Cancer Core Europe Lecture

Presented by the Education & Training pillar

SPEAKER

Christiane Opitz

Head of the Division of Metabolic Crosstalk in Cancer
German Cancer Research Center (DKFZ)

Metabolites as signaling molecules and biomarkers in cancer

March 18, 2026 | 12:00 -13:00 CET

Link to Meeting

Metabolic reprogramming is a hallmark of cancer and leads to the accumulation of metabolites that function not only as intermediates of cellular metabolism but also as signaling molecules that regulate tumor progression. Increasing evidence demonstrates that metabolites can influence transcriptional programs, cellular signaling pathways, and immune responses, thereby linking metabolic states to cancer biology. Among these mechanisms, metabolites derived from tryptophan metabolism have emerged as critical mediators of tumor-immune interactions and tumor cell adaptation. Enzymatic degradation of tryptophan generates metabolites capable of activating the aryl hydrocarbon receptor (AHR), a ligand-activated transcription factor involved in cellular differentiation, immune regulation, and tumor progression. Tryptophan metabolites act as endogenous AHR agonists and promote transcriptional programs that support tumor cell survival, immune suppression, and adaptation to metabolic stress. Metabolite-mediated signaling is also closely connected to growth-regulatory pathways such as mechanistic target of rapamycin (mTOR), which integrates nutrient availability and metabolic cues to control cell growth, proliferation, and anabolic metabolism. The interaction between metabolic pathways and signaling networks including AHR and mTOR plays a critical role in the metabolic plasticity of cancer cells and contributes to therapy resistance.

Beyond their signaling roles, tumor-associated metabolites are increasingly explored as clinically relevant biomarkers. Metabolomic profiling enables the identification of metabolic signatures that reflect tumor activity, immune status, and therapy response. Interdisciplinary research initiatives such as the BMFTR-funded BALANCE-ET consortium illustrate this translational approach by investigating systemic metabolic changes and biomarker signatures associated with relapse risk and long-term outcomes in breast cancer survivors. Such metabolite-based biomarkers may improve risk stratification and long-term monitoring of quality of life in cancer survivors. Together, these findings highlight metabolites as key regulators of oncogenic signaling networks and as promising biomarkers in cancer.

Christiane Opitz studied medicine in Heidelberg, the US, Sweden and Switzerland, as well as Molecular Cell Biology at ZMBH and EMBL in Heidelberg. She did postdoctoral research at the University of Indianapolis, USA, the University of Tübingen, Germany and at DKFZ, in Heidelberg. She has worked as a resident in the departments of Neurooncology and Neurology at the University Hospital Heidelberg. In 2013, Opitz started the junior research group “Brain Cancer Metabolism”. Since 2022 she heads the division of “Metabolic Crosstalk in Cancer” at DKFZ. Christiane has been awarded an ERC consolidator grant “CancAHR” to study the controversial role of AHR activation in cancer. She has received numerous awards including the prize of the Berlin-Brandenburg Academy of Sciences, the Bayer Early Excellence Award and the Hella Bühler Prize.

Hosted by