

STEM CELL RESEARCH IN THE GREATER MIDDLE EAST

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Introduction

While fossil fuel resources have strengthened the economies of numerous countries in the Greater Middle East (GME) for decades, multiple nations within this region are now increasingly investing in internal science and engineering programs as a mechanism to develop more extensive knowledge-based economies. The extent to which these efforts have been productive remains unknown, therefore we decided to analyze one of these emerging disciplines, stem cell research. Here, we assess the state of stem cell research in the GME by quantifying publication data from a ten year period (1998–2008), reporting on the policy and ethical considerations facing the region, and determining the impact of international collaborations on research in this area.

Methods

To evaluate the state of stem cell research in the GME, we conducted a systematic literature review of regional publications from 1998 to 2008 using the ISI Science Citation Index. Stem cell research articles were identified from the GME by entering search entries with the keyword string “TS=(“stem cell”) AND CU=Respective Country AND Document Type=(Article).” Country attribution for each publication was determined by the corresponding author’s institutional affiliation. These publications were then examined by hand to eliminate those that did not derive or use stem cells in an experimental context or did not report original research such as reviews. Excluded publications include articles not indexed by ISI, non-English language journals, book chapters, abstracts and conference proceedings.

Conclusions

Overall, our data show that stem cell research in the GME is located in only a limited number of countries prior to 2008. Of the countries publishing, the majority only recently began contributing to the field and initiating state-funded programs. We have also shown that when the countries of the GME collaborate with other nations to research stem cells, the resulting publications are of higher impact, based on citation rates, than when these nations produce this research independently. National governments in the GME, as well as other countries looking to expand their stem cell research programs, would be well advised to strive for policy interoperability regarding stem cell research regulation to enhance this effect.

From a regulatory standpoint, much of the GME is without formal legislation regarding human embryonic stem cell research. Religious decrees or fatwas outlining acceptable practices in this research area are present in multiple Islamic-majority countries, but these fatwas do not provide the necessary framework to foster international collaborations with nations that have enacted formal, internationally recognized laws.

Fortunately, nations in the GME can study and learn from the history of stem cell research policy developments from already well-established countries and international unions and scientific societies. The governments in the GME have the unique chance to establish stem cell research policies which confer interoperability between nations to foster crucial international collaborations. As science itself knows no boundaries, these partnerships would not only benefit the nations involved, but they would increase the rate by which knowledge and understanding is achieved.

Flynn, J.F. and K.R. Matthews. 2010. Stem Cell Research in the Greater Middle East. Stem Cell Reviews and Reports [EPub ahead of print], PMID#20198516.

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Results

Figure 1: The Greater Middle East

For the purposes of this study, we chose to define the GME as the region bridging northeastern Africa and southwestern Asia comprised of: Afghanistan, Algeria, Bahrain, Djibouti, Egypt, Israel, Iraq, Iran, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, Turkey, the United Arab Emirates (UAE), and Yemen.

The data reveal:

- Approximately **75%** of all stem cell research performed in the GME from 1975 to 2008 was produced from 1998 through 2008.
- These publications comprised approximately **2.1%** of all stem cell research performed worldwide for a total of **761 articles**.

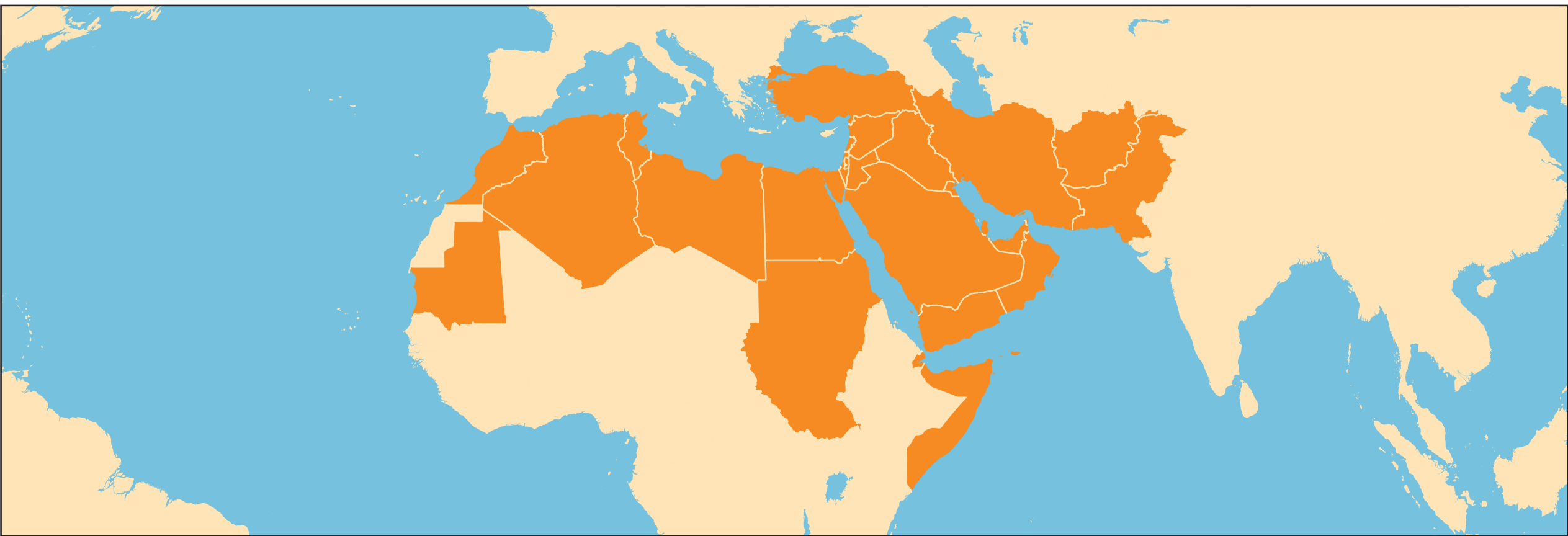
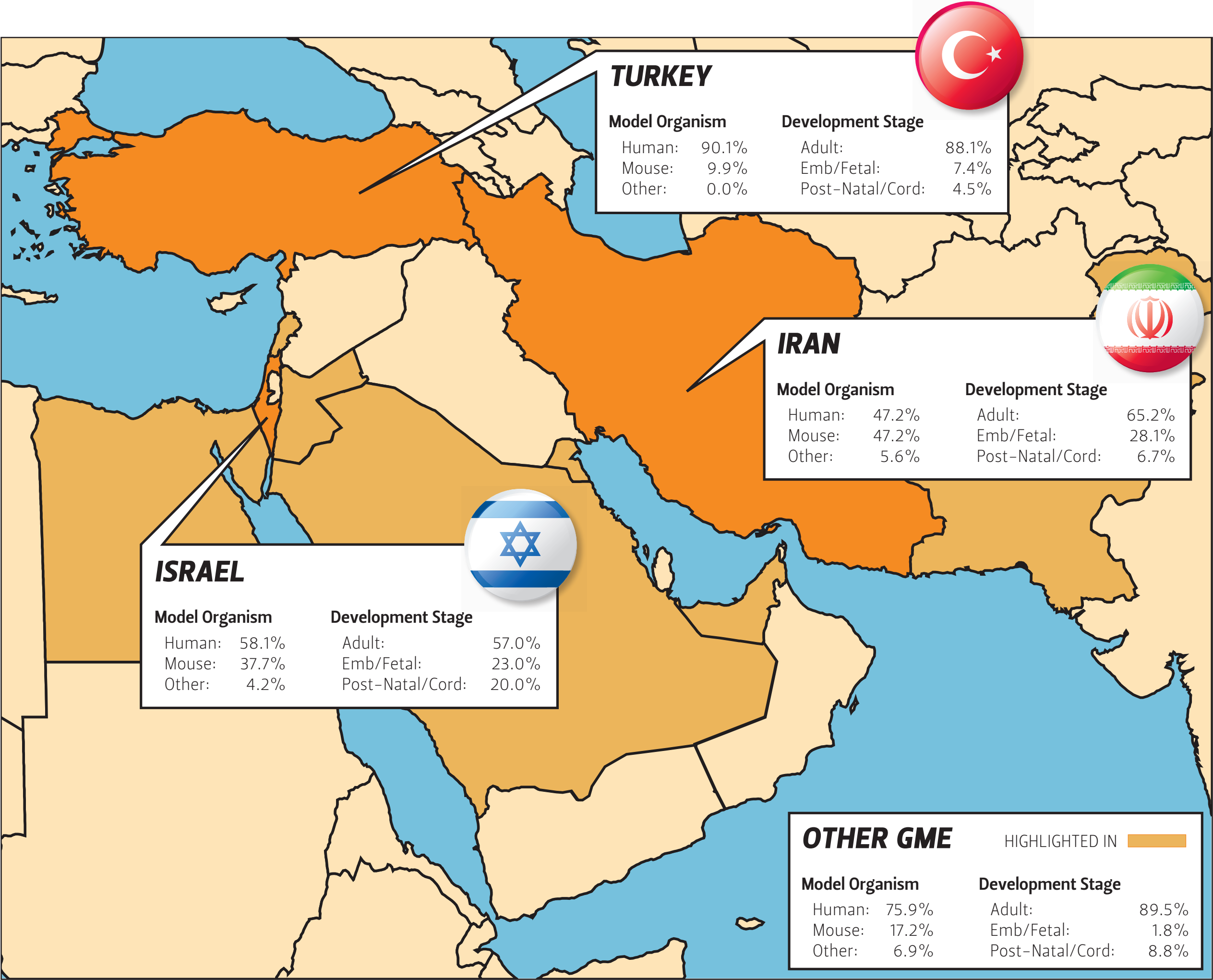


Figure 3. Characterization of Stem Cell Research in GME

Results demonstrate:

- Israel and Iran research included adult and embryonic stem cells from both human and mouse.
- Turkey and the remaining countries in the GME focused predominately on human adult stem cells.



Other GME defined as: Egypt, Jordan, Kuwait, Lebanon, Morocco, Pakistan, Saudi Arabia, Tunisia, and the UAE

Figure 2: Stem Cell Publications in the GME between 1998 to 2008

Of the 26 nations composing the GME, only 12 countries—Egypt, Israel, Iran, Jordan, Kuwait, Lebanon, Morocco, Pakistan, Saudi Arabia, Tunisia, Turkey, and the UAE—were identified as having published stem cell research articles.

Our data indicate:

- **Israel (440 articles)**, **Turkey (176 articles)** and **Iran (89 articles)** were the leading producers of stem cell publications in the region.
- These three countries constituted approximately **93%** of all journal articles in the GME.
- The remaining countries produced **56 articles** during this time.

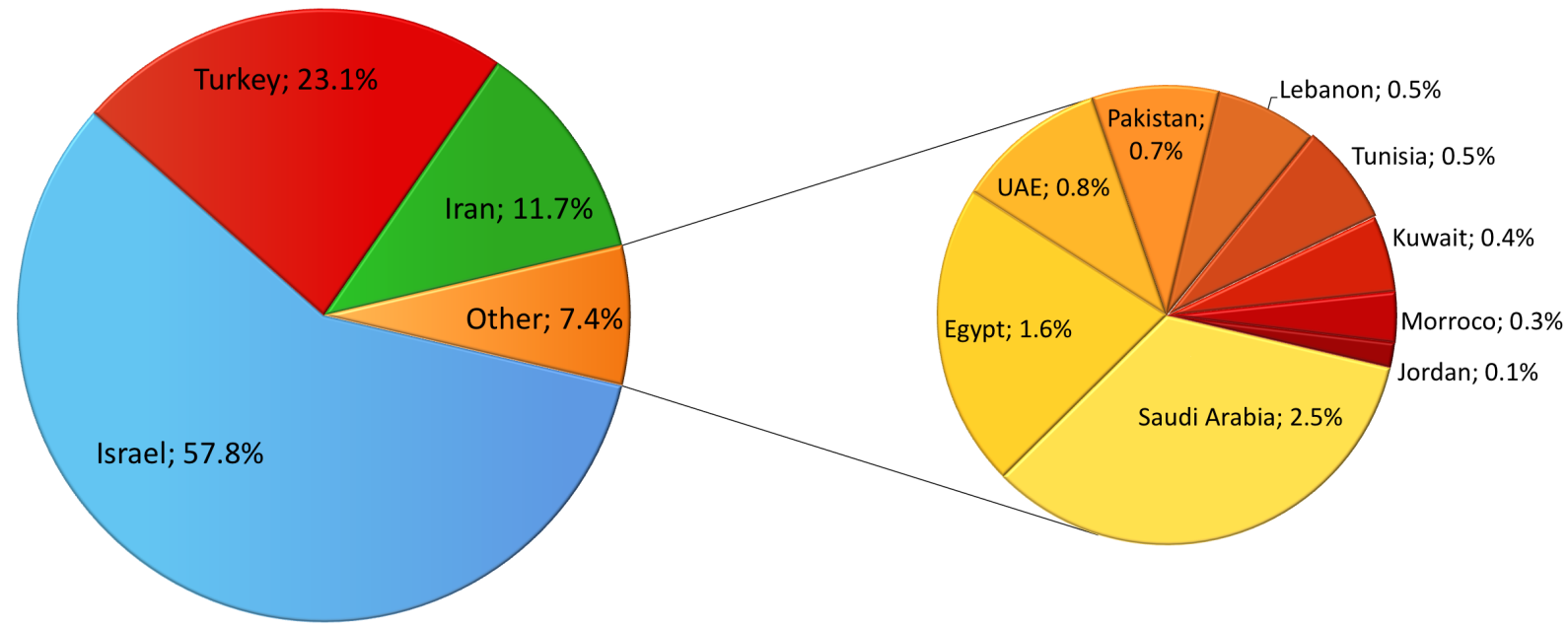
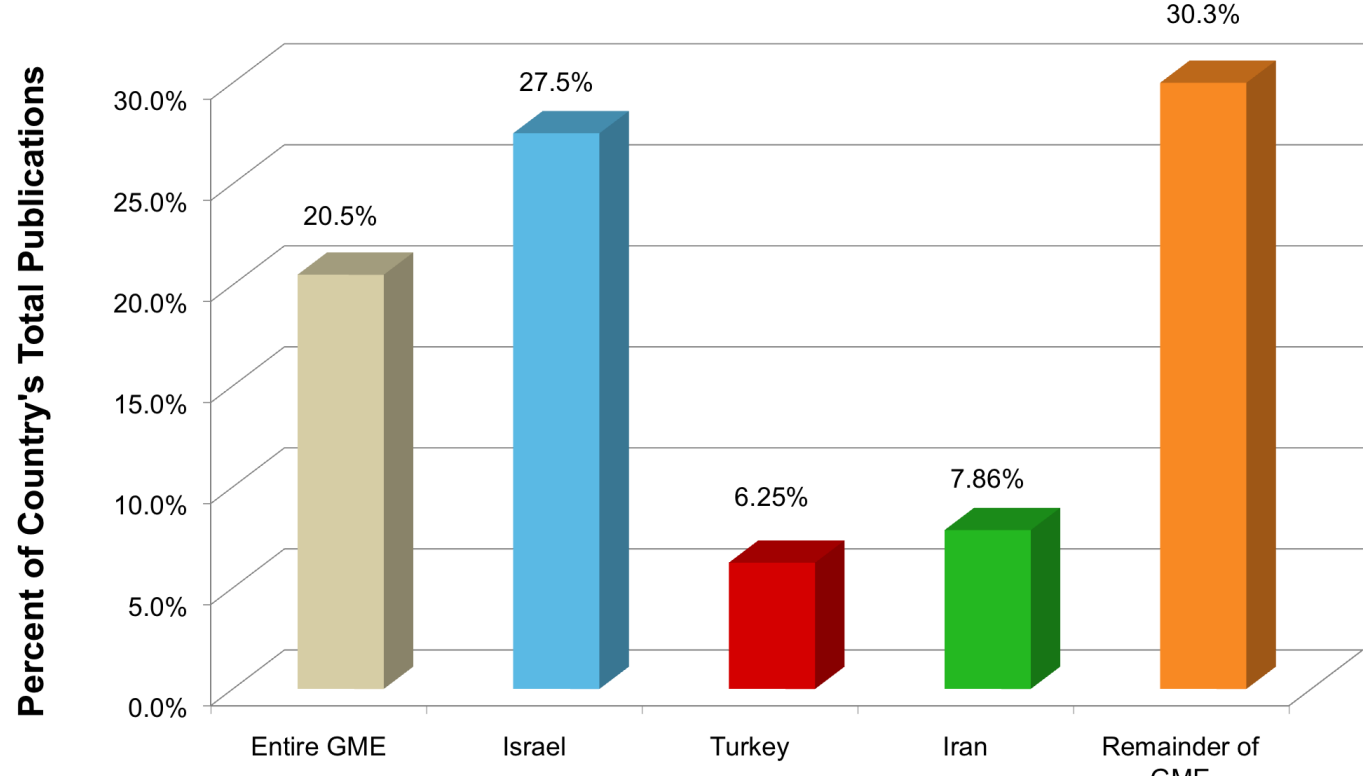


Figure 4: Impact of International Collaboration on Publications

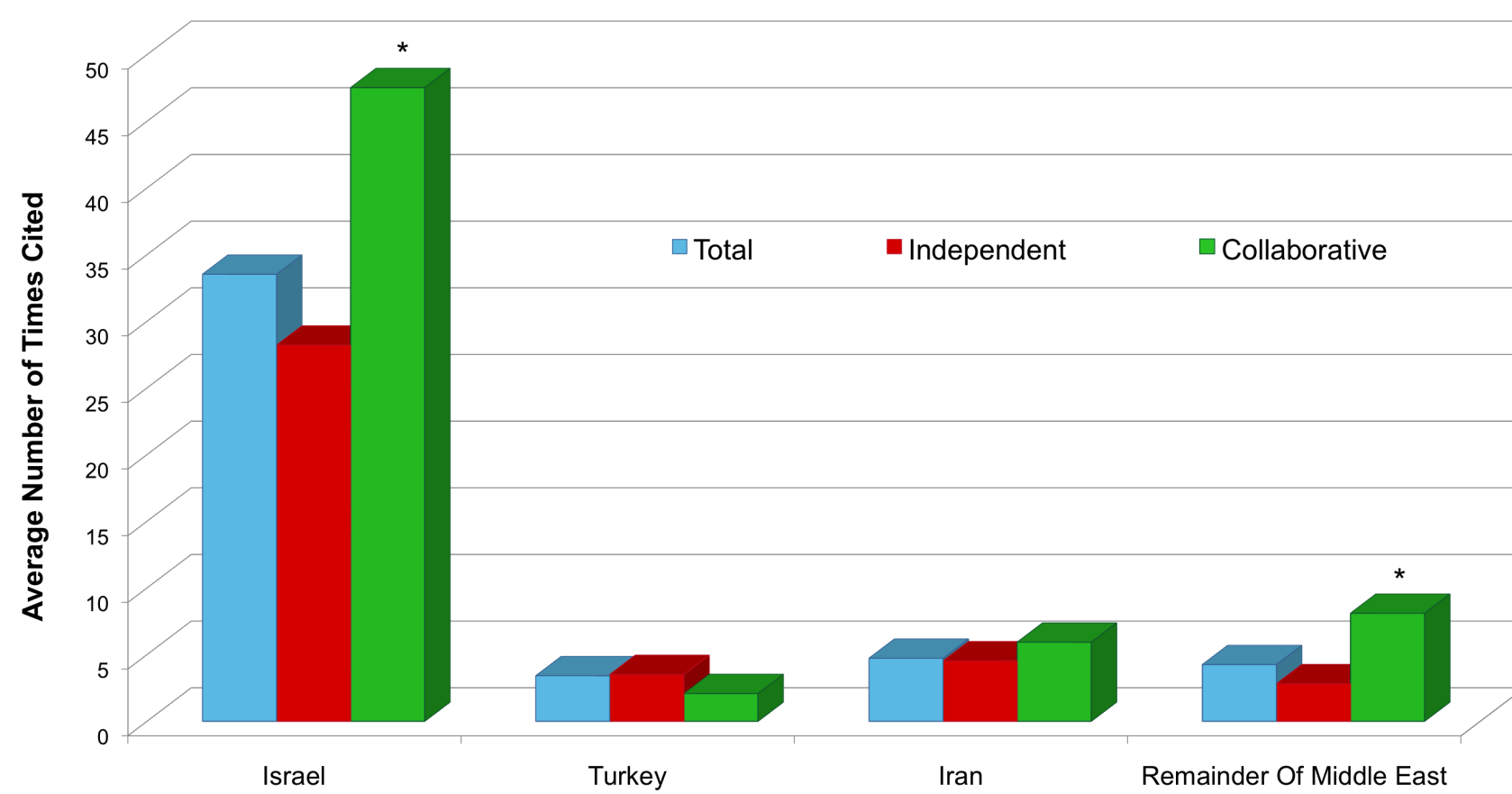
Data indicate:

- Turkey and Iran were less likely to engage in international collaborations than other countries in the region.
- International collaborations in the GME produced publications of greater impact, based on citation numbers.

4a. Publication Produced by International Collaborations



4b. Significance of Independent vs Collaborative Publications



* Statistically significant difference between independent and collaborative citations rates.

Literature Cited

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Matthews, K., and N. Lane. 2009. Baker Institute Policy Report: Science Collaboration Across Borders (www.bakerinstitute.org/publications/ST-pub-PolicyReport42-081809.pdf/view).

Further Information

More information on this or related projects can be obtained at the Baker Institute Science and Technology Policy Program website: science.bakerinstitute.org. A PDF version of the poster is also available at science.bakerinstitute.org/ISSCR2010.

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