



European Society for Medical Oncology

**ESMO Translational Research Fellowship**

***“Breast cancer in young women: impact of pregnancy on biology and outcome”***

**Hatem A. Azim Jr., MD, MSc.**

**(Oct 2010 – Sep 2012)**

**Final Report**

**Host Institute:** Institut Jules Bordet, Brussels, Belgium  
**Mentor:** Christos Sotiriou, MD, PhD  
**Project title:** Genomic Profiling of breast cancer diagnosed during pregnancy  
**Home Institute:** National Cancer Institute, Cairo, Egypt  
**Supervisor at the home institute:** Rabab Gaafar, MD

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## 1. INTRODUCTION

My ESMO project aimed to define the effect of pregnancy on the biology of breast cancer using high throughput technology. This project was a part of a PhD thesis, which I am conducting at the Université Libre de Bruxelles, supervised by Prof. Christos Sotiriou and a PhD committee headed by Prof. Martine Piccart.

The title of my PhD thesis is *“Breast cancer in young women: impact of pregnancy on biology and outcome”*. Throughout the two years of my ESMO fellowship, I have been working on my ESMO project along with several other projects, mainly within the domain of my PhD as well as other domains. In the subsequent sections, I will go through the main methodology and results of the projects that have been started / accomplished during the fellowship period.

Later in the document I summarize the main abstracts / publications that were generated from this grant

## 2. PROJECTS IN PROGRESS/COMPLETED DURING THE FELLOWSHIP

### a. Breast cancer in young women

#### Introduction

Breast cancer in young women is known to be associated with poor outcome. However, little is known regarding its biology at the gene expression level, the role of gene expression signatures in determining patients' prognosis and whether breast cancer at a young age is enriched with unique biological processes.

#### Methods

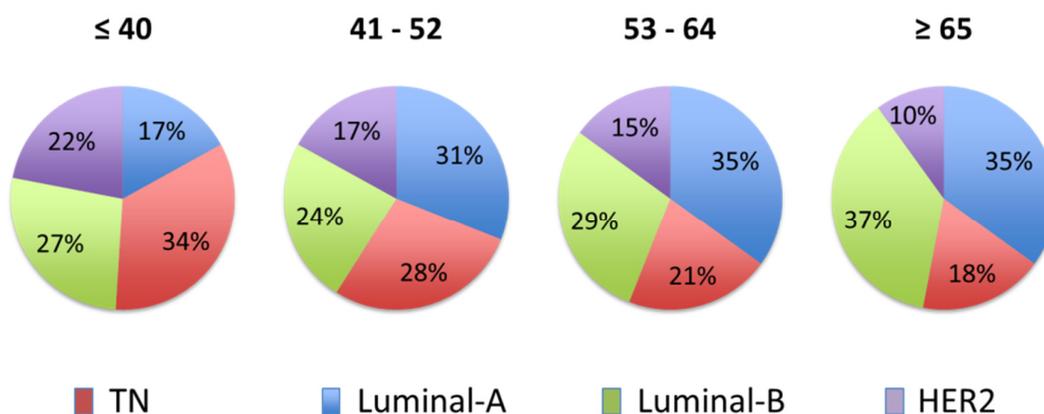
We performed an *in-silico* analysis for all publically available datasets of patients with operable breast cancer. Patients were assigned to 4 breast cancer molecular subtypes using a 3-gene classifier (*ESR1*, *ErbB2*, *AURKA*). We evaluated whether previously published proliferation, stroma, and immune-related gene signatures added prognostic information to Adjuvant! Online and tested their interaction with age in a Cox model for relapse-free survival (RFS). Furthermore, we evaluated the association between candidate age-related genes or gene sets with age in a linear regression model adjusted for tumor stage, histological grade and breast cancer subtype.

#### Results

A total of 3,522 patients were included; of whom 451 patients were 40 years or younger. We found that

- 1) Breast cancer in young women is enriched with basal-like or triple negative tumors compared to older age groups ( $p < 0.0001$ ) (Figure 1).
- 2) Young patients have poor RFS compared to older age groups irrespective of tumor stage and breast cancer subtype (HR: 1.34, 95% CI 1.1 – 1.6,  $p = 0.004$ ).
- 3) Proliferation gene signatures add prognostic information to Adjuvant! irrespective of age.
- 4) Breast cancer in young women is enriched with unique biological processes (Table 1).

**Figure 1:** High triple negative tumors in young breast cancer patients



**Table 1:** Genes and gene sets associated with young age

	Genes	Gene sets	Training set (n=1188)		Validation set (n=2334)		Direction
			Effect of age adjusted to all covariates *	FDR	Effect of age adjusted to all covariates *	FDR	
Apoptosis-related	FAS CASP3 BAD		6.6E-03 2.2E-02 3.2E-02	0.03 0.08 0.11	3.9E-03 2.5E-02 1.7E-02	0.008 0.04 0.03	down
MAP kinase – related		MAPK	5.8E-07	<0.0001	5.9E-05	0.0002	up
mTOR/PI3K – related	PDPk1	PIK3CA-GS	2.1E-02 6.7E-09	0.08 <0.0001	7.6E-04 5.0E-11	0.002 <0.0001	up
BRCA-related	BRCA1	BRCA1	3.8E-04 4.5E-03	0.003 0.02	4.4E-02 2.5E-03	0.06 0.006	down up
Stem cell-related	RANKL	MaSC	1.8E-10 1.5E-09	<0.0001 <0.0001	1.6E-06 3.2E-15	<0.0001 <0.0001	up up
Luminal progenitor	c-kit	Luminal progenitor	3.3E-13 1.1E-03	<0.0001 0.007	1.3E-07 1.9E-02	<0.0001 0.04	up up

### Conclusions and take home messages

Breast cancer in young women is biologically unique beyond differences in breast cancer subtypes. This calls for tailoring treatment strategies for these patients based on the potential targets that we were able to identify.

RANKL emerged as an interesting potential target. We have observed that it was significantly associated with breast cancer arising in young women independent of subtype and stage. In addition, other groups have shown that RANKL attenuate breast tumor development both in hormonal dependent and independent models. It is also a key mediator for the mammary stem cell population.

Hence, we designed a prospective pre-operative, phase II, window study evaluating the effect of denosumab - a monoclonal antibody directed against RANKL - on breast cancer biology in young breast cancer patients.

Study Title

A pre-operative window study evaluating Denosumab, a RANKL-Ligand inhibitor and its Biological Effects in YOUng pre-menopausal women Diagnosed with early breast cancer (D-BEYOND)

EudraCT number: 2011-006224-21



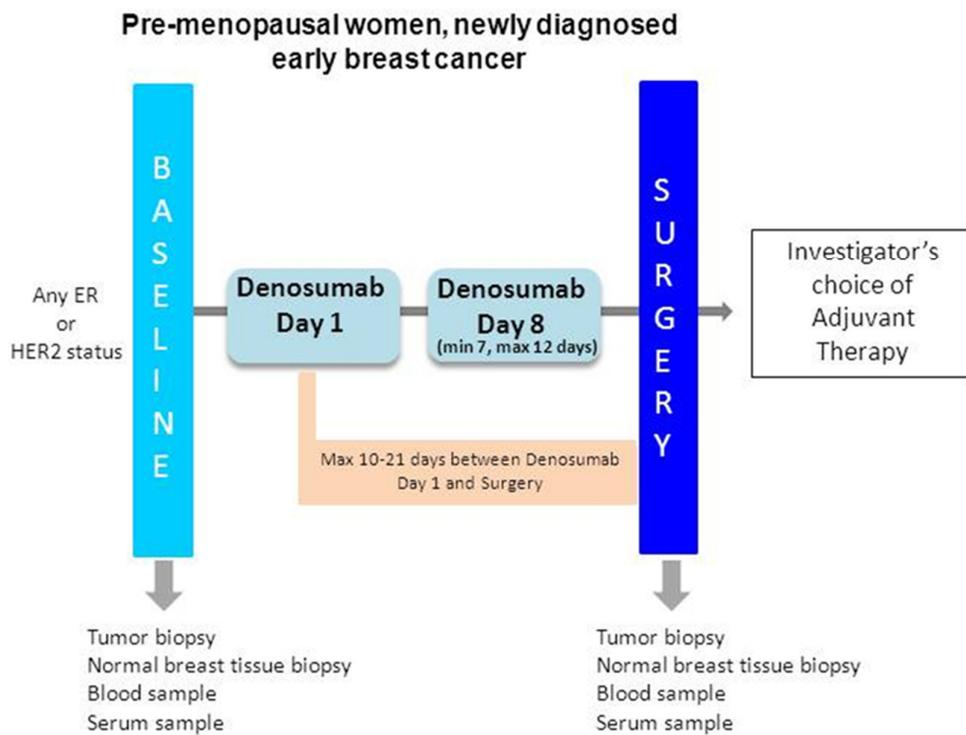
Study Principle Investigators:

Sherene Loi, **Hatem A.Azim Jr.**, Martine Piccart, Christos Sotiriou

Sponsor: Institut Jules Bordet

Phase of development: Phase II

Study design



### Main eligibility criteria

1. Histological diagnosis of breast cancer, with no evidence of metastasis
2. Age >17, confirmed premenopausal status
3. Tumor size >1.5 cm
4. Neoadjuvant therapy is not planned

### Study endpoints

#### **Primary:**

- Geometric mean change in tumor Ki67 assessed by immunohistochemistry (IHC) from baseline to prior to surgery

#### **Secondary:**

- Absolute Ki67 responders after a short course of denosumab treatment, defined as below 2.7% Ki67 IHC staining in the post treatment tumor
- Decrease in serum CTX levels from baseline to prior to surgery
- Change in RANK/RANKL gene and protein expression assessed by Gene expression Analysis (GEP) and IHC from baseline to prior to surgery in the tumor
- Change in proliferation-related genes using gene expression (i.e. AURKA, ki-67) and proliferation-related gene modules (i.e. GGI) using gene expression in the tumor baseline to prior to surgery
- Change in tumor apoptosis rates assessed by IHC from baseline to prior to surgery
- Change in gene modules corresponding to modulation of the immature mammary epithelial cell populations and luminal progenitors.
- Change in specific immune genes using gene expression, evaluation of tumor infiltrating lymphocytes (TILs), using IHC and immune-related gene modules specifically looking at modulation of T regulatory cells in the tumor
- Safety and tolerability of a short course of denosumab.

### Logistics and Timelines

This is an academically sponsored trial, supported by a research grant from Amgen. The study will include 39 patients that will be recruited from 5 sites (3 in Belgium, 1 in the UK, and 1 in Australia). The protocol has been already submitted for ethics committee approval in Institut Jules Bordet. The first patient is expected to be enrolled in Q1 2013.

## **b. Breast cancer during pregnancy**

### Introduction

Studying the biology of breast cancer arising during pregnancy was the main focus of my ESMO project. Breast cancer during pregnancy is a relatively rare condition with limited available information on its biology and prognosis.

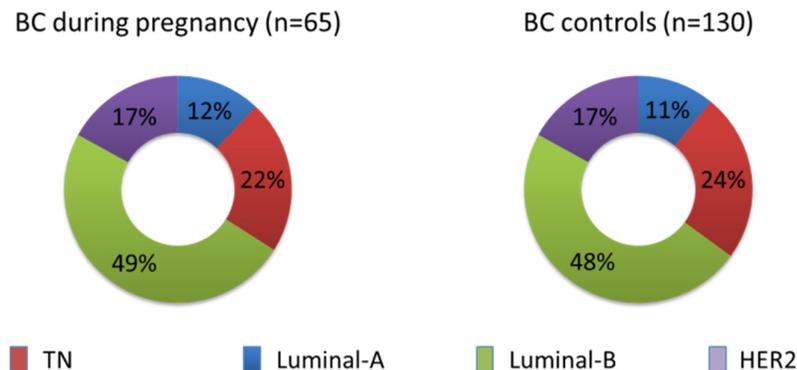
### Methods

This project was done in close collaboration with the European Institute of Oncology in Milan. In this study, we had 65 patients diagnosed during pregnancy and for each patient; we identified two matching controls according to age, tumor size, nodal status, year of diagnosis and whether neoadjuvant therapy was received or not. We aimed to define the difference in biology starting from the pathological and immunophenotypic features, down to transcriptomic and mutational profiling. Pathological examination was performed in the European Institute of Oncology. Three formalin-fixed paraffin embedded (FFPE) tumor cores were sent to Institut Jules Bordet for nucleic acid extraction for transcriptomic and mutational profiling. Transcriptomic profiling was performed using affymetrix, while mutational profiling was performed using the Sequenom platform

### Results

We first started by looking at the difference in pathological and immunophenotypic features. No significant differences were observed in pathological subtypes, histological grade or breast cancer subtypes defined by IHC between the two groups of patients ( $p=0.68$ ; Figure 2).

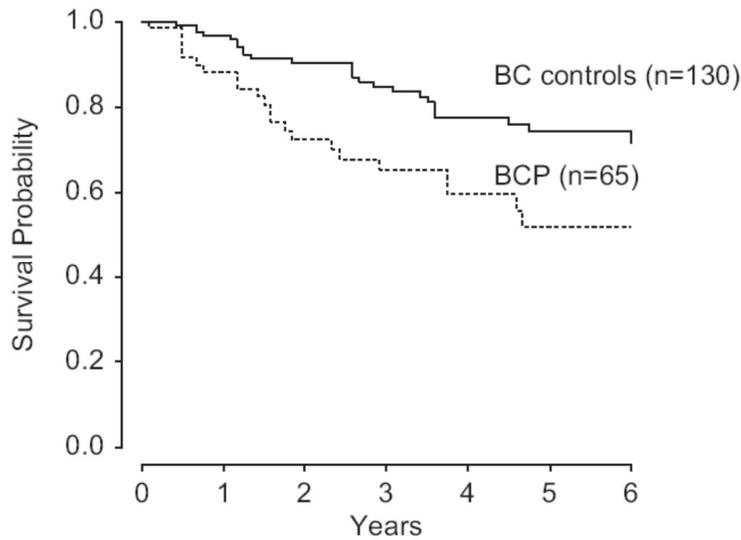
**Figure 2:** Differences in breast cancer subtypes between pregnant and non-pregnant patients using IHC



However at a median follow-up of 4 years, we observed a significant difference in disease free survival (Figure 3). This was observed independent of classic clinic-pathologic prognostic factors as well as treatment (HR: 2.3; 95% CI 1.3 – 4.2). These results have urged

us to further study the biological features of these tumors at a more detailed level to try to elucidate the reason of such a poor outcome.

**Figure 3:** Differences in DFS between the pregnant and non-pregnant groups at a median follow up of 4 years



DNA and RNA were successfully extracted in 95% of cases.

We first looked at the differences in hot spot somatic mutations using the Sequenom platform. This was the first report on the pattern of mutations not only in patients diagnosed during pregnancy but also in young breast cancer patients in general which comprises the control group. A total of 57 hotspot mutations (30%) were detected in 51 pts (15 [23%] pregnant and 36 [28%] controls). No obvious differences in the pattern of mutations were observed between the two groups of patients.

The transcriptomic profiling part was relatively delayed given the challenges of performing gene expression profiling of RNA extracted from paraffin-embedded tissue; being largely degraded. Throughout the past year, we have been conducting pilot studies to ensure the reproducibility and robustness of the obtained results. We finally reached a clear idea on the platform that can be used and we obtained reliable information from 12 samples so far. We are expected to finalize this part of the project in early 2013.

Funding

We received research grants from the Avon foundation in Italy and the Fonds de la Recherche Scientifique Médicale (FRSM) in Belgium.

### c. Pregnancy after breast cancer

#### Introduction

Evaluating the effect of subsequent pregnancy on breast cancer prognosis has been an area of research that I have been also working on as well during my fellowship period. Previously I collaborated with other groups in a large meta-analysis addressing the same question (Azim et al; EJC 2011). We found that pregnancy after breast cancer appeared to reduce the risk of death. However, this was largely confounded by selection bias. In addition, most of the studies were small, underpowered, and lack information on outcome according to ER status.

#### Methods

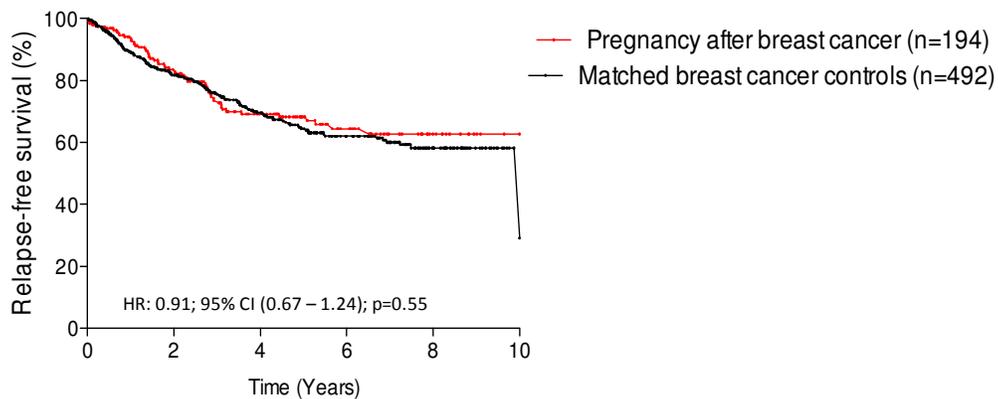
We conducted a study to look into the difference in DFS between patients with known ER status who had a pregnancy following breast cancer diagnosis and matched breast cancer controls. The study was designed to adjust for the selection bias, known as the “healthy mother effect”. The study was conducted in 6 European hospitals and was powered to address the impact of pregnancy on outcome in the ER+ cohort.

#### Results

A total of 1,207 patients were enrolled; of whom 333 became pregnant after breast cancer diagnosis. Nearly 57% and 40% of patients had an ER+ and node-positive disease respectively. Around 30% of patients were subjected to induced abortion.

At a median follow-up of 5 years post conception, no difference in DFS was observed between the two groups irrespective of ER status. Figure 4 shows the difference in DFS in the ER+ cohort. Induction of abortion was not associated with DFS.

**Figure 4:** Difference in DFS between patients who became pregnant following ER+ breast cancer and matched controls of the same stage, age, year of diagnosis and treatment



### Conclusions and take home messages

This is the largest study to date addressing the prognostic impact of pregnancy following ER+ breast cancer. Our results underscore the safety of pregnancy in the ER+ population. This would have a very positive impact on patient counseling. In addition, we found no effect of induced abortion on DFS, which would further reduce the promotion of abortion for therapeutic reasons for these patients.

### Funding

This study was supported by a grant from from the European School of Oncology and Les Amis De l'Institut Bordet.

In the same topic, we addressed the outcome of pregnancy in patients previously treated with chemotherapy and trastuzumab. This was a sub-study of the HERA phase III large adjuvant trial. The results showed that getting pregnant on trastuzumab does not appear to increase the risk of congenital malformations. However, there was an apparent increased risk of spontaneous abortion, albeit the absolute numbers remain low (25%; 4/16). However, getting pregnant after 3 months of trastuzumab completion is not associated with compromised pregnancy outcomes.

## d. IMPAKT 2012 CONSENSUS ON THE USE OF GENOMIC SIGNATURES IN BREAST CANCER

### Introduction

In preparation for the 4<sup>th</sup> IMPAKT Breast Cancer Conference, I was appointed to coordinate a task force aiming to define the medical utility of genomic signatures in early breast cancer. This work was presented in the guidelines session of the 4<sup>th</sup> IMPAKT Breast Cancer conference.

### Methods

Independent evaluation of six genomic tests [Oncotype Dx™, MammaPrint®, Genomic Grade Index, PAM50 (ROR-S), Breast Cancer Index, and EndoPredict] was performed by a panel of experts in three parameters; analytical validity, clinical validity, and clinical utility based on the principles of the EGAPP criteria.

The task force adopted a Delphi process and evaluation process involved a wide variety of breast cancer experts coming from different disciplines as shown in Figure 5 and 6

**Figure 5:** Delphi process

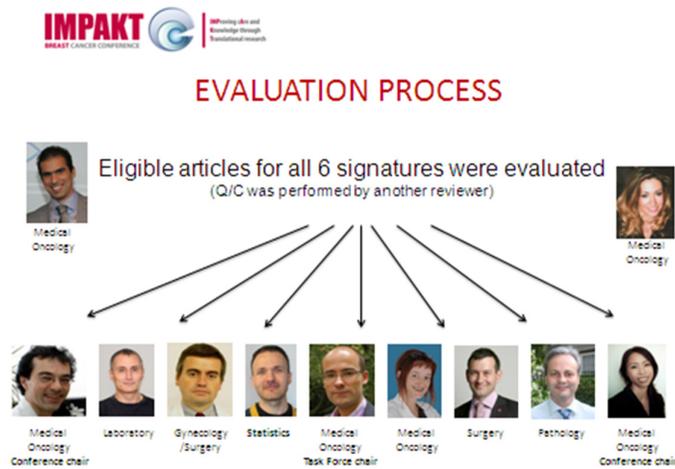


### PROCESS OF WORKING GROUP

- **Delphi process:**
  - Members were selected due to expertise
  - After 1<sup>st</sup> F2F meeting and TC, a fellow does literature search under the supervision of biostatistician & TF leader
  - **Members are kept separated**, are asked to review and grade all the available literature and answer through an open-ended questionnaires
  - Gradings are gathered, summarized, and then fed back to all the TF members
  - **Results are analyzed and a consensus is reached by F2F meeting**
  - **Meetings: Two F2F, Five TCs, multiple emails over 1 year**



**Figure 6:** Evaluation process and panel involved in the task force



### Panel Statements

The majority of the working group members found the available evidence on the analytical and clinical validity of Oncotype Dx™ and MammaPrint® to be convincing. None of the genomic tests demonstrated robust evidence of clinical utility: it was not clear from the current evidence that modifying treatment decisions based on the results of a given genomic test could result in improving clinical outcome.

### Conclusions

The IMPAKT 2012 Working Group recommends 1) Adoption of models that integrate clinicopathologic factors along with genomic tests 2) Demonstration of clinical utility should be made in the context of a prospective randomized trial 3) Creation of registries for patients who are subjected to genomic testing in the daily practice, which could facilitate the clinical development of these tests.

**e. THE ROLE OF CIRCULATING TUMOR CELLS (CTCs) IN PATIENTS RECEIVING NEOADJUVANT**

**HER2-TARGETED AGENTS**

Introduction

We evaluated the role of CTCs in patients treated with trastuzumab, lapatinib or the combination concomitantly with paclitaxel as a part of the NeoALTTO trial

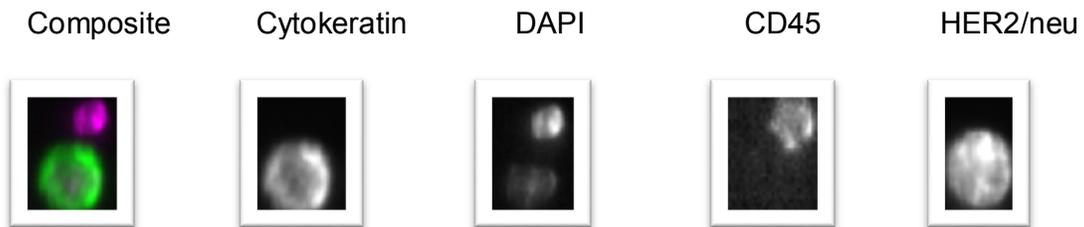
Methods

CTC detection and HER2 phenotyping using CellSearch® were centrally performed at Institut Jules Bordet at baseline, week 2 and prior to surgery. We evaluated the associations between CTC detection, tumor characteristics, pCR and FDG-PET/CT response.

Results

Samples for CTC analysis were available for 51 (11%) patients. At baseline, week 2 and surgery, we detected  $\geq 1$  CTC/22.5ml in 5/46 (11%), 4/41 (10%), and 5/31 (16%) patients with evaluable samples, respectively. HER2-positive CTCs were still detectable after 18 weeks of treatment with anti-HER2 agents plus paclitaxel in 3/31 (10%) patients (e.g. Figure 7). No significant association was observed between CTC detection and pCR ( $p=0.36$ ) or FDG-PET/CT response ( $p=0.90$ ).

**Figure 7:** residual HER2+ CTCs after 18 weeks of therapy with HER2-targeted agents



Conclusions and take home messages

Our results suggest that CTC detection does not appear to be associated with pCR in HER2-positive patients treated with anti-HER2 agents and chemotherapy acknowledging that our study was not adequately powered to provide a definite answer in this regard. This was a clear example of the difficulties in executing prospective translational research sub-studies in the context of international randomized trials when the collection of biological material is optional. In the future, prospective powered studies will be needed to address this issue as well as to investigate the prognostic/predictive role of CTCs in women with HER2-positive early breast cancer treated with anti-HER2 agents.

### 3. LIST OF PRESENTED ABSTRACTS RESULTING FROM THIS GRANT

1. **Azim HA Jr**, Peccatori FA, Loi S, Lambrechts D, Majjaj S, Renne G, Desmedt C, Rotmensz N, Michiels S, Dell'Orto P, Ignatiadis M, Goldhirsch A, Piccart M, Viale G, Sotiriou C. Mutational and transcriptomic characterization of breast cancer (BC) arising in young patients (pts) and during pregnancy and their association with long-term outcome. Proceeding **San Antonio Breast Cancer Symposium**, 2012, abstract # P6-07-14 (poster presentation)
2. **Azim HA Jr**, Singhal S, Michiels S, Ignatiadis M, Djazouli K, Fumagalli D, Desmedt C, Piccart M, Sotiriou C. Association between SPARC mRNA expression, prognosis and response to neoadjuvant chemotherapy in early breast cancer (BC): a pooled *in-silico* analysis. Proceeding **San Antonio Breast Cancer Symposium**, 2012, abstract # P6-07-22 (poster presentation)
3. **Azim HA Jr**, Rothé F, Aura CM, Bavington M, Maetens M, Rouas G, de Azambuja E, Sotiriou C, Di Cosimo S, Ignatiadis M. Correlation between circulating tumor cells (CTCs), PET/CT response and pathological complete response (pCR) in primary HER2-positive (HER2+) breast cancer patients: a sub-study from the NeoALTTO trial. Ann Oncol 2012; (Suppl 9), proceeding **ESMO**, abstract 255PD (poster discussion)
4. Criscitiello C, **Azim HA Jr**, Agbor-Tarh D, de Azambuja E, Piccart M, Baselga J, Eidtmann H, Di Cosimo S, Bradbury I, Rubio IT. The discrepancy between high pathological complete response (pCR) rate and low breast conserving surgery (BCS) following neoadjuvant therapy: analysis from the NeoALTTO trial (BIG 1-06). Ann Oncol 2012; 23(Suppl 9), proceeding **ESMO**, abstract #247O-PR (oral presentation)
5. **Azim HA Jr**, Michiels S, Bedard PL, Singhal SK, Criscitiello C, Ignatiadis M, Haibe-Kains B, Piccart MJ, Sotiriou C, Loi S. Biology of breast cancer diagnosed in young women: pooled gene expression analysis from 3522 patients. Ann Oncol 2012; 23(suppl 2), proceeding **IMPAKT**, abstract #140 (oral presentation)
6. **Azim HA Jr**, Kroman N, Ameye L, Rotmensz N, Gelber S, Cordoba O, Pinto A, Jensen M, de Azambuja E, Peccatori F. Pregnancy following estrogen receptor-positive breast cancer is safe – Results from a large multi-center case-control study. Eur J Cancer 2012; proceeding **EBCC**, abstract # 21 (oral presentation)
7. **Azim HA Jr**, Santoro L, Russell-Edu W, Pentheroudakis G, Pavlidis N, Peccatori FA. Prognosis of pregnancy associated breast cancer: a meta-analysis involving 29 studies. Proceeding **San Antonio Breast Cancer Symposium**, 2011, abstract # P4-11-03 (poster presentation)

8. **Azim HA Jr**, Metzger-Filho O, de Azambuja E, Loibl S, Focant F, Gresko E, Proctor M, Piccart-Gebhart M, on behalf of the HERA study team. Pregnancy during or following adjuvant trastuzumab in patients with HER2-positive breast cancer: An analysis from the HERA trial (GIB 01-01). Proceeding **San Antonio Breast Cancer Symposium**, 2011, abstract # P1-12-01 (poster presentation)
9. Botteri E, **Azim HA Jr**, Renne G, Sangalli C, Rotmensz N, Goldhirsch A, Gentilini O, Di Nubila B, dell'Orto P, Viale G, Peccatori FA. Pathological features and prognosis of patients (pts) with pregnancy-associated breast cancer (PABC): a case-control study. Proceeding 17<sup>th</sup> **European Society of Gynecological Oncology (ESGO)** Conference, 2011, abstract # A-372-0008-00485 (poster presentation).
10. **Azim HA Jr**, Michiels S, Bedard P, Fumagalli D, Singhal S, Haibe-Kains B, Piccart M, Sotiriou S, Loi S. Elucidating the biological basis of prognosis in young women with early breast cancer (BC) using gene expression profiling. *J Clin Oncol* 2011; proceeding **ASCO**, abstract # 10603 (poster presentation)
11. **Azim HA Jr**, Michiels S, Bedard P, Singhal S, Haibe-Kains B, Piccart M, Sotiriou S, Loi S. The prognostic performance of first generation signatures (FGS) in young women with operable breast cancer (BC). *Ann Oncol* 2011; proceeding **IMPAKT**, Vol 22 (Suppl 2), abstract # 136P (poster walk discussion)

#### **4. LIST OF ORIGINAL PUBLICATIONS RESULTING FROM THIS GRANT**

1. **Azim HA Jr**, Kroman N, Paesmans M, Gelber S, Rotmensz N, Ameye L, De Mattos-Arruda L, Pistilli B, Pinto A, Jensen M, Cordoba O, de Azambuja E, Goldhirsch A, Piccart MJ, Peccatori FA. The prognostic impact of pregnancy after breast cancer according to estrogen receptor status: A multicenter retrospective study. *J Clin Oncol* 2012; *in press*.
2. **Azim HA Jr**, Santoro L, Russell-Edu W, Pentheroudakis G, Pavlidis N, Peccatori FA. Prognosis of pregnancy-associated breast cancer: A meta-analysis of 30 studies. *Cancer Treat Rev* 2012; 38(7): 834-42.
3. **Azim HA Jr**, Metzger-Filho O, de Azambuja E, Loibl S, Focant F, Gresko E, Arfi M, Piccart-Gebhart M, on behalf of the HERA study team. Pregnancy occurring during or following adjuvant trastuzumab in patients enrolled in the HERA trial (BIG 01-01). *Breast Cancer Res Treat* 2012; 133(1): 387-9.
4. **Azim HA Jr**, Michiels S, Bedard PL, Singhal SK, Criscitiello C, Ignatiadis M, Haibe-Kains B, Piccart MJ, Sotiriou C, Loi S. Elucidating prognosis and biology of breast cancer arising in young women using gene expression profiling. *Clin Cancer Res* 2012; 18(5): 1341-51.

5. **Azim HA Jr**, Botteri E, Renne G, Dell'orto P, Rotmensch N, Gentilini O, Sangalli C, Pruneri G, Di Nubila B, Locatelli M, Sotiriou C, Piccart M, Goldhirsch A, Viale G, Peccatori FA. The biological features and prognosis of breast cancer diagnosed during pregnancy: A case control study. *Acta Oncol* 2012; 51(5): 653-61.

6. **Azim HA Jr**, Michiels S, Zagouri F, Delalogue S, Filipits M, Neven P, Symmans WF, Thompson A, Andre F, Loi S, Swanton C. Utility of prognostic genomic tests in oncological practice: IMPAKT (IMProving care And Knowledge through Translational research) 2012 Working Group Consensus Statement. *Submitted*.

7. **Azim HA Jr**, Rothe F, Aura CM, Bavington M, Maetens M, Rouas G, Gebhart G, Gamez C, Eidtmann Hm Baselga J, Piccart-Gebhart M, Ellis C, Vuylsteke P, Cure H, Domont J, Ferro A, Toral-Pena JC, de Azambuja E, Sotiriou C, Di Cosimo S, Ignatiadis M. Circulating tumor cells, FDG-PET/CT and pathological complete response in HER2-positive breast cancer: a sub-study from the NeoALTTO phase III trial. *Submitted*.

## 5. LIST OF BOOK CHAPTERS RESULTING FROM THIS GRANT

1. **Hatem A. Azim Jr.**, Debora Fumagalli, Christos Sotiriou. The prognostic and predictive value of gene expression signatures in breast cancer. In *“Handbook of Metastatic Breast Cancer*, 2<sup>nd</sup> edition, Editors: Charles Swanton and Stephen Johnston, Informa Healthcare, 2011

## 6. LIST OF CONFERENCES / COURSES ATTENDED DURING THE FELLOWSHIP PERIOD (OCT 2010 – SEP 2012)

### 2010

- ESMO annual congress, October 8<sup>th</sup> - 12<sup>th</sup>, Milan, Italy

### 2011

- San Antonio Breast Cancer Symposium, Dec 6<sup>th</sup>-10<sup>th</sup>, San Antonio, TX, USA

- 14<sup>th</sup> European Society of Sexual Medicine (ESSM) annual meeting, Dec 2<sup>nd</sup>-4<sup>th</sup>, Milan, Italy

- ASCO annual meeting, June 3<sup>rd</sup>-7<sup>th</sup>, Chicago, IL, USA

- 3<sup>rd</sup> IMPAKT Breast Cancer Conference, May 5<sup>th</sup>-7<sup>th</sup>, Brussels, Belgium

- 13<sup>th</sup> Belgian Society of Medical Oncology (BSMO) annual meeting, February 19<sup>th</sup>, Brussels, Belgium

- Best of San Antonio Breast Cancer Symposium, February 12<sup>th</sup>, Brussels, Belgium

### 2012

- ESMO annual congress, Sep 28<sup>th</sup> – October 2<sup>nd</sup>, Vienna, Austria

- 4<sup>th</sup> IMPAKT Breast Cancer Conference, May 3<sup>rd</sup>-5<sup>th</sup>, Brussels, Belgium

- Cancer and pregnancy Conference, April 12<sup>th</sup>-13<sup>th</sup>, Milan, Italy

- 8<sup>th</sup> European Breast Cancer Conference (EBCC8), March 21-24<sup>th</sup>, Vienna, Austria

## **7. CAREER PLANS FOLLOWING THE END OF THE FELLOWSHIP**

The ESMO fellowship period provided me with a unique opportunity to work in a very stimulating environment alongside prominent experts in the field of breast cancer. I believe the last two years were very productive, representing a major step in my career.

My plan for the coming year or two is to stay in Institut Jules Bordet to complete my PhD. I liaised with my home institute in Egypt to extend my study leave until I complete my studies. As of September 2012, I moved from the lab to the BrEAST Data Centre in the department of medical oncology serving an associate scientific director. Along with the assigned responsibilities and duties, this position will provide me a good opportunity to continue conducting my own research, which I tend to focus it in the fields of breast cancer in young women, and drug development. Once I am done, I will be looking forward to returning back to Egypt and try to advance the way breast cancer is studied and managed.

Hailing from a developing country myself, I am completely aware of the challenges facing young oncologists in such countries to obtain an opportunity to train and work in large institutions in Europe or the US. Acknowledging the fierce competition in this regard, I strongly call ESMO for devoting at least one fellowship/year to young oncologists from outside Europe, Australia and the US. This will help exposing a new generation of oncologists coming from developing nations to the up-to-date advancements in their field, which will help bridging the knowledge gap between the developed and the developing world.