# بسم الله الرحمن الرحيم


MONA MAGHRABY

# شبكة المعلومات الجامعية

# التوثيق الالكتروني والميكروفيلم

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# جامعة عين شمس

# التوثيق الإلكتروني والميكروفيلم

# قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

# يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

***MONA MAGHRABY***

# Correlation between the prostate-specific antigen level and bone metastasis in prostate cancer. (Retrospective study)

***Thesis***

for fulfillment of master degree in clinical oncology and nuclear medicine

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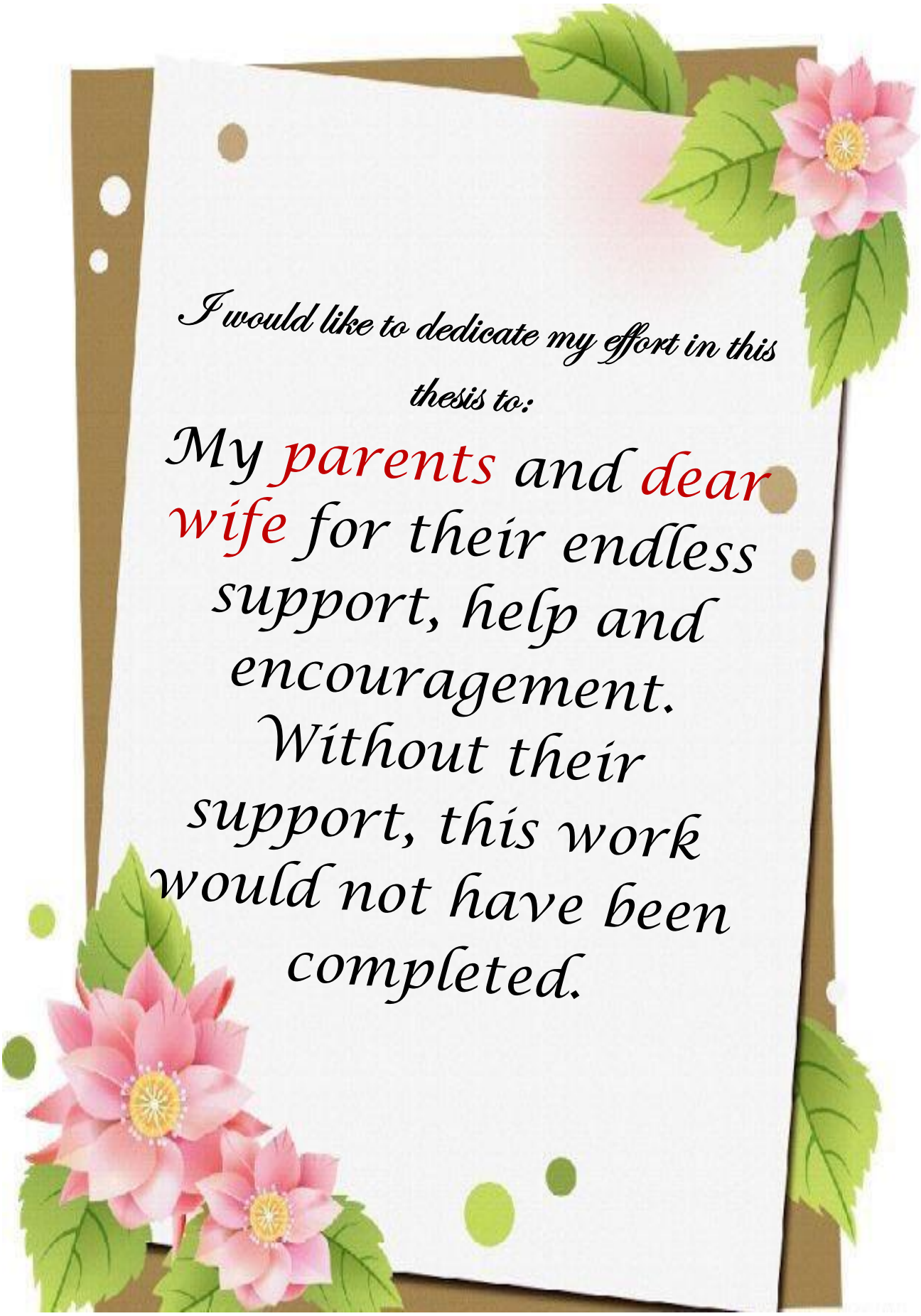
Adel Hassan Mohamed

2020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# List of abbreviations

| | |
|---|---|
| **EPE** | Extra prostatic extension |
| **ASAP** | atypical small acinar proliferation |
| **BS** | Bone scan |
| **BM** | Bone metastasis |
| **DCE** | dynamic contrast-enhanced |
| **DRE** | Digital rectal examination |
| **ECE** | extracapsular extension |
| **ED** | ejaculatory ducts |
| **MRI** | magnetic resonance imaging |
| **MDCT** | multidetector CT |
| **PET** | positron emission tomography |
| **PIN** | prostatic intra-epithelial neoplasia |
| **PSA** | prostate-specific antigen |
| **PZ** | peripheral zone |
| **SV** | seminal vesicles |
| **SVI** | Seminal vesicle invasion |
| **TRUS** | Transrectal ultrasound |
| **TURP** | transurethral resection of the prostate |
| **TZ** | transition zone |
| **ECE** | extracapsular extension |
| **IGF** | insulin-like growth factor |
| **PCa** | Prostate cancer |

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# Chapter 1

# Epidemiology and Risk Factors

Cancer is not one disease, but a heterogeneous cluster of malignancies. Even within one cancer type substantial variations exist, and prostate cancer (PCa) is no special case to that biological observation. Undoubtedly, disease heterogeneity is reflected by the diverse clinical courses of indolent, aggressive and lethal PCa .PCa is the second most commonly diagnosed cancer and the second leading cause of cancer death in males, after lung cancer ***(Siegel et al., 2018).***

The Incidence of PCa varies greatly worldwide. There are many reasons as the incompletely known risk factors are affected by ethnicity, environment and geography, in addition to lack of proper documentation and registry in some developing countries ***(Duggan et al., 2016).***

Bray et al, stated that worldwide the number of new cases diagnosed with PCa is 1,276,106 (7.1%) and the number of cancer deaths is 358,989 (3.8%)(figure 1) ***(Bray et al., 2018).***

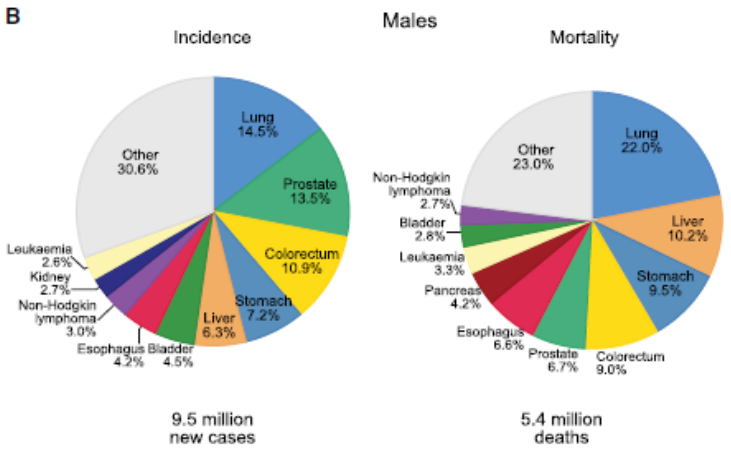


**Figure (1):** Distribution regarding Cases and Deaths of the ten most common cancers for males in 2018 ***(Bray et al., 2018).***

PCa is the most common diagnosed cancer in more than 100 countries compared by lung cancer in thirty seven countries, and liver cancer in thirteen countries outstandingly in the Northern and Western Europe, Americas, Australia/New Zealand, and much of Sub-Saharan Africa (Figure 2) ***(Bray et al., 2018).***

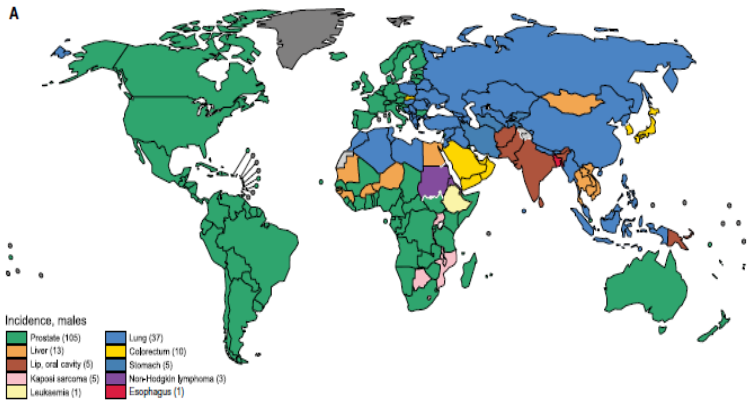


**Figure (2):** Global Maps Presenting the Most Common Type of Cancer Incidence in 2018 in Each Country among Men ***(Bray et al., 2018).***

The incidence of PCa as well as the mortality rate from PCa in Middle East and North Africa region is likely expected to increase from more than 29 thousands in 2012 to more than 38 thousands in 2020 and from about 15 thousands in 2012 to about 20 thousands in 2020 respectively (Figure 3) ***(Hilal et al., 2015).***

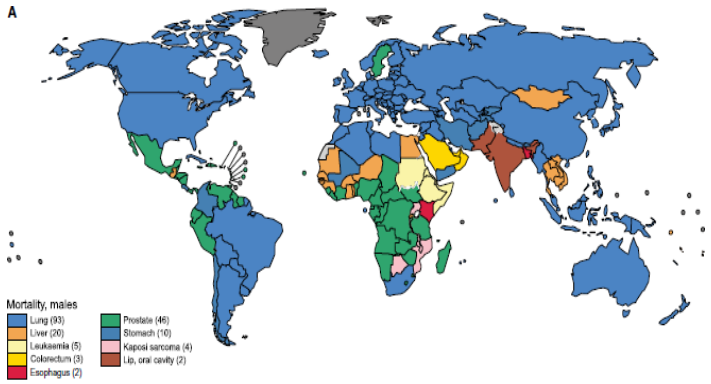


**Figure (3):** Global Maps Presenting the Most Common Type of Cancer Mortality by Country in 2018 among Men ***(Bray et al., 2018).***

The different levels of awareness about PCa and prostate specific antigen (PSA) testing with urbanization and sedentary life are the main reasons for higher PCa mortality rates in developing countries ***(Banerjee and Aaron, 2016).***

According to ***(Globocan 2018),*** incidence of PCa in Egypt in 2018 is 3109 (2.67%) that makes PCa the ninth between all cancers in Egypt. Also the number of patients who died from PCa is roughly 1237 patients (1.58%), and the 5-year prevalence among all ages is 6485 (12.91%) ***(Bray et al., 2018).***

Although incidence rates are high in Northern and Western Europe (eg, Norway, Sweden, Ireland), Australia/ New Zealand, and North America (particularly in the United States), death rates distribution is different from those of incidence, with death rates elevated in the Sub-Saharan Africa regions (eg, Benin, Zambia, South Africa, and Zimbabwe) as well as the Caribbean (Jamaica, Barbados, and Haiti)***(Figure 4) (Siegel et al., 2018)***

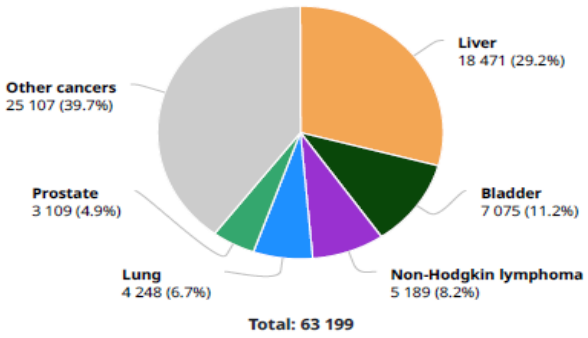


**Figure (4):** Number of new cases in 2018 in males of all ages.

According to the National Population-Based Registry program of Egypt 2008-2011; incidence of PCa in Egypt is about 4.27% ***(Ibrahim et al., 2014).***

Although PCa is a very common disease, its etiology is still not totally known. Ethnic and genetic predisposition somehow plays a role as

increasing the incidence of PCa among African men in the Caribbean and The United States ***(Harris, 2015).***

**Risk factors for PCa:**

- ***Old age.***

Age is one of the strongest associations with increased risk of PCa. It is uncommon for males younger than 40 years old to have PCa. Also, there is dramatic increase of PCa incidence rate after the age of 55 years old ***(Torre et al., 2015).***

However, after the implantation of screening for PSA in developed countries, diagnosis of PCa is shifted to an earlier age with average of 66 years old (Figure 5) ***(Tosoian et al., 2016).***

Besides that, early onset PCa has a different clinical phenotype and etiology ***(Salinas et al., 2014).***

The practice of PSA screening results in a lead time of ~10 years because of detection of PCa before symptom onset. Following the implementation of PSA screening in the United States, the average age at PCa diagnosis shifted earlier and is currently 66 years of age ***(Howlader et al. 2016).***

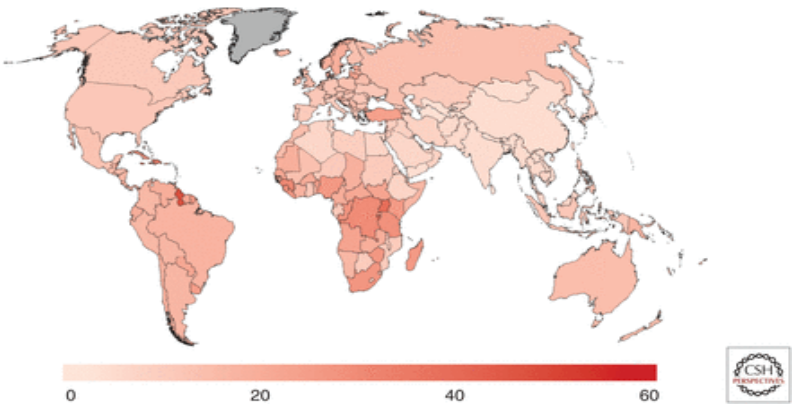


**Figure (5):** Age-adjusted PCa mortality rates worldwide. Rates are age-adjusted for comparisons across countries and are presented per 100,000 in the population. Gray, no data available.***(Globocan 2012)***