Summary

Homologous recombination deficiency (HRD) is an important biomarker determining the effectiveness of PARP inhibitor therapy in patients with ovarian cancer. With the growing importance of personalized medicine, it becomes crucial to assess the prevalence of HRD in the Polish population, evaluate the effectiveness of different diagnostic methods, and analyze regional disparities in the implementation of *BRCA* and HRD testing. The lack of uniform reimbursement mechanisms and heterogeneous diagnostic strategies may limit access to targeted therapies and affect treatment outcomes.

The aim of this study was to evaluate the frequency of HRD-positive ovarian cancer patients depending on the diagnostic technology applied, to assess the prevalence of HRD in the Polish population, and to investigate the correlation between *BRCA1/2* mutation status and HRD frequency across different regions of the country. The study material consisted of 1,865 HRD tests performed between 2022 and 2024 in four genetic laboratories in Poland and 3,125 *BRCA* tests carried out in 2023 in fourteen laboratories. HRD was assessed using three technologies: AmoyDx® HRD Focus Panel, TruSight™ Oncology 500 HRD, and Oncomine™ Comprehensive Assay Plus. For each test, the proportion of HRD, HRP, and non-diagnostic results was calculated. Regional data were compared with *BRCA* mutation prevalence, national cancer registry data, and National Health Fund reports on reimbursed procedures.

In the entire study population, HRD was identified in 44% of *BRCAwt* patients, with significant differences depending on the test used: 48% for AmoyDx®, 40% for TruSight™, and 29% for Oncomine™. The prevalence of HRD in Poland was higher than that reported in most international studies, where in the *BRCAwt* population HRD rates are estimated at 25–30%. Marked regional differences were also observed: the proportion of HRD *BRCAwt* patients ranged from 29% to 52% depending on the province. The prevalence of pathogenic or likely pathogenic *BRCA1/2* variants was 19% overall, with a range of 14–34% across regions. Combined, the proportion of patients eligible for PARP inhibitor therapy (*BRCAm* or HRD *BRCAwt*) in Poland reached 61%.

The analysis of diagnostic implementation showed that in 2023, *BRCA* testing was performed in approximately 88% of diagnosed ovarian cancer patients, whereas HRD testing

was carried out in 58% of those who met the criteria. Despite unquestionable, long-standing national and international recommendations, *BRCA* and HRD diagnostics are not implemented uniformly in Poland. The absence of reimbursement for HRD testing and complex billing procedures for BRCA testing constitute significant barriers to the broader application of molecular diagnostics.

The results indicate that *BRCA* and HRD testing in Poland plays a crucial role in the qualification of ovarian cancer patients for targeted therapies. At the same time, significant variability was demonstrated both in the effectiveness of HRD detection depending on the diagnostic test used and in regional access to testing. These findings highlight the urgent need for the standardization of diagnostic methods and the establishment of sustainable reimbursement mechanisms to ensure equitable access to personalized cancer therapy for all patients.