National Cancer Institute

Cancer Incidence in Four Member Countries (Cyprus, Egypt, Israel, and Jordan) of the Middle East Cancer Consortium (MECC) Compared with US SEER

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Front cover pictures (clockwise, beginning upper left):

Cyprus: 7th century Byzantine castle in Pathos, ruined by earthquake in 1222.
Egypt: Menkaure's Pyramid on Giza Plateau.
Israel: Jaffa Port, a seaport at least 3200 years old.
Jordan: Petra, an impressive facade carved into the rock more than 2000 years ago.

Middle East Cancer Consortium

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Preface

In 1996, the Ministers of Health of Egypt, Israel, Jordan, Cyprus, and the Palestinian Authority (PA) signed an agreement to establish the Middle East Cancer Consortium (MECC). The U.S. Secretary of Health and Human Services witnessed the signature ceremony (Figure 1). Turkey joined the Consortium as a full member state in 2004. The main goal of the new Consortium was to develop regional cooperation and to lessen the burden of cancer in the Middle East. After continuous deliberations, it was decided that the development of a cancer registration network across borders would be the first feasible project. Prior to the agreement, most of the countries in the Consortium had only recently begun to establish population-based registries, starting with, in most cases, hospital-based registries. Hence, by accelerating and strengthening this process, the Joint Cancer Registration Project very quickly became the flagship of MECC's activities in the region.

MECC has either established or supported, along with the respective Ministries of Health, local centers for cancer registry covering the following populations: Jordan (registry situated in Amman); Gharbiah Region, Egypt (registry situated in Tanta); Israel (registry situated in Jerusalem); West Bank, PA (registry situated in Beit Jala, Bethlehem); Gaza Strip, PA (registry situated in Gaza City); Cyprus (registry situated in Nicosia); and Izmir, Turkey (registry situated in the city of Izmir). The major preliminary goal of educating and training a nucleus of registry staff in each country was achieved via courses in the region and in the United States, led by Dr. John Young of Emory University, Atlanta, Georgia. An additional important issue related to standardizing the coding and classification of the registration information and adopting one computer program that would enable comparative studies among the countries. With the support of the International Agency for Research on Cancer (IARC) in Lyon, France, the new MECC cancer registries began to use the CANREG program. This software was relatively easy to operate and had the constant backing of IARC staff (Drs. Andy Cook and

Figure 1. Ministers of Health, Geneva, 2000. From left to right: Mr. Frixos Savvides (Cyprus); Dr. Riad El-Zaanoun (Palestinian Authority); Dr. Donna Shalala, chair (United States); Dr. Ismail Salam (Egypt); and Mr. Shlomo Benizri (Israel). Not pictured: Dr. Faleh Al-Naser (Jordan), who was not present at that occasion.

Preface

Venkata Kumar) through electronic support and site visits to the Middle Eastern centers.

To coordinate the work of this international group, Professor Laurence Freedman was appointed as chairman of the Steering Committee for the Joint Cancer Registration Project. Professor Freedman's responsibilities were to provide overall supervision of the scientific direction of the project, maintain communications across borders, and organize the annual meetings of the Joint Cancer Registration Project, which initially rotated between the various capitals in the Middle East and IARC in Lyon. One person in each cancer registry center was appointed as principal investigator (PI), to serve on the Steering Committee and as the chairman's contact person for ongoing issues. These PIs are Dr. Charitini Komodiki (Cyprus), Professor Amal S. Ibrahim (Egypt), Dr. Khamis Najjar (Gaza Strip, PA), Dr. Micha Barchana (Israel), Dr. Samir Al-Kayed (Jordan), Dr. Sultan Eser (Turkey), and Dr. Abdel Razzaq Salhab (West Bank, PA). The coordination was often difficult, due to circumstances in the region, but by and large it yielded very positive results, including, ultimately, this monograph. The frequent interactions between the PIs and the cancer registry staff in the MECC countries also served to develop better understanding between the individuals involved, including physicians, nurses, secretaries, statisticians, and others.

The scientific aspects of the regional cancer registry program have been strongly supported by Dr. John Young; Dr. Elaine Ron of the Division of Cancer Epidemiology and Genetics, National Cancer Institute (NCI), Bethesda, Maryland; and Dr. Brenda Edwards, Associate Director, Division of Cancer Control and Population Sciences, NCI, and her dedicated staff. Drs. Young, Ron, and Edwards serve as members of the Steering Committee.

The policies associated with the present and future work of the registry project are set by the MECC Board of Governors (one representative from each member state): Dr. Samir Al-Kayed, chairman (Jordan); Professor Amal S. Ibrahim (Egypt); Dr. Charitini Komodiki (Cyprus); Dr. Khamis Najjar (Palestinian Authority); Professor Rami Rahamimoff (Israel); and Professor Murat Tuncer (Turkey); together with the NCI coordinator, Dr. Joe Harford (United States) (Figure 2). The Board of Governors bears the responsibility of approving the annual budget for each center, adding special allocations for new equipment, assigning the budget for the annual meetings, and discussing all other initiatives and proposals associated with the registry project. The greater part of MECC's annual budget is allocated to the registry project, and funds are channeled to MECC through NCI.

Because MECC is supported directly by the National Institutes of Health through NCI, which is a research institute, the expectations are always that the program will eventually yield a tangible scientific product. I believe that this monograph complies with the above expectations, and I do hope that it is only the first in a series of comprehensive publications related to cancer registration in the Middle East.

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Figure 2. MECC Board of Governors

Executive Summary

Cancer Incidence in Four Member Countries (Cyprus, Egypt, Israel, and Jordan) of the Middle East Cancer Consortium (MECC) Compared with US SEER is the first comprehensive publication of the MECC Cancer Registration Project. This monograph presents information about cancer incidence for populations in Cyprus, Egypt (Gharbiah Region), Israel (Jews and Arabs), and Jordan for the period 1996-2001. The MECC findings are compared with those from the US Surveillance, Epidemiology, and End Results (SEER) Program.

For most of the cancers described in this monograph, incidence is expressed as age-standardized incidence rates (ASRs) per 100,000 population. The ASR is a summary measure that permits comparison of incidence rates across populations while adjusting for differences in age distributions. ASRs for childhood cancers are expressed per 1 million population.

MAJOR FINDINGS

- The **overall incidence of cancer** was substantially higher in the US SEER population and in Israeli Jews than in the other MECC populations. Cypriots, Israeli Arabs, and Egyptians had intermediate rates, while the Jordanian rates were the lowest. This pattern was seen for both males and females across the registries.
- Israeli Jews had the highest rate of **colorectal cancer** among the MECC populations, and their rate was higher than that of US SEER. The other MECC populations had rates less than half that of Israeli Jews.
- The incidence of **liver cancer** in Egyptians was more than 3 times that in US SEER and about 5 to 7 times that in the other MECC populations.
- Although overall **lung cancer** incidence in the MECC populations was much lower than in the US SEER population, younger Israeli Arab males (under 60 years of age) had rates comparable to those in US SEER.
- **Urinary bladder cancer** incidence was very high among Egyptians and Israeli Jews, surpassing rates in the US SEER population. Egypt's high rate is at least partly explained by the previously high prevalence of schistosomiasis, known to lead to squamous cell carcinoma of the urinary bladder. However, the currently high proportion of transitional cell carcinoma in Egypt may indicate a changing etiology of urinary bladder cancer in that population.
- **Non-Hodgkin lymphoma** incidence was very high in Israeli Jews and Egyptians – higher than in US SEER, which was considered to have one of the highest rates worldwide.
- **Childhood cancer** incidence (under age 15 years) was high among Cypriots and higher than in the US SEER population. The high rate among Cypriots was mainly due to high rates of childhood leukemia and central nervous system malignancies.
- The incidence of **childhood lymphoma** was particularly high among Egyptians, compared with the other populations studied.

MAIN FINDINGS BY CHAPTER

Chapter 1: Overview and Summary Data

- The age distributions of the populations varied widely. The populations of Egyptians, Israeli Arabs, and Jordanians had higher proportions of young people (younger than 20 years) and lower proportions of older people (older than 50 years) than the populations of Cypriots, Israeli Jews, and US SEER.
- In the populations studied, cancer of the digestive system accounted for about 20% of all cancers, and cancer of the breast, about 33% of female cancers – with relatively little variation across the populations.

- Cancer of the male genital system (mostly prostate) accounted for as little as 4%-10% of male cancers in Egyptians, Jordanians, and Israeli Arabs, compared with 19%-33% in Israeli Jews, Cypriots, and the US SEER population.
- The younger populations (Israeli Arabs, Jordanians, and Egyptians) had a greater proportion (16%-18%) of leukemias and lymphomas than the older populations (Cypriots, Israeli Jews, and US SEER) (7%-9%).
- Two populations, US SEER and Israeli Jews, had substantially higher ASRs overall (318.6 and 274.4, respectively), compared with the others. The Cypriot (164.2), Israeli Arab (149.8), and Egyptian (143.0) populations had intermediate rates, while the Jordanian rates (113.3) were the lowest. This same pattern was seen for both males and females.

Chapter 2: Esophageal Cancer

- The incidence of esophageal cancer in the MECC countries was among the lowest in the world, with ASRs ranging between 0.6 and 1.5, compared with 3.0 in US SEER. This may be related to the relatively low consumption of alcohol in the region. In contrast, there is a high prevalence of smoking in almost all of the MECC countries, which would tend to increase esophageal cancer rates. Further study seems warranted.

Chapter 3: Stomach Cancer

- Compared with the US SEER population (5.3), the ASR for stomach cancer was low among Egyptians (2.9); similar among Cypriots, Israeli Arabs, and Jordanians; and high among Israeli Jews (8.5).

Chapter 4: Colorectal Cancer

- The ASR for colorectal cancer was particularly high among Israeli Jews (36.9), and higher than in the US SEER population (32.0). Other MECC populations had rates less than half that among Israeli Jews. The gap in incidence between the Israeli Jewish and US SEER populations was even greater in the 70-and-older age group.

Chapter 5: Liver and Intrahepatic Bile Duct Cancer

- The incidence of liver and intrahepatic bile duct cancer in Egyptians (12.8) was more than 3 times that in the US SEER population (4.2) and 5 to 7 times that in the other MECC populations. The high rates in Egypt may be related to the prevalence of hepatitis B and hepatitis C in the population or to contamination of food by aflatoxins.

Chapter 6: Lung Cancer

- The incidence of lung cancer in the MECC populations (9.9-20.4) was lower than that in the US SEER population (39.2).
- Age-specific rates of lung cancer among Israeli Arab males aged 50 to 59 years (92.9) were comparable to those in the US SEER population (86.2). Israeli Arab men are known to have high tobacco consumption, and the high lung cancer rates at younger ages may reflect a cohort effect of rising rates in this population.
- The lung cancer ASR in Israeli Jews (19.0) was less than half that in the US SEER population (39.2). Yet, past records indicate higher rates of tobacco consumption among Israeli males than US males for the past 30 years. This possible anomaly calls for further study.

Executive Summary

Chapter 7: Laryngeal Cancer

- The incidence of laryngeal cancer in males in the MECC populations (1.6-3.1) was comparable to that in US SEER (2.7), although rates were somewhat higher in Israeli Arabs (3.1) and somewhat lower in Cypriots (1.6). This similarity between rates in MECC and US SEER merits further study.

Chapter 8: Breast Cancer

- The ASR of female breast cancer was high in Israeli Jews (93.1), comparable to that in the US SEER population (97.2). The other MECC populations had much lower rates (36.7-57.7).
- Age-specific rates of breast cancer among women under 55 years of age were higher in Israeli Jews than in the US SEER population. These high rates may be related to the genetic mutations in the *BRCA* genes known to be more prevalent among Ashkenazi women.

Chapter 9: Cervical and Corpus Uterine Cancer

- The incidence of cervical cancer was low in the MECC populations (2.5-5.3), substantially lower than in the US SEER population (7.0). This may be related to differences in sexual behavior between the populations.
- The incidence of corpus cancer and uterine cancer not otherwise specified was lower in the MECC populations (3.5-13.8) than in the US SEER population (17.6). Within MECC populations, the higher rates were found among Cypriots (11.8) and Israeli Jews (13.8). These results may be related to differences in the number of children born and the use of hormone replacement therapy in these populations.

Chapter 10: Ovarian Cancer

- The incidence of ovarian cancer in Israeli Jews (9.4) and Cypriots (7.7) was a little lower than that in the US SEER population (10.0). The rate was substantially lower in the other MECC populations (3.6-5.4). These differences may be related to differences in the number of children born in these populations.

Chapter 11: Urinary Bladder Cancer

- The incidence of urinary bladder cancer was very high in Egyptians (16.6) and Israeli Jews (15.1) – higher than the incidence in the US SEER population (12.2). The ASR was intermediate among Cypriots (11.2) and low among Israeli Arabs (8.6) and Jordanians (7.6).
- The high urinary bladder cancer rate in Egypt is at least partly explained by the previously high prevalence of schistosomiasis, known to lead to squamous cell carcinoma (SCC) of the urinary bladder. The proportion of SCC among all urinary bladder cancers was 26% in Egyptians, compared with 0%-2% in the other MECC populations and US SEER. Transitional cell carcinoma (TCC), the type of urinary bladder cancer found in most Western countries and associated with cigarette smoking, accounted for 63% of the urinary bladder cancers in Egypt and over 90% of the urinary bladder cancers in the other MECC populations and US SEER. That as much as 63% of the cancers in Egypt were TCC may indicate a changing etiology of urinary bladder cancer in that population. Further studies are indicated.
- The high rate of urinary bladder cancer in Israeli Jews may be related to high rates of cigarette smoking. This calls for further study.

Chapter 12: Brain and Other Central Nervous System Cancer

- The ASR of malignant brain tumors in Israeli Jews was identical to that in the US SEER population (4.9). The rates in the other MECC populations were somewhat lower (3.2-4.1). The higher rate in Israeli Jews may be related to the practice of head irradiation for tinea capitis, a treatment given to a substantial proportion of immigrant children entering Israel during the 1950s.

Chapter 13: Thyroid Cancer

- The ASR of thyroid cancer was higher in Israeli Jews (7.5) than in the US SEER population (6.2). The ASRs were moderate in Cypriots (5.6) and lower in Israeli Arabs, Egyptians, and Jordanians (2.0-4.1). The ASR in Israeli Jewish women (11.2) was second only to that among Icelandic women (13.1), and may be related to the head irradiation treatment for tinea capitis received by many children immigrating to Israel during the 1950s.

Chapter 14: Lymphoma and Leukemia

- The incidence rate of non-Hodgkin lymphoma was very high in Israeli Jews (15.2) and Egyptians (14.2) – higher than the rate in the US SEER population (12.9), which was considered one of the highest worldwide. The other MECC populations had lower rates (6.4-10.2). The reasons for the high rates in Israeli Jews and Egyptians are not well understood and require further study.
- The proportions of non-Hodgkin lymphomas that were extranodal did not differ widely across the populations studied (23%-36%).
- The ASR of Hodgkin lymphoma was somewhat higher in most of the MECC populations (2.1-3.4) than in the US SEER population (2.4). Rates were highest among Israeli Jews (3.4) and Cypriots (3.0).
- The ASR of leukemia in Israeli Jews (8.6) was similar to that in the US SEER population (8.8). The rates in the other MECC populations were lower (6.0-6.9).

Chapter 15: Childhood Cancer

- The ASR of childhood cancer (under age 15 years) was high among Cypriots (170.0 per million), compared with US SEER (153.3) and with the other MECC populations (114.8-133.3).
- Rates of childhood leukemia (under age 15) were highest among Cypriots (53.0) and the US SEER population (50.4). The rates in other MECC populations ranged from 29.4 to 39.2.
- The incidence of childhood lymphoma (under age 15) was particularly high among Egyptians (37.7), compared with the other populations studied, and was higher in MECC populations (15.7-24.2) than in the US SEER population (13.5).
- The incidence of childhood central nervous system malignancies (under age 15) was high in Cypriots (40.1) and higher than in the US SEER population (32.5). ASRs in other MECC populations were lower (16.5-24.2).
- Reasons for the high rates of childhood leukemia and CNS malignancies in Cypriots and the high rate of childhood lymphoma in Egyptians are not understood and call for investigation.