urine. The present study was undertaken to examine the relationship between levels of urinary alpha glutathione S-transferase (GST) and prognostic stages of type 2 diabetic nephropathy.*

Materials and Methods. *A two hundred-five type 2 diabetic patients (aged 59-79) were studied. The subjects were divided into two groups retrospectively according to the urinary albumin excretion rate as follows: normoalbuminuria (<20 µg/min) and microalbuminuria (20-200 µg/min). Duration of diabetes, blood pressure, body weight, height and knee jerk reflex of all patients were recorded. Timed, quantitative, overnight urine samples were collected and the collection period and volume are recorded. The GST activity was measured by using an enzymatical method. The levels of urinary alpha and pi GST were determined using by enzyme immunoassay (EIA) method.*

Results. *No significant differences were observed in the duration of diabetic mellitus, blood pressure or HbA1c between the two groups, but the age, and the levels of creatinine clearance (Ccr), N-acetyl â-D glucosaminidase (NAG), â2-microglobulin (â2-MG), GST activity, and alpha GST in patients with microalbuminuria were significantly higher than in patients with normoalbuminuria ($p<0.001$). Pi GST was almost the same in both groups ($p=0.165$). Urinary albumin excretion (UAE), NAG, and â2-MG in urine showed correlated with GST activity and alpha GST in urine. Blood pressure showed correlated with NAG and â2-MG in urine but not with correlation with GST activity or alpha GST in urine.*

Conclusion. *The results indicated that quantitative analysis of alpha glutathione S-transferase in urine could be a useful marker for monitoring proximal tubular injury cause of diabetic nephropathy.*

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PP 45

Long Term Prospective Follow up Experience from a Muli-Disciplinary Diabetic Nephropathy Clinic (DNC)

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Background and Aims. *Diabetic nephropathy (DN) is a leading cause of end stage renal disease. We report on the 18 month follow-up experience of a Kidney Disease Outcomes Quality Initiative (K/DOQI) recommendations guided multi-disciplinary DNC for patients with moderately advanced renal impairment.*
Materials and Methods. *In a joint nephrologist-endocrinologist clinic, we aim to retard the progression of DN with intensive patient education (led by allied health personnel), metabolic and blood pressure control. General linear model with repeated measurements was employed in the analysis.*
Results. *There are 302 subjects seen in the DNC from December 2001 to June 2005, of which 118 completed 18 months follow-up. 52% were males; 78% Chinese, 18% Malays and 3 % Indians. Mean (SD) age was 62(12) years, duration of diabetes 14(9) years and BMI 28.0(5.4) kg/m2. At baseline, these subjects had moderately advanced DN with 24-hour urine total protein and calculated glomerular filtration rate (GFR) using abbreviated MDRD formula, of 1.93(2.29) g/day and 45.8(26.6) ml/min/1.73 m2 respectively. Serial changes in parameters at baseline, 6, 12 and 18 months are as follows: Systolic blood pressure (BP) (mmHg) - 155(25), 150(19), 144(21) and 143(18) (P<0.001); diastolic BP (mmHg) 84(12), 81(11), 77(11) and 77(9) (P<0.001); HBA1c(%) 8.1(1.8), 8.2(2.0), 8.0(1.6) and 8.0(1.6) (P=0.615); serum potassium (mmol/L) 4.5(0.6), 4.7(0.5), 4.7(0.7) and 4.7(0.6) (P=0.052); number of anti-hypertensives 1.9(1.1), 2.3(1.2), 2.4(1.3) and 2.6(1.3) (P<0.001) respectively. There was a reduction in the albumin creatinine ratio (ACR) (mg/g) at 18 months compared to the value at baseline - 1039(1304) and 1861(1792) respectively, P=0.015. There was a continual decline in GFR in the initial six months – 45.8(26.6) to 40.8(21.1) ml/min/1.73m2 , P<0.001). However, further decline in GFR in the 6th, 12th and 18th month appears to have been retarded- 40.8(21.1), 40.4(29.4) and 38.4(28.8), P=0.176.*
Conclusion. *There is a reduction in the ACR in this cohort of patients with moderately advanced diabetic nephropathy followed up in a diabetic nephropathy clinic for 18 months. This is accompanied by a retardation in the progression of DN after the initial 6 months.*

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Effct of Some Calcium Chanels Blockers in Expaerimentally Induced Diabetic Nephropathy in Rats

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Background and Aims. *Diabetic nephropathy (DNP) is considered a CRD (Chronic Renal Disease); it is a major cause of illness and premature death in people with DM. Furthermore, it is considered the single most important cause of end stage renal disease in the western world and accounts for more than a quarter of all end stage renal diseases. The present study was designed to illustrate the role of CCBs (amlodipine and diltiazem) in prevention and treatment of DNP in rats.*

Materials and Methods. *Eighty male albino rats weighing (130-180gm) were used in this study. These animals were subdivided into five equal groups. Insulinopenic diabetes was induced by STZ, two weeks later, 30 minutes of complete ischaemia was induced in the left kidney to induce diabetic nephropathy then treatment was started for 12 weeks. At the end of experiment urine samples and blood samples were taken for biochemical analysis and kidneys were taken after scarification for histopathological evaluation.*

Results. *Combination of renal ischaemia with DM produced a significant increase in rat weight, rat kidney weight, BUN (Blood Urea Nitrogen) level, K/B (Kidney/Body weight) ratio, random blood glucose, 24 hrs urine proteins, and 24 hrs urine volumes and creatinine clearance. Treatment with diltiazem or amlodipine significantly lowered elevated SBP and elevated 24 hrs urine volumes. Furthermore, treatment with captopril produced a highly significant lowering of elevated SBP and elevated serum creatinine; and a significant reduction in elevated K/B ratio and proteinuria. Light microscopic examination of diabetic kidneys revealed glomerulopathy characterized by thickening of the glomerular basement membrane, mesangial matrix expansion, arteriolar hyalinosis and large proteinaceous deposits occluding some capillary loops and hyaline droplets within the glomeruli. Moreover, examination of kidneys of ischaemic animals by light microscope revealed focal tubular necrosis at multiple points along the nephron, interstitial edema and accumulation of leucocytes within dilated vasa recta*

Conclusion. *It can be concluded that, renal ischaemia hasten the progression of DNP, diltiazem and amlodipine have a tendency to reverse of changed parameters toward normal values except biochemical parameters, generally speaking, diltiazem is better than amlodipine in reversing biochemical and histopathological changes produced by DNP, and captopril reversed most of changed parameters except histopathological changes.*

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Association with Color Change Indicator (Neurocheck®) and Ewing Method in the Assessment of Diabetic Autonomic Neuropathy

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Background and Aims. *Diabetic autonomic neuropathy(DAN) was significant negative impact on survival and quality of life in diabetes patients and may affect the cardiovascular, gastrointestinal, genitourinary and autonomic sudomotor function. Diagnostic approach of DAN was mainly held Ewing method as gold standard but clinically was not reliable because of poor patient compliance, economic burden, time consumption, small limited medical worker difficulty and technically accuracy. The aim of the present study was to evaluate the association with the new indicator test for autonomic sudomotor neuropathy(NEUROCHECK®) and Ewing method for assessment of DAN.*

Materials and Methods. *This study included 55 type 2 DM with mean age of 54.4±12.8 years, mean diabetes duration of 8.9±7.0 years and mean HbA1c of 8.9±2.2 %. The presence of DAN was diagnosed by Ewing method. For evaluation of autonomic sudomotor neruropathy, NEUROCHECK® was applied on the on the foot sole, in the area corresponding to the head of the first or second metatarsal bone and we assessed the color change of cobalt II salt plaster(blue color shift to pink color) after 10 minutes to all patients(pink color: normal, blue color: positive).*

Results. *Of 55 patients we investigated, 16 patients were proven to have DAN by Ewing method(29.1%). Autonomic sudomotor neuropathy by NEUROCHECK® was diagnosed in 12 patients(75%) with DAN and in 13 patients(33.3%) without DAN($p<0.01$). The overall measure of agreement between NEUROCHECK® and Ewing method was 0.357($p<0.01$). The sensitivity of NEUROCHECK® for assessment of DAN was 75% and specificity was 66.7%. The measure of agreement in men was 0.339($p=0.02$) and in the women it was 0.414($p=0.03$). The sensitivity of NEUROCHECK® was higher in men (100%) than in women (63.6%).*

Conclusion. *NEUROCHECK® is safe, easy-to-use and reproducible method, but the overall measure of agreement between NEUROCHECK® and Ewing method was somewhat low. Therefore, NEUROCHECK® may use as a adjunctive tool for assessment of DAN.*

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PP 48

Cardiovascular Autonomic Neuropathy in Korean Type 2 Diabetic Patients

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Background and Aims. *Diabetic autonomic neuropathy has a significant negative impact on survival and quality of life in type 2 diabetic patients. Especially cardiovascular autonomic neuropathy (CAN) is clinically important, because of its correlation with cardiovascular death. Therefore, we investigated the prevalence of CAN in Korean type 2 diabetic patients.*

Materials and Methods. *861 type 2 diabetic patients, 347 males and 514 females, visited Diabetes Clinic at St. Vincent Hospital, Suwon, Korea, were included from Jan 2001 to June 2005. Clinical evaluation, laboratory test and assessment of diabetic complication were completed. Standard test for CAN were performed: 1) heart rate variability (HRV) during deep breathing 2) valsalva maneuver 3) 30:15 ratio 4) blood pressure response to standing. CAN score was determined according to the results of the test as following: 0=normal, 1=borderline, 2=abnormal. A score of 0-1, 2-3 or 4-6 was considered as normal, early CAN or definite CAN, respectively.*

Results. *Mean age and diabetic duration of the patients were 56.9 ± 10.0, and 10.4 ± 9.1 years. Normal, early, and definite CAN were detected in 49.5%, 32.8%, and 17.7% of the patients, respectively. Abnormal deep breathing, valsalva, or 30:15 ratio were found in 42 (6.58%), 237 (27.7%), or 108 (14.4%) patients, respectively. BMI, diabetic duration, postprandial hyperglycemia, and HbA1c level were not different among normal, early and definite CAN groups. However, 24 hr urinary albumin excretion rate was significantly increased in early and definite CAN group (normal: 68.6, early: 204.2, definite: 509.4 mg/min, $P < 0.005$). 22.7 and 11.2% of patients with CAN showed high prevalence of stroke and ischemic heart disease compared with patients without CAN. In addition, diabetic foot was more frequent in patients with CAN.*

Conclusion. *CAN is frequent in Korean type 2 diabetic patients. It was associated with increased albumin excretion rate and cardiovascular disease.*

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The Usefulness of the Colour Change Plaster for the Diagnosis of Cardiac Autonomic Neuropathy among Type 2 Diabetes

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Background and Aims. *Recently, the colour change plaster(NeuroCheckâ) has been introduced, which measures sweat production on the basis of a colour change from blue to pink. This new test was useful to detect of diabetic peripheral neuropathy. The aim of this study was to evaluate the usefulness of the colour change plaster(NeuroCheckâ) for the diagnosis of cardiac autonomic neuropathy among type 2 diabetic patients.*
Materials and Methods. *This study include 35 type 2 diabetic patients(10 male, 25 female) with a mean age of 55±14.9 years and a mean diabetes duration of 11.8±8.8 years. Cardiac autonomic neuropathy was diagnosed by means of Ewing's method. Peripheral autonomic neuropathy(Sudomotor function abnormality) was assessed by means of time(more than 600 seconds) until complete colour change in the indicator test.*
Results. *Peripheral autonomic neuropathy was diagnosed in 23 patients(65.7%). Time until start colour change of plaster in normal and abnormal sudomotor patients were 38.3±33.7 sec and 367.1±470.3 sec ($p<0.05$). Time until complete colour change of plaster in normal and abnormal sudomotor patients were 372.5±198.8 sec and 1677.4±711.9 sec ($p<0.05$). The autonomic score of two groups were 2.4±2.3, 4.6±2.2 ($p<0.05$) points. Sudomotor abnormal group was older than normal (59.2±11.7 yrs, vs 47±17.4 yrs). Presence of retinopathy was related with sudomotor abnormality. Peripheral autonomic neuropathy was related with parasympathetic cardiac autonomic neuropathy. Sudomotor function abnormality was related with definite cardiac autonomic neuropathy, but it was not related with early cardiac autonomic neuropathy. The sensitivity, specificity, positive predictive value and negative predictive value of colour change plaster in the diagnosis of definite cardiovascular autonomic neuropathy was 86.7%, 62.5%, 68.4% and 83.3%, respectively.*
Conclusion. *The colour change plaster(NeuroCheckâ) is not useful for the early diagnosis of cardiac autonomic neuropathy among type 2 diabetic neuropathy, but it may be some useful for the diagnosis of definite cardiac autonomic neuropathy.*

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PP 50

Effect of 12-Week Oral Treatment with Alpha-Lipoic Acid on the Nerve Conduction Test in Symptomatic Diabetic Neuropathy

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Background and Aims. *Diabetic peripheral neuropathy is multifactorial disorder arising from hyperglycemia and insulin deficiency. It has been suggested that oxidative stress resulting from enhanced free-radical formation and defects in antioxidant defence plays a major role among the putative pathogenic mechanisms of diabetic neuropathy. Because alpha-lipoic acid, a natural antioxidant, has been suggested to improve symptoms of diabetic neuropathy, we assess the efficacy of alpha-lipoic acid on neuropathic symptoms and peripheral nerve conduction in patients with type 2 diabetes mellitus with symptomatic polyneuropathy.*
Materials and Methods. *A cohort of 30 type 2 diabetic patients with symptomatic polyneuropathy received a daily dose of 600 mg alpha-lipoic acid, and was followed for 3 months. Neuropathic symptoms(pain, burning, paraesthesia, and numbness) of feet were scored at monthly interval and summarized as a Total Symptoms Score(TSS). Nerve conduction study was done before and after 3 month treatment of alpha-lipoic acid.*
Results. *Treatment of alpha-lipoic acid given 600 mg per oral for 12 weeks improves the symptoms of diabetic polyneuropathy(TSS: 8.00 ± 2.42 vs 5.02 ± 2.86, $p<0.01$) . Alpha-lipoic acid improves fasting blood glucose(221.17 ± 63.72 vs 192.63 ± 59.92 mg/dL, $p<0.05$) but not HbA1c. Effect on nerve conduction study shows that in the motor nerves, amplitude of medican nerve(8.01 ± 3.3 vs 8.58 ± 3.37 mV, $p<0.05$) and tibial nerve(7.67 ± 4.71 vs 9.25 ± 5.2 mV, $p<0.01$) and velocity of tibial nerve(38.48 ± 4.74 vs 40.50 ± 4.83 m/s, $p<0.01$) improved after 12 weeks treatment. In the sensory nerves, the velocity of median nerve(41.17 ± 8.66 vs 44.43 ± 9.1 m/s, $p<0.01$), ulnar nerve(50.74 ± 6.14 vs 53.81 ± 8.27 m/s, $p<0.01$), and sural nerve(40.09 ± 6.81 vs 41.85 ± 6.18 m/s, $p<0.05$) improved after 12 weeks.*
Conclusion. *Alpha-lipoic acid is effective in the treatment of diabetic polyneuropathy improving both clinical menifestations and nerve conduction study. The improvement of clinical menifestations may be due to improved amplitude of motor nerve fibers and conduction velocity of sensory fibers.*

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Clinical Characteristics and Anlysis of Risk Factor for Gastroesophageal Reflux Disease in Korean Diabetic Patients

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Background and Aims. *The prevalence of gastroesophageal reflux disease (GERD) is highly reported in diabetic patient. However, the exact mechanisms of GERD in diabetic patient have not been described. In several studies, diabetic neuropathy and dysfunction of autonomic nervous system is suggested for the risk factors of GERD. However, there are no study about the exact prevalence or the risk factor of GERD in korean diabetic patient. Therefore, we examined that the prevalence of GERD in korean diabetic patient, the analysis of the risk factor for GERD, the differences of symptoms between GERD patient and non-GERD patient, and the degree of symptom relief after treatment.*

Materials and Methods. *Total 310 diabetic patients were done upper gastroendoscopy from April 2001 to November 2003 due to diverse gastrointestinal symptoms and were enrolled. Diagnostic criteria of GERD included the upper gastroendoscopic view which was analyzed by using the scale of 'The Los Angeles Classification of Esophagus' from grade A to D. Prevalence and symptoms of GERD patient and variable risk factors such as blood glucose level, smoking, and diabetic neuropathy were examined.*

Results. *1) The prevalence of GERD in diabetic patient was 18.4%. 2) Clinical characteristics including sex, age, and serum lipid level of GERD group were not significant compared to control group. However, the duration of smoking, the fasting and postprandial 2-hour serum glucose level, and the diabetic neuropathy were significantly affected to GERD, 3) The main symptoms of GERD group were dyspepsia (47.4%) and heart burn (26.3%), otherwise there were some differences in control group. 4) The degree of subjective symptom relief in GERD group after treatment of proton pump inhibitor, pantoprazole 40mg for about a month was remarkably low than the control group.*

Conclusion. *In this study, the prevalence of GERD in diabetic patient was higher than the general population. This result suggested that GERD in diabetic patient was caused by poorly controlled serum glucose level and diabetic neuropathy. The chief complaints of gastrointestinal symptom in both study group were non-specific. However, the recovery of symptom in GERD group after drug therapy was lower than the control group. It is thought that the causes of low response rate in GERD group might be examined and further study will be needed.*

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Association between C-Reactive Protein and Features of the Metabolic Syndrome in a Rural Population of Malaysia: Preliminary Analysis

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Background and Aims. *C-reactive protein (CRP), a marker of sub-clinical inflammation predicts the occurrence of cardiovascular disease. Several studies have shown a relationship between CRP and components of metabolic syndrome (MS). The purpose of this study is to assess the prevalence and relationship of components of MS with CRP in a subjects residing in a rural community in Malaysia.*

Materials and Methods*. In this cross sectional study, data were collected from 402 men and 560 women. Data on blood pressure, BMI and waist were determined by standard method. Blood specimens were taken for glucose, insulin, and lipid profile, CRP, gamma GT (GGT) and ApoB. CRP was measured by a highly sensitive competitive immunoassay. Insulin resistance was assessed by homeostasis model assessment (HOMA-IR) and MS was defined according by revise 2004 NCEP ATP (III) definition.*

Results. *Prevalence of MS was 48.4% in the population studied and was higher in women (51.8% vs. 43.8%; $P<0.05$). The prevalence increased with age in both sexes (46, 50 and 60% for age groups 31-40, 41-50, and >51 years, respectively, for women and 42, 53 and 58% for men, $P_{trend}<0.05$ for both). Subjects (women and men) with MS had significantly higher GGT, Apo B, CRP, insulin and HOMA-IR those without. There was statistically significant positive crude correlation between CRP and measures of waist circumference, HOMA-IR, fasting insulin, fasting glucose, GGT and apo B (all $R>0.2$, $p<0.001$). A negative correlation was found between CRP and HDL cholesterol ($R=0.28$, $P<0.001$). There was a linear increase in CRP levels with an increase in the number of components of the MS (CRP: 2.4, 3.1, 4.5, 4.7. 5.6 and 6.1 mg/l for those with 0, 1, 2, 3, 4, and 5 features of the MS, respectively; $P_{trend}< 0.001$).*

Conclusion. *CRP levels increased continuously across the spectrum of components of MS. This finding suggests that increasing number of components of the MS is associated with increasing pro-inflammatory status that may contribute to adverse cardiovascular outcome. Thus, measurement of CRP adds clinically important prognostic information to MS in our population.*

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PP 53

Correlation between HS-CRP Levels and Metabolic Syndrome

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Background and Aims. *Metabolic syndrome represents a constellation of risk factors for cardiovascular disease. Previous prospective studies proved that elevated of hs- CRP, a systemic marker for inflammation, is a risk factor for coronary heart disease. The aim of this study is to evaluate the correlation between hs-CRP levels in subjects with metabolic syndrome.*

Materials and Methods. *Subjects were participants of the EIDEG study for the screening of diabetes. For the criteria of metabolic syndrome we used the modified NCEP ATP III for Asian, where abnormal waist circumference for males > 90 cm and females > 80 cm. Blood sample was taken after 12-hour fasting for determination of fasting plasma glucose, triglyceride, HDL-cholesterol, and hs-CRP. Subjects were divided into five groups according to their component of metabolic syndrome, one component (group I), two components (group II), three components (group III), four components (group IV) and five components (group V). Statistical analysis was performed by either one-way ANOVA or chi-square analysis, and conducted with SPSS for Windows 13.0 software (SPSS, Inc.).*

Results. *During the study 135 metabolic syndrome patients were covered. There were 19 subjects in group I, 21 subjects in group II, 51 subjects in group III, 34 subjects in group IV and 10 subjects in group V. We found that there was a significant increased of BMI, waist circumference, systolic blood pressure, fasting plasma glucose, total-cholesterol, LDL-cholesterol, triglycerides and hs-CRP levels, and decreased of HDL-cholesterol levels with the increased number of components of metabolic syndrome ($p<0.05$). There was a significant positively correlation between BMI ($r=0.390$, $p=0.000$), systolic blood pressure ($r=0.593$, $p=0.000$), diastolic blood pressure ($r=0.299$, $p=0.001$), fasting plasma glucose ($r=0.474$, $p=0.000$) and triglycerides ($r=0.506$, $p=0.001$) with hs-CRP levels. And negatively correlation was found between HDL-cholesterol and hs-CRP levels ($r=0.509$ $p=0.000$).*

Conclusion. *We found that there was a significant linear increase in hs-CRP levels as the number of the components of the metabolic syndrome increased. Other coronary heart disease risk factors are also increased as the number of the components of the metabolic syndrome increased.*

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C-Reactive Protein is Associated with Varying Degrees of Glucose Tolerance: Results from a Rural Population in Malaysia

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Background and Aims. *C-reactive protein (CRP), a marker of subclincial inflammation, predicts future risk of diabetes in healthy subjects. Hyperglycaemia is known to stimulate the release of inflammatory cytokines from various cell types and can lead to the induction and secretion of acute-phase reactants by adipocytes. Recently, International Diabetes Federation (IDF) has proposed the use of IFG (fasting glucose > 5.6 mmol/l)/ diabetes as the component of MS. The aim of the present study was to determine the relation between glycaemic status and CRP in subjects residing in a rural community in Malaysia.*

Materials and Methods. *We studied the relationship between of CRP to glucose tolerance and other components of the MS in a population-based cross-sectional study of 402 men and 560 women. Data on blood pressure, BMI and waist were determined by standard methods. Blood specimens were taken for glucose, insulin, and lipid profile, CRP, gamma GT (GGT) and ApoB. CRP was measured by a highly sensitive competitive immunoassay. A standard 75 g OGTT was carried out to determine the glucose tolerance status into; normal glucose tolerance (NGT), impaired fasting glucose (IFG), impaired glucose tolerance (IGT) and diabetes (DM) based on WHO 1999 classification. Insulin resistance was assessed by homeostasis model assessment (HOMA-IR).*

Results. *The glycaemic status of glucose tolerance was 33.9 (NGT), 24.4 (IFG), 20.8 (IGT) and 21.0% (DM). Plasma CRP levels increased continuously from NGT to IFG, IGT and DM (CRP: 3.20 ± 0.21; 4.17 ± 0.32; 4.62± 0.38 and 6.30 ± 0.66, respectively; P trend < 0.001). There was statistically significant positive crude correlation between CRP and measure of waist circumference, HOMA, insulin, 2hr glucose, GGT and apo B (all R > 0.2, p< 0.001). A negative correlation was found between CRP and HDL cholesterol (R = 0.28, P< 0.001). After adjustment by multivariate linear regression, only fasting glucose remained significantly and independently related to CRP levels (R= 0.218, P< 0.05).*

Conclusion. *Fasting glucose was significantly and positively associated with plasma CRP levels. CRP increased continuously across the spectrum of fasting, beginning in the lowest quartile of NGT. This finding suggests that a pro-inflammatory effect may contribute to the adverse cardiovascular outcome associated with glucose tolerance status. Thus, our results support the inclusion of IFG/DM as a risk parameter in the new IDF definition for MS.*

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C-Reactive Protein and Metabolic Disorders-A Cross Section Study in Shangai Communities

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Background and Aims. *Accumulating evidence suggested that inflammatory factors could be partially associated with metabolic syndrome. This study was to research the relationship between serum C-reactive protein(CRP) and metabolic disorders in individuals in Shanghai communities.*
Materials and Methods. *A total of 5502 individuals(men 2379, women 3123) aged over 20 years with complete baseline data on metabolic syndrome(MS) and serum CRP from 1998 to 2001 in two communities of Shanghai were included. Highly sensitive CRP was tested by kinetics nephelometry. Quartiles of concentration of CRP were computed. Hyperglycemia(diabetes or impaired glucose regulation), hypertension, dyslipidemia, central obesity and MS were defined by WHO(1999) working definition of MS. Logistic regression models was used to estimated relation of increasing CRP with the relative risk of metabolic disorders.*
Results. *1) Serum CRP was gradually elevated with the increment of ages in both men and women. 2) Serum CRP was increased with the increment of the components of metabolic disorders. In individuals with MS CRP was higher than in those with 1 or 2components of metabolic disorders. 3) The highest quartile of CRP was 2.11mg/L in men and 2.22mg/L in women. 4) Comparasion with those in the lowest quartile, men in the highest quartile had increased relative risk of hyperglycemia(3.8times),central obesity(5.5times), hypertension(2.8times), hypertriglyceride (1.3times), low high density lipoprotein cholesterol(1.5times) and MS(10 times). Similarly, women in the highest quartile had increased relative risk of hyperglycemia(7.7times), central obesity(12.2times), hypertension(6.1times), hypertriglyceride (5.6times), low high density lipoprotein cholesterol(1.1times) and MS(8.5times).*
Conclusion. *Individuals with elevated serum CRP had higher risk of metabolic disorders including hyperglycemia,. hypertension , dyslipidemia , central obesity and MS.*

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PP 56

Adiponectin/HS-C-Reactive Protein Ratio is an Independent Surrogate Marker Predictive of the Development of Metabolic Risks and the Metabolic Syndrome Over 5 Years in Chinese

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Background and Aims. *The metabolic syndrome describes the constellation of metabolic risk factors contributing to increased risk of cardiovascular disease. Insulin resistance remains an important component of the syndrome, but low-grade inflammation has also been implicated. We explored the association of 1) adiponectin, an adipokine inversely associated with insulin resistance, and 2) high-sensitivity C-reactive protein (CRP), an inflammatory marker, with baseline metabolic risk factors, and subsequent risk progression and the development of metabolic syndrome in a prospective study over a period of 5 years in Chinese.*

Materials and Methods. *Subjects were recruited from the Hong Kong Cardiovascular Risk Factors Prevalence Study. 422 subjects without metabolic syndrome at baseline were followed up for 5 years to assess the progression of metabolic risks. Adiponectin was measured using an in-house ELISA assay and high-sensitivity CRP was measured using a particle-enhanced immunoturbidimetric assay.*

Results. *At baseline, both low adiponectin and high CRP levels strongly correlated with insulin resistance indices and adverse metabolic risk factors: high BMI, waist circumference, fasting and 2-hour post-load glucose, triglyceride, and low high-density lipoprotein (all $p<0.01$). At 5 years, 136 had risk progression and 50 had developed metabolic syndrome. On multinomial regression analysis, baseline adiponectin and CRP were both independently associated with the number of metabolic risks at 5 years and were predictive of risk progression. Low baseline adiponectin/CRP ratio, which takes into account both inflammatory and insulin resistance components, was predictive of the development of the metabolic syndrome at 5 years (OR 1.40, $p=0.002$). The adiponectin/CRP ratio was significantly associated with the number of metabolic risk factors at 5 year ($p=0.002$) and was predictive of risk progression, even after adjustment for sex and age ($p<0.001$) as well as BMI ($p=0.002$).*

Conclusion. *Both adiponectin and CRP correlated with metabolic risk factors, and the adiponectin/CRP ratio appeared to be an important surrogate marker in addition to BMI in the prediction of metabolic risk progression in 5 years in our Chinese population.*

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PP 57

Relationship of Automated Brachial-Ankle Pulse Wave Velocity and Type 2 Diabetes Mellitus in Korean Population

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Background and Aims. *People with type 2 diabetes are at increased risk of microvascular complications and cardiovascular disease including atherosclerosis. Brachial-ankle pulse wave velocity (baPWV) has been reported to be a useful method for assessing aortic stiffness, early-stage atherosclerosis, and peripheral arterial disease (PAD). The aim of this study was to evaluate usefulness of baPWV among diabetic patients and difference of baPWV in diabetic patients group with non diabetic control group in Korean population.*
Materials and Methods. *We examined baPWV, using automatic device, which monitors arterial pressure waves in the arm and ankle using volume plethysmographic method. This study included 115 non diabetic control subjects (51 men and 64 women) with a mean age of 51.0±8.21 years and 146 type 2 diabetic patients (76 men and 70 women) with a mean age of 58.2±7.43 years.*
Results. *There was no significant difference in baPWV between the right and left legs in both group. BaPWV in diabetic patients is significantly increased compared with non diabetic control group (15.9±3.9 vs. 14.2±2.0, p=0.0003). We divided diabetic patients into two groups according to presence of PAD. Diabetic patients with PAD showed lower baPWV compared with non diabetic group and diabetic patients without PAD, but statistically not significant (p=0.228). The results of multiple regression analysis showed that age, nephropathy, retinopathy, smoking, anti-lipid medication were closely related with PAD.*
Conclusion. *These preliminary results suggest that baPWV, as an indicator of atherosclerosis and aortic stiffness, may be useful in detecting vascular complications in Korean diabetic patients. But baPWV is decreased in more advanced vascular lesions such as peripheral arterial disease. It concluded that decreased baPWV may be a assistant indicator of PAD.*

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PP 58

Utility of Brachial-Ankle Pulse Wave Velocity, ABI, AI as Indepent Predictor of Cardiovascular Disease in Korean Type 2 DM Patients

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Background and Aims. *Though cardiovascular disease is the major cause of death in type 2 DM patients resulting in poor prognosis, they are usually diagnosed in advanced stage because of their blunted nociception caused by complicated diabetic neuropathy. For this reason early predictor in cardiovascular disease in type 2 DM patients would be very useful in early detection and preventive therapy. In this study, we measured baPWV, ABI, AI, early indicators of atherosclerosis, and evaluated their role in predicting the severity of cardiovascular disease, a macrovascular complication of DM type 2 patients.*

Materials and Methods. *Total 443 patients of 181 DM and 261 non DM patients were enrolled in the study with informed consent. They all were undergone percutaneous coronary angiography and measured baPWV, ABI and AI by a noninvasive pulse wave analyzer. Atherosclerotic anthropometric and serologic markers were also measured. The extent of coronary artery occlusive disease was expressed by Gensini scoring system.*

Results. *Between DM and non DM patient group, there was significant difference in baPWV, Gensini score, pulse rate, pulse pressure, serum c-reactive protein (CRP), B type natriuretic peptide (BNP), and fasting plasma glucose, all higher in DM patient group. Gensini score was positively related to baPWV, fasting plasma sugar, serum CRP, BNP level and among these, baPWV was the only significant independent predictor of multivessel disease in both groups. In addition, with ROC curve, we could set the cut off value of baPWV at 1,635 cm/sec to screen multivessel coronary artery disease with 64.6% sensitivity and 63.5% specificity. Moreover odds ratio to develop multivessel coronary artery disease was 3.08 in those with higher than 1,635 cm/sec compared to the group below and especially DM patient group showed higher sensitivity to this cutoff value.*

Conclusion. *We suggest baPWV to be routinely examined in all DM patients in order to detect coronary artery occlusive disease in early stage, for those who belong to the range above 1,635cm/sec who are at high risk of developing multiple coronary artery occlusive disease, prompt initiation of interventional measures could be helpful.*

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PP 59

The Predicting Effects of hsCRP Levels on Development of CCA-IMT in Newly DiagnosedI T2DM Patients

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Background and Aim. *The study was to investigate the relationship among high-sensitive C-reactive protein (hsCRP) level and intima-media thicknesses of the common carotid artery (CCA-IMT) in patients with type 2 diabetes (T2DM) and the predicting effects of hsCRP on CCA-IMT in newly diagnosed T2DM.*

Materials and Methods. *The CCA-IMT was assessed using non-invasive high resolution B-mode ultrasonography in patients with T2DM and healthy controls. hsCRP levels were measured with latex-enhanced immunonephelometer method. Age, sex, metabolic parameters including BMI, FPG, HbAlc, serum lipids, blood pressure and 24hUALB, CCA-IMT, and incidence of subclinical AS, were compared among the healthy controls, T2DM without subclinical AS (T2DM group), T2DM with subclinical AS (AS group). The 156 newly diagnosed type 2 diabetics (?1year) without AS received the multifactorial targeted intervention, including taking aspirin and controlling blood glucose, blood pressure, blood lipid and body weight. Logistic regression analysis was used to disclose the correlation between the CCA-IMT and macrovascular risk factors, especially WhsCRP.*

Results. *CCA-IMT and hsCRP levels were lower in the healthy control group than those in T2DM group and AS group ($P<0.01$). CCA-IMT was higher in T2DM patients with hsCRP in the top quartile (group 4) than that in the other three groups ($P<0.05$). CCA-IMT had a linear correlation with hsCRP in T2DM patients ($n=294$, $r=0.149$, $p=0.009$). After 2 years multifactorial intervention , Logistic regression analysis showed thatWhsCRP were closely correlated with CCA-IMT.*

Conclusions. *Low grade hsCRP was one of main risk factors for CCA-IMT in T2DM. Under the multifactorial intervention for 2 years, WhsCRP may predict the progression of CCA-IMT in patients with newly diagnosed type 2 diabetes.*

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Average 2-H Post-Challenge Glucose is an Independent Risk Factor of the Carotid Intima-Media Thickness Progession in Korean Type 2 Diabetic Patients

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Background and Aims. *We evaluated the role of the action of metabolic abnormalities on the carotid intima-media thickness (IMT) changes in Korean type 2 diabetic patients without clinically demonstrated cardiovascular disease (CVD).*

Materials and Methods. *In a prospective study, a total of 152 type 2 diabetic patients without CVD recruited from a group of outpatients at the Yonsei University Hospital. Carotid IMT of 152 subjects with type 2 diabetes (mean age 63.5 ± 7.0 years), but without CVD, was determined at baseline and after a mean follow-up of 23.7 ± 3.7 months. Fasting plasma glucose, serum total cholesterol, serum triglyceride, high density lipoprotein-cholesterol (HDL-C), and HbA1c, oral glucose tolerance test (OGTT) results for 2-h post-challenge glucose (2hPG), and blood pressure measurements were collected every 3 months and averaged.*

Results. *Change in the mean IMT correlated with average values of HbA1c (r=0.219, P=0.007), 2-h post-challenge glucose (2hPG) (r=0.239, 0.003), high-density lipoprotein-cholesterol (r=-0.228, 0.005), low-density lipoprotein-cholesterol (r=0.175, P=0.033), and non-high density lipoprotein-cholesterol (r=0.194, P=0.016) levels were related to change in the mean IMT. Multiple regression analysis demonstrated that the independent risk factors of the mean IMT change in diabetic patients were average 2hPG (P=0.018) level. The mean IMT in the well-controlled group for average 2hPG (< 11.1 mmol/L, n; 40) increased by 18 ± 105 micrometer (P=0.276), and in the poorly-controlled group (≥ 11.1 mmol/L, n; 112) increased by 87 ± 93 micrometer (P<0.001).*

Conclusion. *Blood glucose and lipid control are important in terms of IMT changes, and that 2hPG and LDL-C, among the various metabolic parameters, exert the most important influence upon the prevention of the carotid IMT progression in type 2 diabetic subjects. 2hPG is an independent risk factor of the carotid intima-media thickness progression in Korean type 2 diabetic patients.*

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The Predicting Effects of ACE and PAI-1 Gene Polymorphisms on the Development of CCA-IMT in Newly Diagnosed T2DM Patients

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Background and Aims. *The study was to investigate the relationship between angiotensin 1-converting enzyme(ACE), plasminogen activator inhibitor-1(PAI-1)gene polymorphisms and the common carotid artery (CCA-IMT) in patients with type 2 diabetes (T2DM) and the predicting effects of them on CCA-IMT in newly diagnosed T2DM.*

Material and Methods. *The polymorphisms of ACE (I/D) and PAI-1 (4G/5G) gene were determined by polymerase chain reaction- restriction fragment length polymorphism (PCR-RFLP) and allele-specific polymerase chain reaction (AS-PCR) method in 303 T2DM in Han's population of Hunan province. CCA-IMT was compared among the groups with different genotypes of ACE and PAI-1. Using multivariate linear regression analyses, we investigated the independent or synergistic effects of the ACE I/D and PAI-1 4G/5G polymorphisms on IMT in 303 patients with T2DM. Then the 156 newly diagnosed type 2 diabetics (¡Ü1year) without AS received the multifactorial targeted intervention, including taking aspirin and controlling blood glucose, blood pressure, blood lipid and body weight. The differences of metabolic control, ACE (I/D) and PAI-1 (4G/5G) polymorphisms were analyzed. Logistic regression analysis was used to disclose the correlation between the CCA-IMT and ACE (I/D) and PAI-1 (4G/5G) polymorphisms.*

Results. *Patients with ACE DD genotypes had higher CCA-IMT than those with ACE-II or ACE ID genotype. Patients with both ACE DD and PAI-1 4G4G genotypes had a higher CCA-IMT than those with any other pairs of genotypes. Multivariate linear regression analysis showed that ACE DD and PAI-1 4G4G polymorphisms had synergistic effect on the CCA-IMT in T2DM patients. After 2 years multifactorial intervention , the frequencies of PAI-1 4G alleles and 4G4G genotypes were lower than those in the CCA-IMT non-increasing group.*

Conclusions. *These findings indicate that the ACE-DD genotype and its synergistic effects with the PAI-1 4G/4G genotype are independent risk factors for the CCA-IMT in T2DM patients. Under the multifactorial intervention for 2 years, PAI-1 4G/4G genotype may be a negative predictor for the progression of CCA-IMT in T2DM patients.*

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Blood Glucose Control and the Development of CCA-IMT in Newly Diagnosed T2DM Patients

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Background and Aims. *The study was to investigate the relationship among glycosylated haemoglobin (HbA1c) levels and intima-media thicknesses of the common carotid artery (CCA-IMT) in patients with type 2 diabetes (T2DM) and the predicting effects of hsCRP on CCA-IMT in newly diagnosed T2DM.*

Materials and Methods *The CCA-IMT was assessed using non-invasive high resolution B-mode ultrasonography in patients with T2DM. Age, sex, metabolic parameters including BMI, FPG, HbAlc, serum lipids, blood pressure and 24hUALB and CCA-IMT were compared among T2DM without subclinical AS (T2DM group), T2DM with subclinical AS (AS group) and T2DM with clinical AS (CHD group).The 156 newly diagnosed type 2 diabetics (¡Ü1year) without AS received the multifactorial targeted intervention, including taking aspirin and controlling blood glucose, blood pressure, blood lipid and body weight. The differences of metabolic control were analyzed between CCA-IMT increasing groupand CCA-IMT non-increasing group. Logistic regression analysis was used to disclose the correlation between the CCA-IMT and macrovascular risk factors.*

Results. *FPG, HbAlc levels were higher in CHD group than those in T2DM group and AS group (P<0.01). CCA-IMT had a linear correlation with hsCRP in T2DM patients£¨n=324£¬r=0.106, p=0.049£©.¡÷HbA1c were lower in the CCA-IMT increasing group than those in the CCA-IMT non-increasing group. Logistic regression analysis showed that¡÷HbA1c were closely correlated with CCA-IMT.*

Conclusion. *FPG, HbAlc levels was one of risk factors for CCA-IMT in T2DM. Under the multifactorial intervention for 2 years, ¡÷HbAlc may predict the progression of CCA-IMT in patients with newly diagnosed type 2 diabetes.*

Keywords : *Type 2 diabetes mellitus, common carotid artery, intima-media thickness, glycosylated haemoglobin, multifactorial intervention*

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PP 63

Relationship of Low Density Lipoprotein Particle Size to Carotid Intima-Media Thickness and Insulin Resistance in Healthy Korean

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Background and Aims. *The aim of this study was to investigate the predictor of low density lipoprotein (LDL) particle size and the relalationship of LDL particle size to the levels of insulin resistance, and carotid intima-media thickness (IMT) in healthy Korean.*

Materials and Methods. *The subjects were 47 males and 89 females (136 in total; aged 32~70 years) who were clnically healthy and without medications that might alter glucose and lipid metabolism. Mean LDL particle size was determined by polyacrylamide tube gel electrophoresis (Lippoprint LDL, Quantimetrix), insulin resistance by kitt ofshort insulin tolerance test, and subclinical atherosclerosis by carotid intima-media thickness.*

Results. *LDL particle size was significantly correlated with insulin resistance by simple Pearson's correlation ($r=0.233$, $p<0.01$), but the independent predictors of LDL particle size determined by multiple stepwise regression analysis were serum triglyceride (TG), high density lipoprotein (HDL) cholesterol level, and age ($\beta= -0.403$, $p=<0.001$; $\beta=0.309$, $p=0.003$; $\beta=-0.219$, $p=0.016$, respectively). There were significant relation ships between increasing IMT and traditional risk factors of atherosclerosis; age, LDL cholesterol, HDL cholesterol, systolic and diastolic blood pressure ($r=0.490$, $p<0.001$; $r=-0.251$, $p<0.01$; $r=0.211$, $p<0.05$; $r=0.298$, $p<0.01$; $r=0.263$, $p<0.01$, respectively). But there was no significant correlation between increasing IMT and LDL particle size ($r=-0.172$, $p=0.075$).*

Conclusion. *The best predictors for LDL particle size were serum TG level, HDL cholesterol level, and age. Insulin resistance was not an independent predictor of LDL particle size. Small dense LDL was not a predictor of IMT in healthy Korean.*

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Increased Aortic Pulse Wave Velocity is an Independent Risk Factor of Cerebral Infarction in Patients with Type 2 Diabetes

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Background and Aims. *Patients with diabetes have accelerated atherosclerotic vascular lesions. The risk for the coronary, cerebral, and peripheral arterial diseases is higher in diabetic patients than in nondiabetic subjects. Pulse wave velocity(PWV) is the velocity of a pulse wave traveling a given distance between two sites in the arterial system. Several studies suggest that increased arterial stiffness may be predictive of cerebrovascular events though an increase in central pulse pressure. Our aims were to establish the relationship between aortic stiffness, measured through PWV, and cerebral infarction in type 2 diabetic patients and to show that PWV retains its independent risk factor of cardiovascular disease.*

Materials and Methods. *120 patients with type 2 diabetes were studied cross-sectionally. Measurements of aortic stiffness, measured through PWV, were made using the automatic device(PP1000). Cerebral infarction was defined as a clinically apparent focal or global disturbance of cerebral function, and was diagnosed by neurological examination and cranial computer tomography or magnetic resonance imaging.*

Results. *The type 2 diabetes with cerebral infarction was confirmed in 40 patients. Aortic PWV, peripheral PWV, glucose, HbA1c, duration of type 2 diabetes, fibrinogen, CRP, systolic blood pressure and diastolic blood pressure were significantly higher in type 2 diabetic patients with cerebral infarction than in patients without cerebral infarction ($p<0.05$).Pearson's correlation analysis showed that age, duration of type 2 diabetes and systolic blood pressure were correlated with increased aortic PWV ($p<0.05$) in type 2 diabetic patients with cerebral infarction. There was an increasing odds ratio for each tertile of aortic PWV, from the second tertile(odds ratio,3.61;95% confidence interval, 1.05 to 12.36), to the third tertile(odds ratio,10.54; 95% confidence interval, 3.32 to 43.36).*

Conclusion. *These results suggested that increased PWV is associated with cerebral infarction in type 2 diabetic patients.*

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Serum Osteoprotegerin Levels are Associated with Inflammation and Pulse Wave Velocity

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Background and Aims. *We examined the association between serum osteoprotegerin (OPG) levels, systemic inflammation, and atherosclerosis in normal and diabetic patients.*
Materials and Methods. *The study subjects were composed of 49 newly diagnosed diabetic patients and 72 age- and sex-matched normal glucose controls. Anthropometric parameters, blood pressure, fasting blood glucose (FBG), lipid profiles, serum OPG, high-sensitive CRP (hsCRP), interleukin-6 (IL-6), and brachial-ankle pulse wave velocity (baPWV) were measured.*
Results. *Serum OPG levels (6.1 ± 1.4 pmol/l vs. 5.4 ± 1.3 pmol/l, P = 0.011) and baPWV (1562 ± 354 cm/sec vs. 1399 ± 257 cm/sec, P = 0.004) were significantly higher in the diabetic group than in normal glucose group. Serum OPG levels in normal and diabetic patients correlated significantly with systolic blood pressure (r = 0.20, P = 0.035), FBG (r = 0.30, P = 0.002), Rt. baPWV (r = 0.22, P = 0.021), Lt. baPWV (r = 0.26, P = 0.006), HOMA-IR (r = 0.19, P = 0.045), IL-6 (r = 0.32, P = 0.001), and hsCRP (r = 0.21, P = 0.027) after adjusting for age and sex. Multiple regression analysis showed that serum OPG level was significantly associated with age, FBG, IL-6, systolic blood pressure, triglyceride, and hsCRP (R2 = 0.299).*
Conclusion. *Serum OPG and baPWV levels are elevated in diabetic patients and serum OPG levels are significantly associated with inflammation and arterial stiffness.*

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Glucose Oxidation and Production of Reactive Oxygen Species (ROS) in INS-1 Cells

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Background and Aims. *Chronic exposure of pancreatic islets to supraphysiologic concentrations of glucose causes beta cell dysfunction, including decreased insulin mRNA, insulin promoter activity, insulin gene transcription factor, and insulin secretion, that is a process known as glucose toxicity. It has been reported that hyperglycemia increases the production of reactive oxygen species (ROS) in human islets and that ROS accumulation causes beta cell dysfunction associated with low capacity of intrinsic antioxidant enzymes. Also it has been postulated that this increase in ROS is prevented by an inhibitor of electron transport chain complex. We designed this work to determine the site of hyperglycemia-induced intracellular ROS production.*
Materials and Methods. *INS-1 cells were incubated with either an inhibitor of complex I & II(TTFA), an uncoupler of oxidative phosphorylation(CCCP), aCCA, etc, and then insulin secretion and intracellular peroxide levels by flow cytometric analysis in INS-1 cells were detected.*
Results. *We observed that incubation with 30mM glucose increased intracellular peroxide levels but decreased glucose-stimulated insulin secretion(GSIS)($p<0.05$). Exposure to TTFA, CCCP, aCCA did not reduce these increased intracellular peroxide levels, and did not increase GSIS($p<0.05$). 24-hr incubation with glyceraldehydes at 5.6 mM glucose increased intracellular peroxide levels and decreased insulin content.*
Conclusion. *These observations indicate that there might be other origins in which ROS species are produced besides electron transport chain in mitochondria and glyceraldehydes may be a key molecule to produce ROS and induce beta cell dysfunction.*

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Plasma Lipid Peroxidation, Zinc and Erythrocyte Cu-Zn Superoxide Dismutase Enzyme Activity in Patients with Type 2 Diabetes Mellitus in Gorgan City (South East of Caspian Sea)

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Background and Aims. *Diabetes mellitus is a chronic metabolic disorder, which may be associated with the imbalance between protective effect of antioxidants and increased free radical production.Diabetes mellitus can alter the nutritional status of the individual.The aim of this study was to determine the changes of plasma lipid peroxidation , zinc and erythrocyte cu-zn superoxide dismutase activity in patients with type 2 diabetes mellitus and healthy control in Gorgan city.*

Materials and Methods. *50 type 2 diabetic patients and 50 healthy people were included in this study.The sampling of type 2 diabetic patients were randomized. Diabetic patients studied was without any complications.*

Results. *The levels of plasma malondialdehyde and zinc from type 2 diabetes mellitus pateints (6.24 ± 0.85 nmol / ml and 116.78± 5.51 mg / dl) and control groups(3.63 ± 0.97 nmol / ml and 146.86 ± 9.06 mg / dl) were determined. Erythrocyte cu-zn superoxide dismutase activity from type 2 diabetes mellitus pateints (675.34± 60.89 U / gr Hb) and control groups (1052.70± 52.76 U / gr Hb) were determined.*

Conclusion. *The increased plasma lipid peroxidation and decreased plasma zinc and erythrocyte cu-zn superoxide dismutase activity that we demonstrated in pateints with type 2 diabetes mellitus may predispose to the development of cardiovascular complications.We propose that diabetic pateints may have supernormal requirement for antioxidants.Supplementation with zinc and medical or non-medical free radical scavengers such as vitamins E and C or tomato, orange and etc. have a potential role in boosting antioxidant defence and maybe important in diabetic pateints.*

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The Effects of Green Tea Polyphenol on Plasma Glucose, Lipid and Antioxidant in Type 2 Diabetic Patients

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Background and Aims. *The oxygen free radicals generated in hyperglycemic condition have been regarded as the important mediators of diabetic complications. The previous studies with antioxidants on diabetic patients showed conflicting results. The green tea has been reported to have antioxidant effects in in-vitro and in-vivo animal studies, but not in human beings. This prospective randomized double-blind controlled study was performed to investigate the effects of green tea polyphenol(GTP) on plasma glucose, lipid and antioxidants in type 2 diabetic patients.*

Materials and Methods. *Study subjects were 40-70 years old type 2 diabetic patients with stable glycemic control during the past 3 months. They did not show any evidences of diabetic complications. Total 38 patients were randomly divided into 2 groups after 2 weeks of washout period. Each group was given with 1300mg of GTP or placebo(cellulose) for 12 weeks. Dietary intake was assessed by trained dietitian. Blood and urine analysis were done at baseline and after 12 weeks.*

Results. *There were no significant differences in age, body mass index(BMI), dietary status, diabetic duration, basal blood glucose level, HbA1c and lipid profile between the two groups. After 12 weeks supplementation of GTP or placebo, fasting blood glucose, HbA1c, total cholesterol, LDL-cholesterol, and triglyceride levels were not significantly changed. The levels of TBARS and the activity of GSH-Px were not changed. There was a tendency to increase of superoxide dismutase activity in GTP group ($p=0.053$). No significant adverse effects were observed in both groups.*

Conclusion. *12 weeks supplementation of GTP showed no significant changes in plasma glucose and lipid profile, but showed the possibility of beneficial increase of antioxidant in type 2 diabetic patients.*

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Fasting Plasma Glucose and Ascorbic Acid Interact in Determining Lymphocytic DNA Damage in Type 2 DM Subjects: Possible Role of Glucose/Ascorbic Acid Ratio in Risk Assessment and Modulation

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Background and Aims. *Fasting plasma glucose (FPG) and plasma ascorbic acid (ASC) were reported to, respectively, positively and negatively correlate with lymphocytic DNA damage [1]. However, whether the relationship with DNA damage holds throughout the whole range of glucose levels (normal and hyperglycaemic) is not known. The aims of this study were to investigate if the effect of FPG level on lymphocytic DNA damage is a threshold effect or on a continuum, and to explore the influence of FPG/ASC ratio in determine DNA damage in Type 2 DM.*

Materials and Methods. *258 consenting Type 2 DM subjects (mean [SD] age:59.4 [10.4] years) were recruited. Fasting blood samples were analysed for HbA1c, FPG, plasma ASC, and DNA damage score in peripheral lymphocytes subjected to a standard oxidant challenge (by the comet assay). BMI, waist hip ratio (WHR) and blood pressure (BP) were also measured. Pearson's correlational analysis was performed between FPG and DNA damage across a range of FPG values.*

Results. *The DNA damage score was significantly higher (<0.0001) in subjects with FPG³5.5 mmol/L (mean=35.9, SD=6.7, n=226) than that in subjects with FPG<5.5 mmol//L (mean=28.2, SD=6.2, n=22). In subjects with FPG³5.5 mmol/L a significant direct correlation (r=0.430, p<0.001 n=223, and controlled for HbA1c, ASC, BMI, WHR and BP) was found between FPG and DNA damage scores. No such correlation was seen in subjects with FPG<5.5 mmol//L. Moreover at FPG/ASC ratio of ³100, but not below this level, a positive correlation (r=0.394, p<0.001, n=210, controlled for HbA1c, BMI, WHR and BP) was found between FPG/ASC ratio and DNA damage.*

Conclusion. *Hyperglycaemia is associated with increased in DNA damage in blood lymphocytes. Poor glycaemic control is also associated with poorer outcome in DM. While the significance of DNA damage in terms of risk of diabetic complications is not yet clear, it is reasonable to suggest that higher levels of DNA damage are not favourable. Results indicate that hyperglycaemia-induced DNA damage might be ameliorated by increased plasma ASC (decreased FPG/ASC), which is achievable by increased dietary intake of vitamin C. Incorporation of FPG/ASC into a biomarker profile may be useful in assessing the risk of diabetic complications, and increased plasma ASC may be a useful, low cost and easily achievable strategy to lower risk in poorly controlled diabetic patients. Long term follow-up is ongoing. References:[1] Choi SW et al (2005). Diabet Med (in press).*

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Antioxidant Status and Lipid Peroxidation End Products in Patients of Type 1 Diabetes Mellitus

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Background and Aims. *In Type 1 diabetes mellitus (DM), hyperglycemia is considered a primary cause of diabetic vascular complications and is associated with oxidative stress. The role of antioxidant, particularly a - tocopherol, in Type 1 DM and its contribution in the development of vascular complications is not clear. Therefore, the present study is to investigate the relationship between antioxidant status (a - tocopherol) and lipid peroxidation end products (malondialdehyde ; MDA) in the plasma of 20 Type 1 DM and 20 nondiabetic healthy control subjects.*

Materials and Methods. *Lipid levels in all subjects were analyzed spectrophotometrically by enzymatic reagent kits. Plasma MDA was assessed by spectrofluorometer whereas plasma a - tocopherol was estimated by High Performance Liquid Chromatography in Type 1 DM as well as control subjects of matched sex and ages. The results of type 1 DM were compared with a control group by unpaired Student 's t-test.*

Results. *The plasma MDA concentration was significantly high in type 1 diabetic patients as compared to controls, ($p < 0.001$). Significantly reduced plasma antioxidant status of Type 1 DM patients was found only in a - tocopherol / total lipid as compared to controls ($p < 0.05$). However, no significant difference was observed in plasma a - tocopherol and a - tocopherol / total cholesterol ($p > 0.05$) as compared to controls.*

Conclusion. *Results of the present study suggests that oxidative stress is increased and antioxidant defense is decrease in Type 1 DM. However, only a - tocopherol / total lipid are significantly reduced suggesting that this parameter may merit for further study as a candidate biomarker of antioxidant status for the risk of complications in diabetes mellitus. From this study, we conclude that antioxidant supplementation may necessary for treatment to reduce oxidative stress for diabetic complications protection in Type 1 DM.*

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