



eImmunonkologie: Development and Launch of a Virtual Education Platform for the Immunotherapy of Cutaneous Neoplasms

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Abstract

The use of immunotherapies in clinical practice has significantly expanded treatment options and improved the prognosis of patients with advanced cancers over the past decade. We have developed a virtual teaching module entitled “eImmunonkologie” which is the first interdisciplinary virtual course on immuno-oncology for medical students in German-speaking countries.

Keywords Immunotherapy · Skin cancer · Medical education · eLearning · Immuno-oncology · Virtual education platform

The use of immunotherapy in clinical practice has greatly enriched the oncological treatment options and improved the prognosis of patients with advanced skin cancers over the past decade. Given the increasing spread and use of immunotherapies also in other entities, it is very important to introduce the next generation of physicians to this topic at an early stage of education. Unfortunately, immunotherapy has not been adequately represented and situated in medical education in Germany yet. For example, the topics of immuno-oncology or checkpoint blockade have never been addressed in written medical examinations [1]. Physicians of all specialties should have a basic understanding of immunotherapies, their opportunities but also their risks, and be able to recognize potentially fatal side effects in order to appropriately treat and counsel patients. Therefore, we developed and

launched a virtual teaching module entitled “eImmunonkologie” for medical students as well as physicians in training.

The course aims to provide interdisciplinary basic knowledge on immunotherapy with a focus on cutaneous neoplasms. The content includes seven sequential chapters (Fig. 1A) and starts after a section with general course information dealing with the history of immunotherapy from its conception to its current clinical use, the basic mechanisms of action and tumor immunology, how checkpoint inhibitors work, and the disease entities for which the therapy is currently approved (Fig. 1B). At the same time, the course also educates on common adverse events and their management which is highly important for physicians working primarily in oncology, but also in outpatient care. The content was created by two physicians who prepared the topic in an understandable way using the most recent literature and research results. For students who are interested in more details, corresponding papers are attached to each chapter. The teaching module is complemented by several interactive case studies to consolidate and directly apply the acquired knowledge. For this purpose, real patient cases from our clinical practice are used, e.g., a case of severe upper abdominal pain and suspected liver metastases from melanoma with subsequent treatment or a case of an emergency presentation with somnolence and fatigue under already ongoing immunotherapy. The course participants must then independently determine the further diagnostic and therapeutic path in each case. Finally, they receive feedback on the decisions made (Fig. 1C).

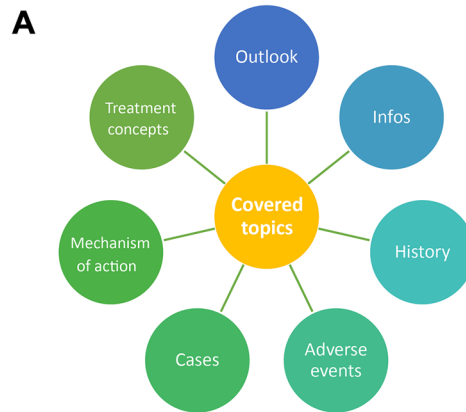
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B Application, effect onset, clinical response, and special patient groups

Application and effect onset

- The checkpoint inhibitors are administered by infusions, which are usually infused into the patients at 3-week intervals for 30–45 min per drug. Regular blood tests are necessary during therapy to detect side effects at an early stage.
- First effects can be expected after a few weeks.

Clinical response

- Unfortunately, not all patients respond to immunotherapy. Many patients are primarily resistant to this therapy or develop resistance in the course of therapy. We speak of so-called "hot" and "cold" tumors: the more immunogenic a tumor is, the more likely it is to respond to immunotherapy. Studies are therefore currently investigating how "cold" or "cooled" tumors can be made "hot" again (keyword: breaking through resistance).
- It is difficult to predict in advance whether a patient will respond to treatment. The search for so-called "biomarkers" that can provide a clue in this regard is currently part of research.
- Often discussed characteristics that correlate with a good response are the infiltration of the tumor with T-lymphocytes, a high tumor mutation load, and a high expression of PD-L1 receptors in the tumor tissue (see Lee JS, Ruppin E. *Multimomics Prediction of Response Rates to Therapies to Inhibit Programmed Cell Death 1 and Programmed Cell Death 1 Ligand 1*. *JAMA Oncol.* 2019;5(11):1614–1618).



Infusion system with the PD1-inhibitor nivolumab

Special patient groups

- Patients taking immunosuppressive drugs must be critically assessed for indication (e.g., higher dose of glucocorticoids in self-medication).
- Patients suffering from autoimmune disease (e.g. multiple sclerosis, myasthenia gravis, inflammatory bowel disease, rheumatoid arthritis, lupus erythematosus, ...) may also not be suitable for therapy.
- In addition, therapy may need to be discontinued in patients who have already experienced severe side effects with checkpoint inhibition.

C Introduction to the case

Initial presentation

Mr. R., an 82-year-old patient, presents himself to your family practice. He first noticed a pain in his upper abdomen 3 weeks ago, which has increased considerably in the last few days so he could hardly sleep at night.

What questions do you ask the patient (multiple choice)?

- Why are you just coming now?
- Have you had this kind of pain before?
- Where does it hurt the most?
- Are you known to have gallstones?
- On a scale of 0–10, how severe is the pain?
- What is the quality of the pain?
- Does anything help with the pain?
- Do you have an actual advance healthcare directive?

Fig. 1 (A) Module overview of the “eImmunonkologie” virtual education platform. (B) Example slide of the module “Checkpoint inhibitors” (translated). (C) Illustrative learning success checks of the interactive case studies (translated)

Successful completion of the course requires finishing several exams (e.g., single or multiple choice questions, gap texts) after each chapter and a digital essay of a patient case which must be submitted separately followed by individual correction and feedback regarding learning potential. This blended review approach controls the newly acquired knowledge and exploits the potential of digital teaching through interactive question formats. The course is integrated as a thematic and voluntary supplement into the main lecture “Dermatology” at the Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) in the 4th year of medical school. Participation independent of this lecture is also possible. Upon successful completion, participants receive two bonus points for the written examination; partial half points are also awarded.

The module was technically implemented on the digital learning management system entitled “ILIAS” with the integration of interactive plug-ins (e.g., an examination plug-in called “H5P”). We also enabled the integration of social media functions such as a forum for the interaction of participants moderated by a physician of our team. The development of the course was financially supported by the “Virtuelle Hochschule Bayern e.V.” (VHB) which hosts the course. We were advised on media didactics by the “Institut für Lern-Innovation (ILI)” at the FAU with profound knowledge about the creation of virtual teaching formats [2].

The course was launched in the winter term 2021 and has been successfully completed by nearly 350 medical students so far. The evaluation shows a high level of interest in this topic and we receive consistently positive feedback. Many students confirmed our thesis that immunotherapy is currently only rarely addressed in medical school.

To the best of our knowledge, the development of this course is the first interdisciplinary and freely accessible virtual course on immuno-oncology for medical students, as well as physicians in training in German-speaking countries. However, it can be completed by any interested parties from other universities after prior registration to the VHB. Continuous evaluations and further development of the course content (e.g., multilingual content) are planned.

Have we aroused your interest? Access to the course is possible via the website of the “Virtuelle Hochschule

Bayern e.V.” (www.vhb.org) > Classic vhb > Dermatologie > eImmunonkologie).

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Declarations

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Consent for Publication Not applicable.

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