



## Artificial Intelligence

# AI and personalised medicine

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Personalised medicine attempts to determine the most effective treatment plan for a particular individual by combining and analysing information from the patient. The ability of AI platforms to interrogate a wide range of information has the potential to revolutionise personalised medicine through advanced, data-driven solutions.



### From generic to personal

Until recently, medicine dosing has been relatively generic, adopting a universal approach for treatment of an entire population of patients with a particular condition. Personalised medicine moves away from this 'trial and error' approach. Rather than considering all patients with a particular condition as being the same, personalised medicine represents a more refined approach that takes into account some disease heterogeneity.

By combining and analysing information from groups of patients, personalised medicine attempts to determine the most effective treatment plan for a particular individual. The essence of the model is to separate patients with a particular condition into different sub-groups. Treatment plans are tailored to the sub-group the patient falls within.



### Patient clusters

Personalised medicine is moving into an exciting new era as new and far more advanced data-driven possibilities are now emerging through AI. Suppose we have collected medical records of patients, dosage regimes and patient outcomes. It is possible to train a machine learning classifier to cluster these records based on their similarity using known clustering algorithms. For each cluster, it is then possible to train a machine learning system using the medical records, dosage regimes and outcomes of patients in the cluster. The result is a number of trained machine learning systems, one for each patient cluster.

In order to treat a new patient it is then a question of finding the appropriate cluster and taking the machine learning system for that cluster. Based on the patient record and alternative dosage regimes, the system can compute predicted outcomes for the patient for each of the alternative regimes. The dosage regime with the optimal patient outcome is then selected and used in personalised medicine.

AI platforms will be able to interrogate a wide range of information about a patient and determine which drug has the greatest chance of successfully treating their condition and in what dose. Also, by continually reviewing data, the platforms will be able to adjust the treatment plan over time. The assumption is that these features of modern AI will bring vast progress to the field of personalised medicine.



## Patents or trade secrets

Evaluating the respective benefits and drawbacks of patent protection and retaining a programme as a trade secret can be a difficult business decision for AI technology owners. AI inventions are subject to the same criteria as any other inventions implemented by computers and the European Patent Office is endeavouring to develop examination practices that give certainty regarding such inventions. They have recently amended the Guidelines for Examination to include, for the first time, a section relating to AI and machine learning containing advice about how patents related to AI should be assessed.

Even a basic search of the EPO register for 'personalised medicine' reveals that many companies in this field are choosing the patent route to protect aspects of their AI-related life sciences IP. Companies are seeking to strengthen their patent portfolios with product claims by defining 'systems' comprising computer hardware arrangements. In addition, they often seek patent protection for methodology involving AI, such as claiming a method involving obtaining patient data as a first step. For instance, an AI solution which uses patient data to find patterns in tumour progression as a basis for predicting evolution of a tumour, might allow personalised treatment of a new patient by obtaining data from the new patient and tailoring treatment to the predicted evolution. Such a technique might be patentable via a product claim directed to e.g. 'a system for modelling tumour progression using biomedical data from a patient' and a method claim directed to e.g. 'a method of modelling tumour progression using biomedical data from a patient'.

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**Further reading:** [AI in life sciences](#)

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