

Diabetes and Hypertension: How to Prevent and Treat Chronic Kidney Disease

Satellite Conference and Live Webcast
Wednesday, March 7, 2007
2:00 - 4:00 p.m. (Central Time)

Produced by the Alabama Department of Public Health
Video Communications and Distance Learning Division

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Representatives from:
Alabama Primary Health Care Association
Southeastern Diabetes Education Services
American Diabetes Association
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Program Objectives

- Describe how primary healthcare professionals use the American Diabetes Association standards of care and the chronic care model in the prevention of chronic kidney disease.
- Identify three different diets used in the management of various stages of CKD in patients with diabetes.

Program Objectives

- Describe the association between the development of diabetes, cardiovascular and kidney disease and its impact on the healthcare system.
- Identify the methods used to refer, select, and manage individuals involved in the kidney transplantation process.

Program Objectives

- Identify the importance of early identification and treatment of those with CKD.
- Describe current activities in Alabama that address the burden of diabetes and the prevention of complications.

Diabetes, Hypertension and Chronic Kidney Disease

Ruth C. Campbell, M.D.
University of Alabama at Birmingham

End Stage Renal Disease

- Approximately 335,025 patients on dialysis in US in 2004
- Five year survival
 - <40% for dialysis patients
 - 25% in diabetics
- Expensive
 - \$32.5 Billion in 2004
 - \$20.1 Billion in 2004 from Medicare

Who Is On Dialysis?

- Diabetic: > 50%
- Hypertensive: 33%
- Older – median age is 64.6 years at initiation
- US minority status
 - 2/3 new patients are white
 - 3.7x risk for African American
 - 1.5x risk for Hispanics

What is K/DOQI?

- Kidney Disease Outcome Quality Initiative
- Expert advice from National Kidney Foundation

A Rose By Any Other Name

- Chronic kidney disease
- Chronic renal failure
- Chronic renal insufficiency
- Mild chronic renal insufficiency
- Moderate chronic renal failure

How Do We Measure Chronic Kidney Disease?

- Reduction in filtration (GFR)
- Evidence of glomerular dysfunction such as proteinuria or hematuria
- Imaging abnormalities
- For at least 3 months

Serum Creatinine

- Clinical “quick and dirty” assessment of renal function
- Not sensitive to loss of kidney function
- Problems
 - Product of muscle mass
 - Not just filtered
 - No national standardization

24 Hour Creatinine Clearance

- Collection must be adequate!
 - 15-20 mg/kg for women
 - 20-25 mg/kg for men



eGFR Equations

- MDRD
 - Less accurate if someone has normal kidney function
 - Creatinine based
- Cockcroft Gault
 - Simple—pen/paper
 - Creatinine based

K/DOQI CKD Staging

Stage	GFR*	Evidence of damage*
I	> 90	yes
II	60-89	yes
III	30-59	no
IV	15-29	no
V	< 15	no

*For greater than 3 months

CKD in US Population

- Stage I 3.3%
- Stage II 3.0%
- Stage III 4.3%
- Stage IV 0.2%
- Stage V (ESRD) 0.2%

Death and CKD

- eGFR 45-59 ml/min/1.73 m²:
– 1.2 increased risk of death
- eGFR 30-44:
– 1.8 increased risk of death
- eGFR 15-30:
– 3.2 increased risk of death
- eGFR < 15:
– 5.8 increased risk of death

Cardiovascular Disease and CKD

- eGFR 45-59 ml/min/1.73 m²:
– 1.4 increased risk of CV event
- eGFR 30-44:
– 2.0 increased risk
- eGFR 15-30:
– 2.8 increased risk
- eGFR < 15:
– 3.4 increased risk

CKD Screening

- Assessment of GFR (all)
- Quantification of proteinuria with “spot” urine protein (or albumin) to creatinine ratio (all)
- Examination of urine sediment (UA with micro) (all)
- Blood pressure (all)
- Imaging (selected)

Who To Screen?

- Diabetes
- Hypertension
- Family history
- Elderly
- SLE
- NSAIDs, COX-2 inhibitor use
- Chronic infections

Who To Screen?

- History of stones
- History of obstruction
- History of repeated UTI
- History of acute kidney injury
- US minority status

Diabetes

- Approximately 20-40% will develop diabetic nephropathy
- Incipient nephropathy (microalbuminuria)
- Overt nephropathy (macroalbuminuria)
- Glycemic control reduces the risk of incipient nephropathy and the progression of incipient nephropathy

CKD Screening for Diabetes

- Type I: Five years after diagnosis and then yearly
- Type II: At time of screening and then yearly
- Tests
 - Estimation of GFR
 - Microalbuminuria (spot urine albumin/creatinine)
 - Two out of three tests over six months
 - Blood pressure

Diabetic Nephropathy

- ACEi or ARB reduces the risk of
 - Progression of incipient nephropathy to overt nephropathy
 - Progression of overt nephropathy to ESRD

Treatment: Diabetic Nephropathy

- Reduce proteinuria
 - Proteinuria is predictive of risk of ESRD
 - Greater reduction of proteinuria is associated with greater risk reduction
- Blood pressure control: 130/80
 - Will need multiple agents
- Glycemic control
- Management of CV risk factors

CKD Treatment

- Reduce proteinuria (ACEi and/or ARB)
- Aggressive treatment of blood pressure
 - 130/80
- CV risk reduction
- Assessment of complications of CKD
 - Anemia
 - Secondary hyperparathyroidism

When to Refer

- If you don't know what the cause is
- Reasons for biopsy
 - Nephrotic syndrome
 - Unexplained CKD
 - Possible glomerulonephritis
 - Urinary abnormalities in SLE
- GFR < 60
- Definitely by GFR < 30

Renal Replacement Therapy

- Planning starts at GFR 30
- Education
- Access placement
- Transplantation evaluation

Nutritional Needs For Individuals With Chronic Kidney Disease And Beyond

Ginger Chandler, MS, RD
Davita, Montgomery

- Information presented was taken from the USDA Dietary Guidelines for Healthy Americans 2005 and from "Pocket Guide to Nutrition Assessment of the Patient With Chronic Kidney Disease" 3rd Edition

Individuals With GFR > 90 With CKD Risk Factors

- Blood pressure control
- Glycemic control
- Weight management
- Cardiovascular factors

USDA Dietary Guidelines For Healthy Americans 2005

- Adequate nutrients within calorie needs
- Choose nutrient dense foods and beverages
- Limit intake of saturated fat and trans fat, cholesterol, added sugars, salt, and alcohol

Weight Management

- Physical activity including cardio-conditioning, stretching, and resistance exercises
- Limit sodium to 2300mg a day
- Alcohol in moderation

USDA My Pyramid Plan

- For help with meal planning to meet nutritional needs

– www.mypyramid.gov

Stage 1 CKD

- Kidney damage with normal or increased GFR \geq 90
 - Diagnosis and treatment of comorbid conditions, slowing progression, CVD risk reduction
 - Dietary Guidelines For Healthy Americans 2005

Stage 2 CKD: GFR 60-89

- Estimating progression
- Dietary Guidelines For Healthy Americans 2005

Stage 3 CKD: GFR 30-59

- Assess protein and energy intake and nutritional status using general MNT recommendations of CKD
- May require protein reduction

Stage 4 CKD: GFR 15-29

- Protein (GM/KG SBW or ABW) • 0.6 to 0.8
- Energy (KCAL/KG, SDW/ABW) • 30-35 > 60 years
30 < 60 years
- Potassium • Usually unrestricted
- Phosphorus (MG/Day) • 800-1000 or 10-12 MG/KG, SBW or ABW

Stage 4 CKD: GFR 15-29

- Phosphorus (MG/DAY) • 800-1000 MG or 10-12 MG/KG, SBW or ABW
- Calcium (GM/DAY) • 1-1.5 GM or < 2-2.5 GM including binder load
- Fluid • Typically unrestricted
- Vitamin / Minerals • RDA; B complex W/C; Individual Vitamin D, ZN, and FE

Stage 5 CKD: GFR < 15

- Begin renal replacement therapy with hemodialysis or peritoneal dialysis.

MNT Recommendations For Hemodialysis

- Protein (GM/KG, SBW or ABW) • $\geq 1.2 - 1.3$; $\geq 50\%$ from HBV
- Energy (KCAL/KG, SBW or ABW) • 30-35 > 60 Years
35 < 60 Years
- Sodium (GM/DAY) • 1-3
- Potassium (GM/DAY) • 2-3 (Adjust to serum levels)

MNT Recommendations For HD

- Phosphorus (MG/DAY) • <900 MG or 10-12 MG/GM of protein
- Calcium (GM/DAY) • 2.0-2.5 includes binder load
- Fluid (CC/DAY) • Outputs plus 1000 CC

MNT For HD

- Vitamin and mineral
 - Vitamin C: 60-100mg
 - B6: 2mg
 - Folate: 1mg
 - B12: 3mcg
 - RDA for others
 - Individualize Fe and Vitamin D

MNT Recommendations For Peritoneal Dialysis

- Protein (GM/DAY) • $\geq 1.2 - 1.3$; $\geq 50\%$ from HBV
- Energy (KCAL/DAY) • 30-35 > 60 Years
35 < 60 Years
- Sodium (GM/DAY) • 2-4
- Potassium (GM/DAY) • 3-4 (Adjust to serum levels)

MNT For PD

- Phosphorus (MG/DAY) • <900 MG or 10-12 MG/GM of protein
- Calcium (GM/DAY) • <2.0-2.5 includes binder load
- Fluid (CC/DAY) • Maintain balance
- Vitamin / Mineral • Same as HD: May need 1.5-2MG of B1 due to dialysis loss

Goals For Nutritional Management For HD and PD

- Albumin • ≥ 4.0 G/DL
- Phosphorus • 3.5 to 5.5 MG/DL
- Potassium • 3.5 to 5.5 MG/DL
- Calcium • 8.4 to 10.2 MG/DL (Prefer 8.4-9.5)
- Triglycerides • <200 MG/DL
- Glucose • <200 Non fasting before dialysis
- HGBA1C • 4.0-7.0%
- Fluid • 2-5% of EDW

Management of Bone Mineral Metabolism In CKD

- Usually requires phosphorus binding medications, IV or oral Vitamin D and calcimimetic agents to achieve goals.

Goals For Bone Mineral Metabolism

- Phosphorus • 3.5-5.5 MG/DL
- Calcium • 8.4-10.2 MG/DL (Prefer 8.4-9.5)
- CA X P product • ≤ 55
- Intact PTH • 150-300 PG/DL

Management of Anemia in CKD

- Usually requires IV or subcutaneous EPO and IV or oral iron supplementation.

Goals for Anemia Management in CKD

- HCT • 33-66%
- Ferritin • ≥ 100 NG/DL (No known benefit > 800)
- Transferrin saturation • $\geq 20\%$ (No known benefit > 50%)

MNT Recommendations For Transplantation

- | | Post OP | Chronic |
|--------------------|--|---------|
| • Protein (GM/KG) | • 1.3-2.0 | 0.8-1.0 |
| • Energy (KCAL/KG) | • 30-35; Maintain SBW, limit fat to 30% of KCALS anc cholesterol < 300MG/DAY | |

MNT For Transplant

- | | Post OP | Chronic |
|---------------------|---|---------|
| • Sodium | • 2-4 | 2-4 |
| • Potassium | • Unrestricted unless serum level is high | |
| • Phosphorus | • RDA | RDA |
| • Calcium | • 0.8-1.5 | 0.8-1.5 |
| • Fluid | • Unrestricted | |
| • Vitamin / Mineral | • RDA, May need additional Vitamin D | |

Conclusion

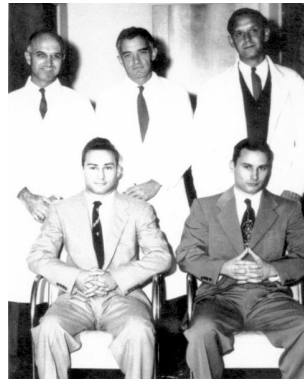
- Early MNT has been proven to slow the progression and complications of CKD.
- CMS has recognized this and is now reimbursing for MNT for Stage 3 and Stage 4 CKD.

Kidney Transplantation

Velma Scantlebury M.D.
Professor of Surgery
Director of Kidney Transplantation
University of South Alabama

History of Transplantation

- The first living donor transplant was performed in Paris in 1952, failed to rejection at 22 days.
- The first successful kidney transplant occurred in 1954 using monozygotic twins with no rejection medications.



The world's first organ transplant (1954). The donor and recipient were identical twins.

Kidney Transplantation: Indications

- End-stage renal disease (ESRD) with or without dialysis
- ESRD implies an eGFR of < 20%
- Options for ESRD:
 - Dialysis: hemodialysis or peritoneal dialysis
 - Transplantation: living or deceased donation

Causes of Kidney Disease

- Hypertension
- Diabetes mellitus
- Glomerulonephritis
- Polycystic kidney disease
- Lupus nephritis
- Drug-induced nephritis
- Alport's disease

Causes of Kidney Disease

- IgA nephropathy
- Chronic infections
- Reflux nephropathy
- Congenital abnormalities
- Nephrotic syndrome
- Unknown

Common Indications

- Diabetes mellitus
- Hypertension
- Polycystic kidney disease
- Focal sclerosing glomerulosclerosis
- Lupus nephritis
- Reflux nephropathy

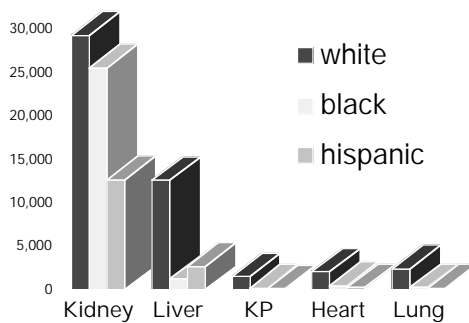
Kidney Transplantation: Who Qualifies?

- Patients with end-stage kidney disease
- Must be in good medical health
- Meet qualifications for insurance, medicare/medicaid
- Can be self-referred or by their local MD

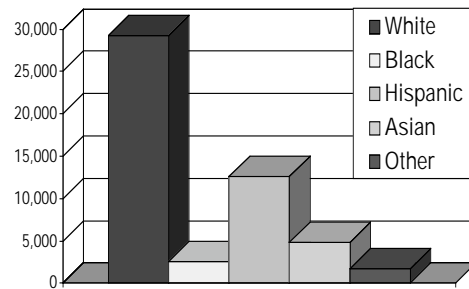
UNOS
Waiting
List
02/15/07

Type Of Transplant	Patients waiting for Transplant
Kidney transplant	73,933
Liver transplant	17,428
Kidney-pancreas transplant	2,499
Pancreas-islet cell transplant	2,444
Intestinal transplant	241
Heart transplant	2,876
Heart-lung transplant	134
Lung transplant	2,876
Total	101,686

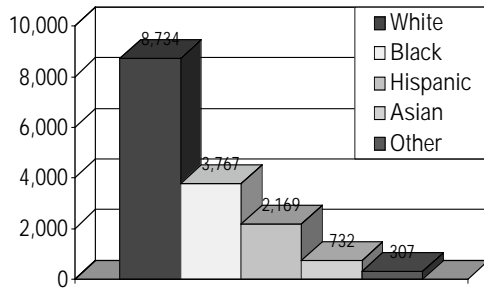
National Wait List by Ethnicity



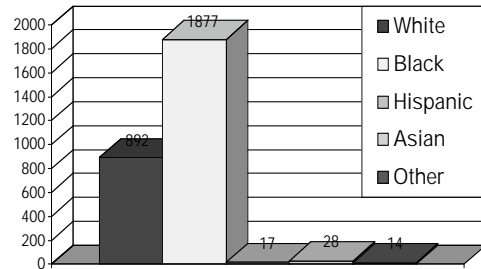
National Wait List for Kidney Transplant (2006): 66,289



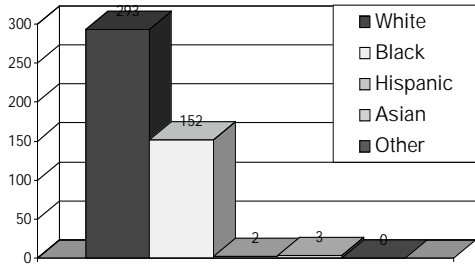
National Kidney Transplants Performed for 2006: 15,719



Waiting List for Kidney by Ethnicity in Alabama in 2006: 2,828



Kidney Transplants by Ethnicity in Alabama (2006): 451 Patients



Ongoing Problem:
Greater Demand, Less Supply

Advantages of Transplantation

- Better longevity
- Improved quality of life
- Less complications
- Improved growth and development (children)

Solutions?

- Decrease the demand
- Increase the supply

Decreasing The Demand

- Early diagnosis and treatment
- Appropriate medical follow-up
- Better research funding
- Limit requirements for listing

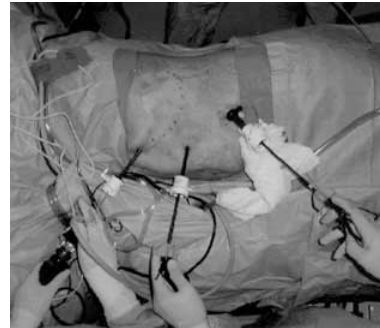
Increasing The Supply

- Living donors
 - Altruistic donation
 - Non-related donation
- Deceased donors
 - Non-heart beating donors
 - Marginal donors: older age, Hep C+ donors, donors with a history of HTN and DM
 - Use of pediatric en-bloc kidneys

Living Donors

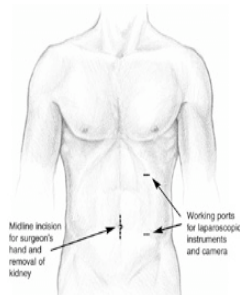
- Avoids the need to be added to the waiting list
- Provides the option of early transplantation
- Can avoid dialysis if diagnosis is made early (pre-emptive transplantation)

Laparoscopic Donor Nephrectomy

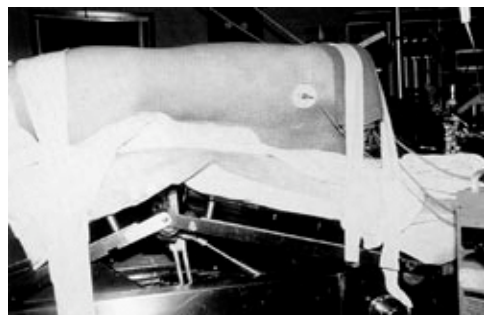


Hand Assisted Laparoscopic Nephrectomy

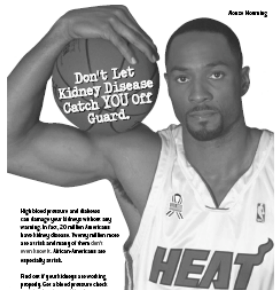
- Midline incision serves both as a portal for the surgeon's hand and as the site for removal of the kidney.



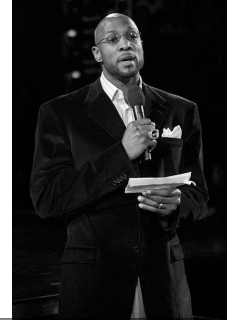
Donor Position At Surgery



Basketball Player: Alonzo Mourning



Basketball Player: Alonzo Mourning



Basketball Player: Sean Elliott



Outcomes of Living Donor

- Better survival
- Less rejection
- Less immunosuppression
- Emotional gain for the donor
- No financial benefit

Pre-emptive Transplantation

- Advantages:
 - Avoids the need for dialysis
 - Possible with living donor organs
 - Better outcomes

Increasing the Supply: Ethical Issues

- Increase organ donation:
 - Financial incentives
 - Presumed consent
 - First person consent
- Promote kidney exchange
- Encourage living donor/deceased donor exchange

Deceased Donors

- Make up the greater supply of organ donor kidneys
- Allocated based on local, then regional then state and national basis
- Options for "perfect match" kidneys given preference
- Preference given to children < 18 yrs and adults with high antibody levels

Deceased Donors

- Person is declared brain dead by a series of neurological tests.
- Consent is obtained from the family for removal of organs (can be specified).
- Retrieval of organs and other tissues are coordinated through an agency called the organ procurement organization.

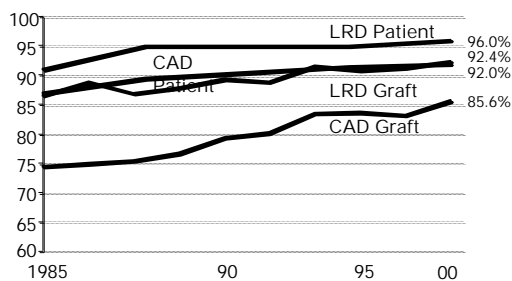
Deceased Donors

- If brain death cannot be declared due to persistent brain stem function, the organs can be obtained after the heart is allowed to cease beating.
- This is done in a controlled setting and is referred to as a non heart-beating donor (donation after cardiac death).

Listing for Deceased Donation

- ABO blood type
- Antigen match (HLA class I: A, B; Class II DR)
- Waiting time (1 point per year)
- Panel reactive antibody level (%PRA)
- Age less than 18 years
- Approved regional medical urgency based on lack of access

One Year Patient and Graft Survival



Short and Long Term Issues

- Rejection
- Infections: bacterial and viral
- Side effects of immunosuppressive drugs
- Patient compliance
- Development of tumors
- Chronic rejection and return to dialysis
- Cardiac disease

Renal Graft Survival: Influencing Factors

- Variables that affect long-term survival are inter-related:
 - Immunological factors
 - Acute rejection (AR)¹
 - Suboptimal immunosuppression¹
 - Adherence to immunosuppression therapy ^{1,2}

Renal Graft Survival: Influencing Factors

- Non-immunological factors
 - Renal function¹
 - Cardiovascular disease¹
 - New-onset diabetes mellitus (NODM)³
 - Donor variables¹

Treatment Objectives

- To optimize long-term outcomes:
 - Maximize renal function
 - Minimize episodes of acute rejection
 - Minimize cardiovascular toxicity
 - Minimize incidence of NODM
 - Minimize medication regimen nonadherence

Summary

- Organ transplantation is truly a gift of life
- Organ donation still remains the main obstacle to getting vast numbers of patients transplanted
- Long term survival of grafts is still related to both immunologic and non-immunological factors
- Benefits of transplantation still outweigh the risks

Give the Gift of Life:
Support Organ and Tissue
Donation



Southeastern Diabetes Education Services



Teaching Children and Their Families
How to Live With Diabetes

Diabetes in Alabama



- Alabama is recognized as one of the top states in the country in the incidence of diabetes.
- Approximately 439,000 Alabamians, or almost 1 in 10 people, have diabetes.

Diabetes in Alabama



- About 1 in every 400-500 children / adolescents have Type 1 diabetes.
- It is estimated that more than 3,330 Alabama children have Type 1 diabetes.

Southeastern Diabetes Education Services

- Since 1947, Southeastern Diabetes Education Services, also known as Camp Seale Harris and Camp Sugar Falls, have been teaching Intensive Diabetes Management.

Southeastern Diabetes Education Services

- Southeastern Diabetes Education Services is the only organization in Alabama providing education on diabetes management developed specifically for children and adolescents, including individualized medical care and structured support for families of children with diabetes.

Southeastern Diabetes Education Services Programs

- We host four formats of educational programs:
 - The Children's Resident Camp Program
 - The Children's Day Camp
 - Family programs, including Family Weekend Retreats and a Summer Family Camp
 - Family outreach and support days
 - Family fun days

Education and Care

- At Southeastern Diabetes Education Services, children learn not only the importance of managing their blood sugar levels, but also how to go about doing so. Participants are provided the knowledge and experience necessary to monitor blood sugar, treat insulin reactions, choose appropriate foods, and exercise effectively. Trained physicians and professionals oversee the treatment and education of each participant at our children's programs.

2007 Services

- Family weekend education retreats
- Children's summer camps
- Day camps – Birmingham and Mobile
- Family outreach activities – fun days, education and support events

Please Help Us Identify and Recruit Children!

- Communicate the mission of Southeastern Diabetes Education Services to your community and inform children and families of our programs.

Volunteer Service Opportunities

- SDES needs Nurses, Physicians, Dietitians, and Diabetes Educators.
- You become knowledgeable about state of the art treatment methodologies for Type 1 diabetes.
- You enjoy volunteer service in a fun, nurturing environment while working alongside other compassionate people.

Visit Southeastern Diabetes Education Services!



www.southeasterndiabetes.org

Upcoming Programs

Psychology of Terrorism and Psychological Counterterrorism:
Seven Things You Should Know

Thursday, March 22, 2007

12:00 - 1:30 p.m. (Central Time)

For complete listing of upcoming programs visit our website at:

www.adph.org/alphtn