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Analysis of trends in physiologically based pharmacokinetic modelling *in silico* in translational studies of monoclonal antibodies

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Background. Monoclonal antibodies (mABs) and their fragments are widely used for therapeutic, diagnostic, research and other purposes. At the same time, the development of this group of pharmacotherapeutic agents still encounters a number of challenges. One of the areas of improvement in translational (T) studies is the use of pharmacometrics *in silico*, which can be explained by significant progress in the computing facilities, increased data volume and information availability. **Aim.** The aim of the study was to identify trends and directions of using physiologically based pharmacokinetic modelling (PBPK) *in silico* in translational studies of mABs. **Methods.** The analysis of scientific publications of the PubMed database for the period up to May 2024 inclusive was used. The keywords used in the advanced search were combinations of the words "PBPK" and "mAB", "antibody", "antibody-drug conjugate", and combinations of "PBPK" with drugs (mABs) that fit our scope. **Results.** In total, 129 scientific articles were identified according to the selected criteria, including 110 (85%) original and 19 (15%) review articles. Although the first paper was published in 1994, 90% (116 publications) were published in the last 10 years (2013–May 2024), including 61% (79) in the last 5 years (2019–May 2024). Over the past 5 years, more than two thirds of original publications were related to the basic (T0) and preclinical (T1) stages of translational studies. 43% of the papers were devoted to the study of parameters that may affect the absorption, distribution, metabolism and excretion (ADME) of mABs, including physicochemical characteristics, route of administration, and antibody affinity to antigens, in particular in the brain. 25 % of published papers aimed at PK and biodistribution of mABs for animal models and based on animal data (*in vitro* experiments, *in vitro-in vivo,* multi-species and cross-species extrapolation, from animal to human modelling). 19% of papers relate to implementation research (T3) and cover population studies that take into account the individual variability of physiological parameters and tend to predict how pediatric (7 papers), or those with comorbidities will respond to mABs, supporting personalized medicine approaches. 38% of publications reflect the study of mABs with the use of the PK parameters of already registered and used drugs (trastuzumab, cetuximab, brentuximab vedotin, infliximab, omalizumab, and others). It should be noted that since over the half of original articles over the past 5 years have reported PBPK results based on the literature data from previous experiments or clinical trials, the possibility of using the method at a particular stage of a translational mAB study depends on the amount and availability of information in the chosen area. **Conclusions.** Physiologically based pharmacokinetic modelling is used at T0–T3 stages of translational studies of monoclonal antibodies and their fragments, which can be used to solve complex problems in the discovery and development of pharmacotherapeutic agents of this group.

Keywords: physiologically based pharmacokinetic (PBPK) modelling, antibody, mABs.