Cancer Epidemiology in the Turkish World: Past, Present and Future

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Head UICC-ARO,
Chief Editor APJCP,
Coordinator Asian Pacific Organization for Cancer Prevention and Control
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APOCP Groups
Australasia
Central Asia
China
Japan
Korea
South Asia
South-East Asia
Western Asia

Education
Screening and Intervention
Clinical Therapy
Epidemiology
Toxicological Pathology
Palliation

http://www.apocp.org

25th IACR Annual Meeting, Hawai‘i
‘Cancer Registration and Surveillance...Around the Globe’

APOCP ASIATOX Satellite Symposium, Bangkok
‘In Vivo Models for Assessment of Carcinogenicity and Chemopreventive Potential of Food Components’

ASIATOX III,
Bangkok/Chiang Mai
‘International Toxicology Harmonization: The Challenge of Asia’

1st Regional APOCP Conference - Western Asia, Izmir
‘New Strategies for Cancer Control’

2nd Regional APOCP Conference - South East Asia, Khon Kaen
‘Customs, Environment and Cancer’
Cancer Control Programs

**Assessment of Burden** (Hospital/Population-based)

**Risk Factor Determination** (Physical/Socioeconomic)

**Interventions - Primary Prevention**
(Awareness/Tobacco Control/Lifestyle)

**Interventions - Secondary Prevention**
(Screening/Monitoring)

**Interventions - Therapeutic**
(Surgical/Radio/Chemical/Hormonal)

**Interventions - Palliative**
(Physical/Psychological)
Cancer Registries in Asia

Cancer Incidence in V Continents
Izmir and Antalya
### Population-based Cancer Registry Data for Turkey and Iran - Males

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<tr>
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<th>Turkey</th>
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<td>Total</td>
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*Curado et al., 2007; †Hinçal et al., 2008; ‡Sadjadi et al., 2003; ‡‡Babaei et al., 2005; ‡§Somi et al., 2008; ‡¶Larijani et al., 2004; A, Antalya; Ar, Ardabil; C, Cyprus; EA, East Azerbaijan; I, Izmir; S, Semnan; T, Tehran

**Comparisons:**
- Oesophagus
- Stomach
- Colorectal
- Larynx
- Lung
- Prostate
- Bladder
## Population-based Cancer Registry Data for Turkey and Iran - Females

### Comparisons:
- Oesophagus
- Stomach
- Colorectal
- Lung
- Breast
- Ovary
- Endometrium
- Cervix

<table>
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Cancer Control Programs

Assessment of Burden (Hospital/Population-based)

Risk Factor Determination (Physical/Socioeconomic)

Interventions - Primary Prevention
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Interventions - Secondary Prevention
(Screening/Monitoring)

Interventions - Therapeutic
(Surgical/Radio/Chemical/Hormonal)

Interventions - Palliative
(Physical/Psychological)
Cancer - Environmental Disease

Geographic Variation
Migration Data
Temporal Variation
Occupation Links
Socioeconomic Links

Factors
Carcinogens
Smoking
Nutrition
Exercise
Carcinogenesis Paradigms

Field

Clonal  Subclonal

Single cell  Preneoplasia/precancer  Neoplasia

Initiation  Modulation  Progression

Carcinogen  Carcinogen  Carcinogen
Dependent  Independent?  Dependent?
Proliferation  Proliferation  Proliferation
Sensitive  Sensitive  Independent?

Primary Prevention  Clinical Treatment
Secondary Prevention
Risk Factor Identification

- Physical Exercise
- High calorie consumption
- Insulin Sensitivity
- Insulin
- Estrogen/Testosterone
- Physical Exercise
- Lipid peroxidation
- Inflammation
- NSAID's
- Antioxidants
- Carcinogens
- Antioxidants
- Insoluble Fiber
- Insulin sensitizers
- DHEA
- Physical Exercise
- Soluble Fiber
- Insoluble Fiber
- IGF-I
- IGF-IR IR
- SHR
- Lactoferrin
- Immune System
- Inflammation
- Parasites
- ODC Inhibitors
- DHEA
- HMG-CoA Reductase Inhibitors

PRENEOPLASTIC/NEOPLASTIC CELL
Molecular Epidemiology

Cholesterol → Pregnenolone → Progesterone

4-Androstenedione → Dehydroepiandrosterone

Dehydroepiandrosterone → 5-Androstene-3β,17β-diol

5α-Dihydrotestosterone → Testosterone → 4-Androstenedione

COMT: Catechol-o-methyl transferase

BRCA1/2 Pathways

Phytoestrogens

Endocrine Disruptors

Estrogen Receptors

Estradiol

2/4 Methoxy E → 16α-OH/16β-OH E

2-OH/4-OH E → Estrone Conjugates

DNA Repair (OGG) Inflammation (TNF/TGF/IL)
Smoking Epidemiology

TOBACCO SMOKING

INITIATION

PROMOTION

Tobacco Advertising
Negative Peer/Family Pressure
Advertising Bans
Positive Peer/Family Pressure Education
Polymorphisms in Inflammation-Associated Genes

TOBACCO AVAILABILITY

High Price
Negative Peer/Family Pressure

Smoking Bans

Carcinogenic Action

Dietary Factors

Polymorphisms in Metabolism-Associated Genes

Dietary Factors

Irritation / Inflammation

Dietary Factors

Polymorphisms in Inflammation-Associated Genes
Cancer Control Programs

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(Surgical/Radio/Chemical/Hormonal)

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(Physical/Psychological)
Epidemiology for Primary and Secondary Prevention

1. **NORMAL CELLS**
   - **Initiation**
   - **Growth**
   - **Regeneration/Proliferation**

2. **Smoking, Endogenous and Dietary Carcinogens**
   - Avoidance
   - Dietary Supplementation/Detoxification

3. **PRENEOPLASIA/DYSPLASIA**
   - Progression
   - Screening and Resection
   - Chemoprevention

4. **CANCER**
   - Naked Eye/Palpation
   - Occult Blood
   - Endoscopy
   - Ultrasound/CT
   - Serum markers

5. **Awareness/Compliance**
   - Medication Vaccination
   - Avoidance
   - Hormonal Milieu Manipulation
Cancer Control Programs

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Interventions - Secondary Prevention
(Screening/Monitoring)

Interventions - Therapeutic
(Surgical/Radio/Chemical/Hormonal)

Interventions - Palliative
(Physical/Psychological)
### Clinical Epidemiology

<table>
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<tr>
<th>Diet</th>
<th>Exercise</th>
<th>Supplements</th>
<th>Cut-off</th>
<th>Complications</th>
<th>Zone sizes</th>
<th>Methodology</th>
<th>Number</th>
<th>Decision-making</th>
<th>QOL</th>
<th>Timing</th>
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<th>QOL</th>
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<td>Risk</td>
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<td>Biopsy</td>
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<td>Outcome</td>
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<tr>
<td>Body Size</td>
<td>Hormones</td>
<td>Morphology</td>
<td>PSA/PSAD/DRE</td>
<td>Free PSA/Ratios</td>
<td>Adjunct Therapy</td>
<td>HGPIN</td>
<td>ASAP</td>
<td>PCa</td>
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<td>Grade</td>
<td>Diet and Exercise</td>
<td>Hormonal Surgery</td>
<td>Radiotherapy</td>
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Intl Hospital-based Comprehensive Case-control Studies!
Epidemiology for Treatment and Palliation

Symptoms and diagnostics
- what are the warning signs
  what are the tests

Treatment care
- what are the options
  what are the financial costs
  what are the outcomes

Palliative care
- controlling pain with analgesics
  assuaging anger and anxiety
  treatment of depression
Organ-Based Research Priorities
Oral Cavity/Oesophageal

Risk Factors
Betel, Smoking, Alcohol, HPV, Sun

Oesophageal Cancer Histopathology: SCC-AC
Percentages (Curado et al., 2007)

<table>
<thead>
<tr>
<th>Country</th>
<th>Male SCC</th>
<th>Male AC</th>
<th>Male Ratio</th>
<th>Female SCC</th>
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<td>27</td>
<td>1.0:1</td>
<td>18</td>
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<td>1.0:1</td>
<td>25</td>
<td>31</td>
<td>0.8:1</td>
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Risk Factors
Trauma, Smoking, Alcohol, Nutrition, Deficiency, Obesity
Stomach Cancer

Risk Factors
Salt, Stress, Alcohol, Smoking, H. pylori

Risk Factors for Gastric Cancers

<table>
<thead>
<tr>
<th>Factor</th>
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<td>Epstein-Barr</td>
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<td>+/-</td>
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<td>Gastric Ulcers</td>
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<td>++</td>
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<tr>
<td>High fat Diet</td>
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<tr>
<td>Obesity</td>
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<tr>
<td>Alcohol</td>
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Colorectal Cancer

Risk Factors
Diet, Hyperinsulinemia
Smoking, Alcohol

Protective Factors
Calcium, Vegetables
Vitamin D

Location
Colon-rectum ratio
Distal-proximal ratio

Colorectal Cancers: Colon and Rectal Carcinoma Incidences and Ratios (Curado et al., 2007)

<table>
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<tr>
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CIV Volume

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Liver Cancer

Risk Factors
HBV/HCV
Opisthorchis

Liver Cancer Histopathology: HCC-CCC Percentages
(Curado et al., 2007)

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<th>Country</th>
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CIV Volume

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<th>Country</th>
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<th>VI#</th>
<th>VII##</th>
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<td>2.6</td>
<td>3.2</td>
<td>2.6</td>
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Laryngeal Cancer

Risk factors
Dusts, tobacco

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<th>CIV Volume</th>
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<th>V</th>
<th>VI#</th>
<th>VII##</th>
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Lung Cancer

Lung Cancer Histopathology: SCC-Adenocarcinoma Ratios (Curado et al., 2007)

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<tr>
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<th>Male</th>
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<th>Female</th>
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<td>Ratio</td>
<td>SCC</td>
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<td>Ratio</td>
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<td>26.6</td>
<td>1.1:1</td>
<td>7.4</td>
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Risk Factors
Smoking, Fumes, Nutrition, Hormonal?

CIV Volume

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<tr>
<th></th>
<th>IV</th>
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<th>VII</th>
<th>VIII</th>
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Antalya
Izmir
42.1 15.5 19.8 39.7
29.2 15.6 13.0 33.4
Urinary Bladder Cancers

Risk factors
Smoking,
Infection, Parasites
Liquid consumption
Genetic?

<table>
<thead>
<tr>
<th>CIV Volume</th>
<th>IV</th>
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<th>VI#</th>
<th>VII##</th>
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# Prostate Cancer

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<th>IX+</th>
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<td>11.4</td>
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Clinical Epidemiology

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<th>Diet</th>
<th>Exercise</th>
<th>Supplements</th>
<th>Cut-off</th>
<th>Complications</th>
<th>Zone sizes</th>
<th>Methodology</th>
<th>Number</th>
<th>Decision-making</th>
<th>QOL</th>
<th>Timing</th>
<th>Alleviation</th>
<th>QOL</th>
<th>Salvage</th>
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<tr>
<td>Risk</td>
<td>Screening</td>
<td>Biopsy</td>
<td>Treatment</td>
<td>Outcome</td>
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<tr>
<td>Body Size</td>
<td>Hormones</td>
<td>Morphology</td>
<td>PSA/PSAD/DRE</td>
<td>Free PSA/Ratios</td>
<td>Adjunct Therapy</td>
<td>HGPIN</td>
<td>ASAP</td>
<td>PCa Stage</td>
<td>Grade</td>
<td>Diet and Exercise</td>
<td>Hormonal Surgery</td>
<td>Radiotherapy</td>
<td>Chemotherapy</td>
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</table>

Intl Hospital-based Comprehensive Case-control Studies!
Breast Cancer

Risk Factors
Estrogen, Progesterone, Insulin
Reproductive Parameters
Anthropomorphic Parameters

Protective Factors
Exercise
Dietary Soy

Risk and Protective Factors

<table>
<thead>
<tr>
<th>CIV Volume</th>
<th>IV</th>
<th>V</th>
<th>VI#</th>
<th>VII##</th>
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## Age-Dependence

### Table 1. Age-Dependence of the Breast Cancer Burden

<table>
<thead>
<tr>
<th>Registry</th>
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<td>45-54</td>
<td>55-64</td>
<td>65-74</td>
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<td>15.8</td>
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<td>9.7</td>
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<tr>
<td>Thailand, Khon Kaen</td>
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<td>1.1</td>
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<td>38.3</td>
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</tbody>
</table>

*Incidence/100,000 x percentage of the female population

# Data from Parkin et al., 1997
Menarche-Associated Risk Factors

- Energy
- BMI
- Lack of Exercise
- Smoking
- Birth Weight
- Removal of GnRH Block
- Estrogen
- Leptin
- IGF-I
- Height Spurt
- Menarche

<table>
<thead>
<tr>
<th>Age</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
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<tbody>
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<td>II</td>
<td>III</td>
<td>IV</td>
<td>V</td>
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<tr>
<td>Scant</td>
<td>Breast Development</td>
<td>Mature</td>
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</tbody>
</table>

GnRH: Gonadotropin Releasing Hormone
Ovarian Cancer

Endometrial Cancer

Thyroid Cancer
Cervical Cancer

Risk Factors
HPV, Smoking

Protective Factors
Vaccination
Screening - HPV/VIA/PAP Smear

<table>
<thead>
<tr>
<th>CIVVolume</th>
<th>IV</th>
<th>V</th>
<th>VI#</th>
<th>VII##</th>
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<td>4.5</td>
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</table>
Cervical Screening - Economic Factors to Consider

Persuasion  Set up  Vaccine  Staff  Location

Incidence  Mortality  HPV Types  Compliance  Sensitivity  Specificity  Predictive potential

Screening: Pap smear/HPV/VIA/VILI

Virginal  Exposure starts  Transient/Persistent Infection

Age  10  15  20  25  30  35  40  45  50  55  60  65  70  75

India  (30)  4.4 (7.8)  12.4 (22)  18.6 (33)  14.9 (27)  6.1 (7.8)
Thailand  (20)  2.7 (7.9)  7.2 (25)  10.2 (36)  7.2 (25)  1.1 (2.3)
Japan  (8)  1.5 (6.7)  4.8 (21)  5.8 (26)  5.5 (24)  4.9 (22)

Colposcopy  Treatment  Surgery  Chemotherapy  Radiotherapy

Persuasion  Set up  Test costs  Staff  Location

Normal  CIN 1  CIN 2-3  Adenocarcinoma in situ

Treat if persists  Treat immediately

Cryotherapy/LEEP/Conization

Normal  Persistent Disease

Re-treatment  Re-enter Screening
Health Problem Explosion?
Diabetes Prevalence
Generally Increasing: Breast, Thyroid, Colon, Prostate
Don’t be Thrifty - Spend it!

Fatty Meat
Low N3/N6 Ratio
High Fructose Soft Drinks
High Fat Snacks

Couch Potato

Lean Meat
High N3/N6 Ratio
Nuts Fruits Grains

Catch the Wild Animal Legs

TV Dinners Motors

Lean Machine

Nutrition and Physical Exercise!
Knowledge about Cervical Cancer Risk Factors and Pap Testing Behaviour among Turkish Women
Increased Serum Granulocyte Colony Stimulating Factor in Turkish Hepatocellular Carcinoma Patients
Efficacy of a Training Course Given by Midwives Concerning Cervical Cancer Risk Factors and Prevention
Prognostic Significance of the C-erbB-2 Expression in Turkish Non-Small Cell Lung Cancer Patients
Incidence and Epidemiological Features of Cancers of the Genitourinary Tract in Izmir between 1993-2002
Health Beliefs and Breast Self-Examination in a Sample of Turkish Women Academicians in a University
Normal CA 19-9 Levels in Hashimoto’s Thyroiditis
Mathematical Models for Human Cancer Incidence Rates - Application to Results from Europe, including North Cyprus
Breast Cancer Screening Behavior in Turkish Women: Relationships with Health Beliefs and Self-esteem, Body Perception and Hopelessness
Efficacy and Toxicity of Gemcitabine and Pegylated Liposomal Doxorubicin in Recurrent Platinum - Resistant/Refractory Epithelial Ovarian Cancer
Psychological and Social Adaptation of Women With Breast Cancer
Comparison of ER, PR & HER-2/neu (C-erb B 2) Reactivity Pattern with Histologic Grade, Tumor Size and Lymph Node Status in Breast Cancer
Eating Habits, Knowledge about Cancer Prevention and the HPLP Scale in Turkish Adolescents
Importance of Social Support for Functional Status in Breast Cancer Patients
Whole Body 18F-FDG PET/CT Imaging in the Detection of Primary Tumours in Patients with a Metastatic Carcinoma of Unknown Origin
Effects of Emotional Support-Focused Nursing Interventions on the Psychosocial Adjustment of Breast Cancer Patients
Cancer Incidence in North Cyprus (1990-2004) Relative to European Rates
Why Do Men Refuse Prostate Cancer Screening? Demographic Analysis in Turkey
Changes in Functional Status and Physical and Psychological Symptoms in Women Receiving Chemotherapy for Breast Cancer
Why are Turkish Children at Risk of Exposure to Environmental Tobacco Smoke in Their Homes?
Radiotherapy-related Tiredness in Patients with Glioblastoma Multiforme (GBM)
Health Promotion Lifestyle and Cancer Screening Behaviors: A Survey among Academician Women
Dietary Agents in Prevention of Prostate Cancer
Lack of Influence of Cyclooxygenase-2 Expression in Hepatocellular Carcinomas on Patient Survival
Comparison of Mediterranean, Western and Japanese Diets and Some Recommendations
Geographical Variation

Birth cohort effect - change in exposure to risk factors, supported by data from migrant studies

Young populations in Asia

Importance of childhood and adolescence

The inevitable result will be markedly increasing rates in the future - we are now seeing only the tip of the iceberg
National Cancer Control Programs?

People Power

Thank you!