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Molecular profiling—ready for clinical routine

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In this special issue of the *Magazine of European Medical Oncology* (*MEMO*) multidisciplinary experts summarize and discuss recent developments and future perspectives of comprehensive molecular profiling spanning from specific cancer entities to agnostic approaches [1–3].

The development of next-generation molecular profiling methods has enhanced our ability to interrogate multiple cancer-associated genomic changes within an individual patient's tumor. As a result of such advancements, an increasing number of molecular aberrations have now been rendered actionable targets and raise hope of obtaining meaningful and applicable information for treatment individualization. Cancer therapy, comprised previously by an arsenal of cytotoxic agents, is now being transformed by genome-targeted drugs, which has led to improved outcomes for several malignancies [4]. As of date, the US Food and Drug Administration (FDA) has approved over 80 targeted agents for solid and hematologic malignancies, driving the possibility of individualized cancer treatment, i.e., precision oncology.

Precision oncology clinical trials have typically been based on molecular profiling (MP) of tissue biopsy-derived DNA. In a pioneering pilot study investigating the efficacy of MP-based treatment in a cohort of refractory metastatic cancer patients, von Hoff et al. reported a clinical progression-free survival (PFS) benefit in 27% of patients [5]. These promising findings have encouraged the enrollment of patients onto trials matching cancer treatment to genetic profiles obtained from biopsy material. Tumor tissue genotyping alone may not be sufficient to capture the complexity and heterogeneity of tumors and recently, circulating cell-free DNA (cfDNA), which contains circulating-tumor DNA (ctDNA) in patients with cancer, has been shown to provide an accurate snapshot of a patient's tumor, enabling the detection of tumor subclones from metastatic lesions [6]. Although studies have begun to prospectively use ctDNA to funnel patients into phase I clinical trials, such trials have only recently been initiated and only preliminary outcomes have been reported yet.

However, a number of significant challenges are to be considered with regards to next-generation molecular profiling. These challenges are complex and manifold and include clinical evidence for molecular profiling, interdisciplinary cooperation, reporting of testing results, access to adequate therapy and financing. Overcoming these challenges on a local, national and international level will determine the success or failure of next-generation molecular profiling [7].

I hope this issue of *MEMO* offers you valuable information for routine clinical practice for the purpose of "lifelong learning" and also stimulates fruitful discussions on clinical and experimental precision oncology.

With best regards,
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Conflict of interest A. Gerger declares that he has no competing interests.

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