- consequences of aggressive treatments (amputations, contractures, burns, fatigue)
- consequences of stress and the psychological processes of adjustment to disability (PTSD, impairment of immune system, depression, anxiety, adjustment disorders)
- changes in life goals, values and priorities, expectations and prejudices
- social consequences that affect the family (impoverishment, divorce, diseases of other family members)
- social consequences in working environment: loss of employment or advancement at work, discrimination, mobbing, conflict with employers or doctors due to administrative pressures of insurance companies to lower workers' compensations.

The studies on return to work reveal that the severity of the disease and the impairment of function are usually the most important factor influencing the return to work, but other environmental and personal factors are important too. Factors influencing the return to work are:

- *demographical factors*: age, economic status, education
- *disease factors*: localization, status of disease at diagnosis, functional status after treatment, other diseases and handicaps
- *work factors*: adaptation of workplace, easier jobs, reduced strain and stress, reduced working hours, suitable transportation to work, can be decisive factors in retaining working ability
- *treatment factors*: quality of life factors should be considered at treatment planning. The accessibility of paid sick-leave and of vocational and medical rehabilitation in a multidisciplinary team also can make a lot of difference.

In many European countries employers still discriminate against the people who have had a cancer diagnosis. The European Employment Framework Directive, 2004, obliged EU member states to introduce legislation to outlaw unreasonable discrimination against people with disabilities. According to discrimination protection laws, employers are supposed to make a "reasonable accommodation" to adapt the working environment to the needs of people with disabilities, but this may not take into account the needs of people with cancer, as the definition of disability is sometimes not suited to the long term chronic illness. The way this legislation has been implemented across EU varies widely, and the differences are even greater in practice. There is room for improvement and a job for survivor advocates. Because millions of cancer survivors, more than ever before, are now working age adults, advocacy efforts should shift from expanding legal protection from cancer-based discrimination to providing resources to help survivors meet their individual employment related concerns. Changing laws is the first step, now minds have to be changed.

Advocacy Session (Tue, 22 Sep, 11:00−12:00)
From patient to partner: evolution of the patient's role in health care

109 INVITED

Why we need a patient voice in Europe

A. Peterle[1]. [1]*Parlement Européen, Brussels, Belgium*

For the last five years the involvement of patient organisations in the discussions and formulation of health and research policy and their healthcare has become increasingly important. At the European level, it is now a fact that politicians consider the voice of patients along that of other stakeholders as critical to their work in health policy.

As Co-chair of **MEPs against Cancer** (MAC) I have been on the frontline of working with patient groups and appreciated their contribution which has helped MAC members to convince the European Parliament and indeed Member States under the Slovenian EU Presidency to make the political commitment to invigorate the fight against cancer across the EU. The arguments put forward by an umbrella organisation such as the European Cancer Patient Coalition who, speaking with one voice for all cancer patients across the EU, convinced us that urgent action was needed to reduce the burden of cancer and tackle head-on the existing inequalities in prevalence and mortality across the EU. The spectre, predicted by WHO, of a looming cancer epidemic largely due to Europe's ageing population, provides us with the urgency to act now. The European Commission is set to embark on a **European Partnership – Action against Cancer** in autumn 2009. With one in three people developing cancer in their lifetime, this ambitious action programme involving key stakeholders and Member States in a concerted effort is a very timely measure.

From a politician's perspective listening to the patient's voice and working in partnership on effective cancer control is an imperative for Europe. Not only does the health and well-being of our citizens depend on it, it is also a tremendous economic, social and political challenge for our ageing societies, placing an ever increasing burden on our economy. We need a healthy population and workforce to sustain our economies. We have to be vigilant that in the time of an economic crisis we keep up effective investment in health services. I know I am joined by cancer patients when I say that we are all looking forward to the European Cancer Partnership to invest in Europe's future health by taking long-term, sustainable actions to tackle cancer. By investing more in prevention, screening and early diagnosis, by sharing our knowledge and expertise about best treatment and care, we have an opportunity to save many European citizens lives now and in the future.

Society session (Tue, 22 Sep, 09:00−11:00)
EACR session

111 INVITED

The complex genomic landscape of breast cancer

C. Caldas[1]. [1]*Cancer Research UK Cambridge Research Institute, Department of Oncology, Cambridge, United Kingdom*

The first generation molecular profiling studies of breast cancer have at most analysed few hundreds of samples each. We have now completed the analysis of 1000 breast cancer genomes using high-resolution SNP arrays, gene expression arrays and focused mutation analysis (including TP53). The pathology of the tumors was rigorously assessed and information on histological type, grade, size, lymph node metastasis and ER was available for all cases. This study is the largest ever done and reveals the molecular taxonomy of breast cancer is more complex than gleaned until now. A copy-number based classification of breast cancer shows there are new subtypes that have been previously missed. Copy number vs gene expression correlation has highlighted both copy-number dependent as well as copy-number independent chromosomal loci. New breast cancer oncogenes and tumor suppressor genes have been identified. The genomic landscape of breast cancer is therefore extremely complex and this has both biological and clinical implications.

112 INVITED

Cancer stem cell spotting: the example of breast cancer

O.W. Petersen[1]. [1]*The Panum Institute, Department of Cellular and Molecular Medicine, University of Copenhagen, Denmark*

Tumor heterogeneity is a hallmark of cancer and it is responsible for tumor progression and resistance to therapy. According to Nowell's classical theory of clonal evolution tumor heterogeneity is caused by genetic instability and phenotypic drifting. Thus, tumors arise from a single "mutated" cell which upon subsequent additional alterations gives rise to more aggressive subpopulations within the original neoplastic clone. These cells may leave a large number of offspring by chance, or new mutations may provide a growth advantage over the other tumor cells. Waves of such clonal expansion and selection drive the process. Therefore, any cancer cell can potentially become invasive and cause metastasis. This stochastic model predicts that the evolution of cancer cells is influenced by intrinsic (e.g. signaling pathways) or extrinsic (e.g. microenvironment) factors. These influences are unpredictable or random and result in heterogeneity in the cell phenotype or in the tumor initiating capacity. A key tenet of this model is that all cells of the tumor are equally sensitive to such stochastic influences. Moreover, tumor initiating cells cannot be identified prospectively or enriched for by for sorting cells based on intrinsic characteristics.

Recently, our understanding of tumor heterogeneity has been expanded through "the hierarchy model" which predicts that cancers contain a minority population of tumor initiating cells or cancer stem cells (CSC) that resist treatment and give rise to the bulk of the more differentiated tumor cells. Thus, a tumor can be considered a hierarchy defined by a maturation process analogous to normal tissue homeostasis. Therefore heterogeneity arises as a consequence of the presence of biological distinct classes of cells with differing functional abilities and behavior within the hierarchy. As opposed to the stochastic model the hierarchy model predicts that tumor-initiating cells can be identified prospectively and purified from the bulk of non-tumorigenic population based on intrinsic characteristics. The fact that most epithelial cancers are composed of cells that retain at least some level of differentiation suggests that the cancer stem cell generates a linage restricted progeny with a finite life span which nevertheless constitute the majority of the tumor. It follows that the bulk of the tumor would die out without being replenished from the cancer stem cells. Other than that little is known about the function of differentiated cancer cells.

Evidence will be presented here for the existence of a stem cell hierarchy in the normal breast and in breast cancer.