

Emil Kofod-Olsen  
Associate Professor  
Department of Health Science and Technology  
The Faculty of Medicine  
Medical Microbiology and Immunology  
Medical Microbiology and Immunology  
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## Research profile

My research revolves around cancer immunotherapy in pre-clinical mouse tumor models, with focus on utilizing dendritic cells for therapy. My research is divided into two arms, one related to STING-targeted therapy and another related to therapeutic cancer vaccines.

STING has proven to be an interesting target for immunotherapy, especially as combination with immune checkpoint inhibitors (ICI). My current aim is to use cholesterol interfering drugs, to prime the STING-pathway, thus making it more susceptible to stimulation during immunotherapy. In addition, I investigate the possible use of caspase-inhibition, as a mean to activate or prime the STING-pathway.

Cancer vaccines holds the potential to aid antigen-presentation and T cell activation during ICI treatment. We have generated a small recombinant protein vaccine, capable of maturing dendritic cells, thereby inducing activation of tumor-specific T cells. The vaccine carries a nucleotide adjuvant capable of activating dendritic cells through the cGAS/STING-pathway or the TLR3-pathway.

## Employment

### Associate Professor

Associate Professor  
Department of Health Science and Technology  
The Faculty of Medicine  
Gistrup, Denmark  
1 Feb 2015 → 31 Dec 4712

### Associate Professor

Associate Professor  
The Faculty of Medicine  
Gistrup, Denmark  
1 Feb 2015 → 31 Dec 4712

### Medical Microbiology and Immunology

The Faculty of Medicine  
Aalborg, Denmark  
1 Jan 2020 → present

### Associate Professor

Associate Professor  
Medical Microbiology and Immunology  
The Faculty of Medicine  
Aalborg, Denmark  
1 Feb 2015 → 31 Dec 4712

## Research outputs

**Novel nucleotide-packaging vaccine delivers antigen and poly(I:C) to dendritic cells and generate a potent antibody response in vivo**

Bruun, N., Laursen, M. F., Carmelo, R., Christensen, E., Jensen, T. S., Christiansen, G., Birkelund, S., Agger, R. & Kofod-Olsen, E., 19 Apr 2024, In: *Vaccine*. 42, 11, p. 2909-2918 10 p.

**Cholesterol-binding motifs in STING that control endoplasmic reticulum retention mediate anti-tumoral activity of cholesterol-lowering compounds**

Zhang, B.-C., Laursen, M. F., Hu, L., Hazrati, H., Narita, R., Jensen, L. S., Hansen, A. S., Huang, J., Zhang, Y., Ding, X., Mueser, M., Nilsson, E., Banasik, A., Zeiler, C., Mogensen, T. H., Etzerodt, A., Agger, R., Johannsen, M., Kofod-Olsen\*, E. & Paludan\*, S. R. & 1 others, Jakobsen\*, M. R., 29 Mar 2024, In: *Nature Communications*. 15, 1, 2760. \*contributed equally.

**Advancing a Dendritic Cell-Targeting Cancer Vaccine Carrying Danger Signal Adjuvants**

Bruun, N., Laursen, M. F., Hansen, C. F., Carmelo, R., Jensen, T. S., Christensen, E., Christiansen, G., Birkelund, S., Agger, R. & Kofod-Olsen, E., 2024.

**Cholesterol-Inhibition Slow Development of Cancer in CT26 and MC38 Cancer Models**

Jensen, T. S., Laursen, M. F., Pedersen, N. M. M., Smodek, A., Jakobsen, M. R. & Kofod-Olsen, E., 2024.

**nucleotide-binding vaccine induces maturation of dendritic cells in vitro and a potent immune response in vivo**

Bruun, N., Hansen, C. F., Christensen, E., Laursen, M. F., Birkelund, S., Kofod-Olsen, E. & Agger, R., 2023.

**Pd-L1 Blockade Followed by Irreversible Electroporation of a Liver Metastasis in Pancreatic Cancer Patients**

Flak, R. V., Kofod-Olsen, E., Sølvsten, N. D., Naujokaite, G., Agger, R., Stender, M. T., Christensen, S., Shim, S., Poulsen, L. Ø., Detlefsen, S., Thorlacius-Ussing, O. & Ladekarl, M., 2023, SSRN: Social Science Research Network, 19 p.

**Nucleotide-packaging vaccine leads to in vitro immune activation with low toxicity**

Bruun, N., Christensen, E., Laursen, M. F., Jensen, T. S., Birkelund, S., Agger, R. & Kofod-Olsen, E., 25 May 2022.

**Development of a dendritic cell-targeting vaccine against cancer**

Bruun, N., Laursen, M. F., Kofod-Olsen, E. & Agger, R., 2022.

**A phase II-study of electroporation potentiated immunotherapy in liver metastatic pancreatic cancer (EPIC-1)**

Flak, R. V., Poulsen, L. Ø., Stender, M. T., Naujokaite, G., Tcacenco, O., Wanders, A., Detlefsen, S., Agger, R., Kofod-Olsen, E., Thorlacius-Ussing, O. & Ladekarl, M., 2021, *Danske Kræftforskningsdage: Abstract Book*. p. 51 40

**Activation of dendritic cells by targeted DNA: a potential addition to the armamentarium for anti-cancer immunotherapy**

Fyrstenberg Laursen, M., Kofod-Olsen, E. & Agger, R., Nov 2019, In: *Cancer Immunology, Immunotherapy*. 68, 11, p. 1875-1880 6 p.

**Analysis of Type 1 IFN Production by DCs after Stimulation with Supernatant of Necroptotic Cells**

Zeiler, C., Banasik, A., Laursen, M. F., Agger, R. & Kofod-Olsen, E., 16 May 2019.

**CD11c-targeted dendritic cell vaccine**

Fredriksen, L., Laursen, M. F., Birkelund, S., Agger, R. & Kofod-Olsen, E., 16 May 2019.

**Generation of a recombinant CD11c-targeted vaccine containing SIINFEKL antigen**

Nielsen, L., Laursen, M. F., Agger, R. & Kofod-Olsen, E., 16 May 2019.

**Investigations on a Novel Dendritic Cell-Targeted Adjuvant for Anti-Cancer Therapy**

Laursen, M. F., Agger, R. & Kofod-Olsen, E., 3 Oct 2018.

**CD11c-targeted delivery of DNA to dendritic cells leads to cGAS- and STING-dependent maturation**

Laursen, M. F., Christensen, E., Degn, L. L. T., Jønsson, K., Jakobsen, M. R., Agger, R. & Kofod-Olsen, E., 2018, In: *Journal of Immunotherapy*. 41, 1, p. 9-18 10 p.

### **Targeting cGAS and STING in human dendritic cells**

Laursen, M. F., Agger, R. & Kofod-Olsen, E., 2018, In: *European Journal of Immunology*. 48, Suppl. 1, p. 162-163 P–249.

### **Ectodermal dysplasia with immunodeficiency caused by a branch-point mutation in IKBKG/NEMO**

Jørgensen, S. E., Bøttger, P., Kofod-Olsen, E., Holm, M., Mørk, N., Ørntoft, T. F., Sørensen, U. B. S., Bernth-Jensen, J. M., Herlin, T., Veirum, J., Larsen, C. S., Østergaard, L., Hartmann, R., Christiansen, M. & Mogensen, T. H., 29 Jun 2016, In: *Journal of Allergy and Clinical Immunology*.

### **Altered fraction of regulatory B and T cells is correlated with autoimmune phenomena and splenomegaly in patients with COVID**

Kofod-Olsen, E., Jørgensen, S. E., Nissen, S. K., Westh, L., Møller, B. K., Østergaard, L., Larsen, C. S. & Mogensen, T. H., 2016, In: *Clinical Immunology*. 162, 1, p. 49-57 9 p.

### **Development and experimental analyses of a novel fusion protein vaccine cassette and its interactions with dendritic cells**

Christensen, E., Birkelund, S., Kofod-Olsen, E. & Agger, R., 2016, *Danish Society of Immunology, Annual Meeting, 19 April 2016, Copenhagen, Denmark*. Danish Society of Immunology, p. 11 No. 8

### **Human CD11c as a potential receptor for targeted vaccines**

Pedersen, L. L., Prangsgaard, J., Sanden, M., Kofod-Olsen, E. & Agger, R., 2016, *Danish Society of Immunology, Annual Meeting, 19 April 2016, Copenhagen, Denmark*. Danish Society of Immunology, p. 10 No. 7

### **The delivery of double-stranded DNA to dendritic cells and its effect on dendritic cell maturation**

Laursen, M. F., Kofod-Olsen, E. & Agger, R., 2016, *Danish Society of Immunology, Annual Meeting, 19 April 2016, Copenhagen, Denmark*. Danish Society of Immunology, p. 21 No. 18

### **Mutations in the TLR3 signaling pathway and beyond in adult patients with herpes simplex encephalitis**

Mørk, N., Kofod-Olsen, E., Sørensen, K. B., Bach, E., Ørntoft, T. F., Østergaard, L., Paludan, S. R., Christiansen, M. & Mogensen, T. H., 29 Oct 2015, In: *Genes and Immunity*.

### **A STAT1-gain-of-function mutation causing Th17 deficiency with chronic mucocutaneous candidiasis, psoriasiform hyperkeratosis and dermatophytosis**

Nielsen, J., Kofod-Olsen, E., Spaun, E., Larsen, C. S., Christiansen, M. & Mogensen, T. H., Oct 2015, In: *B M J Case Reports*. 2015

### **Functional IRF3 deficiency in a patient with herpes simplex encephalitis**

Andersen, L. L., Mørk, N., Reinert, L. S., Kofod-Olsen, E., Narita, R., Jørgensen, S. E., Skipper, K. A., Höning, K., Gad, H. H., Østergaard, L., Ørntoft, T. F., Hornung, V., Paludan, S. R., Mikkelsen, J. G., Fujita, T., Christiansen, M., Hartmann, R. & Mogensen, T. H., 27 Jul 2015, In: *The Journal of Experimental Medicine*.

### **Erratum: A STAT1-gain-of-function mutation causing Th17 deficiency with chronic mucocutaneous candidiasis, psoriasiform hyperkeratosis and dermatophytosis (BMJ Case Reports (2015) DOI: 10.1136/bcr-2015-211372)**

Nielsen, J., Kofod-Olsen, E. & Spaun, E., 2015, In: *BMJ Case Reports*.

### **Innate DNA sensing is impaired in HIV patients and IFI16 expression correlates with chronic immune activation**

Nissen, S. K., Højten, J. F., Andersen, K. L. D., Kofod-Olsen, E., Berg, R. K., Paludan, S. R., Østergaard, L., Jacobsen, M. R., Tolstrup, M. & Mogensen, T. H., Jul 2014, In: *Clinical and Experimental Immunology*. 177, 1, p. 295-309 15 p.

### **The DR6 protein from human herpesvirus-6B induces p53-independent cell cycle arrest in G2/M**

Schleimann, M. H., Hoberg, S., Hansen, A. S., Bundgaard, B., Witt, C. T., Kofod-Olsen, E. & Höllsberg, P., Mar 2014, In: *Virology*. 452-453, p. 254-63 10 p.

### **Human herpesvirus-6B protein U19 contains a p53 BOX I homology motif for HDM2 binding and p53 stabilization**

Kofod-Olsen, E., Petterson, S., Wallace, M., Abduljabar, A. B., Øster, B., Hupp, T. & Höllsberg, P., Jan 2014, In: *Virology*. 488, p. 33-42 10 p.

T cells detect intracellular DNA but fail to induce type I IFN responses: implications for restriction of HIV replication  
Berg, R. K., Rahbek, S. H., Holm, C. K., Melchjorsen, J., Jensen, D. G., Kofod-Olsen, E., Hansen, A. L., Jørgensen, L. B., Østergaard, L., Tolstrup, M., Larsen, C. S., Paludan, S. R., Jakobsen, M. R. & Mogensen, T. H., 2014, In: PLOS ONE. 9, 1, p. e84513

The B1-cell subpopulation is diminished in patients with relapsing-remitting multiple sclerosis  
Tørring, C., Petersen, C. C., Bjerg, L., Kofod-Olsen, E., Petersen, T. & Höllsberg, P., 15 Sept 2013, In: Journal of Neuroimmunology. 262, 1-2, p. 92-98 p.

Identification of innate immunodeficiencies by whole exome sequencing  
Mogensen, T., Christiansen, M., Kofod-Olsen, E., Veirum, J. E., Herlin, T., Ørntoft, T. F., Larsen, C. S. & Østergaard, L., 2013, In: Clinical and Experimental Immunology. 174, Suppl. S1, p. 24 P50.

Inhibition of p53-dependent, but not p53-independent, Cell Death by U19 Protein from Human Herpesvirus 6B  
Kofod-Olsen, E., Møller, J. L. M., Schleimann, M. H., Bundgaard, B., Bak, R. O., Øster, B., Mikkelsen, J. G., Hupp, T. & Höllsberg, P., 2013, In: P L o S One. 8, 3

Seminal Shedding of Human Papillomavirus and Human Herpesvirus  
Kaspersen, M. D., Larsen, P. B., Ingerslev, H. J., Fedder, J., Bungum, M., Kofod-Olsen, E., Höllsberg, P. & Bonde, J. H., 2013, In: APMS - Journal of Pathology, Microbiology and Immunology. 121, p. 26-27 2 p.

U20 inhibits death receptor and pattern-recognition receptor signaling in vitro, but increases inflammation in vivo  
Kofod-Olsen, E., Bak, R. O., Jensen, S. B., Dagnæs-Hansen, F., Holm, C. K., Deleuran, B. W. & Höllsberg, P., 2013.

U20 is responsible for human herpesvirus 6B inhibition of tumor necrosis factor receptor-dependent signaling and apoptosis  
Kofod-Olsen, E., Ross-Hansen, K., Schleimann, M. H., Jensen, D. K., Møller, J. M. L., Bundgaard, B., Mikkelsen, J. G. & Höllsberg, P., Nov 2012, In: Journal of Virology. 86, 21, p. 11483-92 10 p.

Targeted genome editing by recombinant adeno-associated virus (rAAV) vectors for generating genetically modified pigs  
Luo, Y., Kofod-Olsen, E., Christensen, R., Sørensen, C. B. & Bolund, L., 20 Jun 2012, In: Journal of Genetics and Genomics. 39, 6, p. 269-74 6 p.

Human herpesvirus-6A/B binds to spermatozoa acrosome and is the most prevalent herpesvirus in semen from sperm donors  
Kaspersen, M. D., Larsen, P. B., Kofod-Olsen, E., Fedder, J., Bonde, J. & Höllsberg, P., 2012, In: PLOS ONE. 7, 11, p. e48810

U20 Is Responsible for Human Herpesvirus 6B Inhibition of TNF Receptor-Dependent Signaling and Apoptosis  
Kofod-Olsen, E., Schleimann, M. H., Jensen, D. K. & Höllsberg, P., 2012.

Human herpes virus 6 and 7 u20 polypeptide and polynucleotides for use as a medicament or diagnosticum  
Kofod-Olsen, E. (Inventor) & Höllsberg, P. (Inventor), 2011, Patent No. WO/2011/095174 A1

Inhibition of apoptosis by human herpesvirus-6B infection: PhD dissertation  
Kofod-Olsen, E., 2011, 121 p. Faculty of Health Sciences, University of Aarhus.

Regulation of apoptosis by HHV-6B infection  
Kofod-Olsen, E. & Höllsberg, P., 2011.

Expression of MDC/CCL22 and its receptor CCR4 in rheumatoid arthritis, psoriatic arthritis and osteoarthritis  
Flytlie, H. A., Hvid, M., Lindgreen, E., Kofod-Olsen, E., Petersen, E. L., Jørgensen, A., Deleuran, M., Vestergaard, C. & Deleuran, B., Jan 2010, In: Cytokine. 49, 1, p. 24-9 6 p.

Human herpesvirus-6B blocks induction of p53-dependent but not -independent apoptosis  
Kofod-Olsen, E., Mikkelsen, J. G. & Höllsberg, P., 2010.

**Human herpesvirus 6B induces phenotypic maturation without IL-10 and IL-12p70 production in dendritic cells**  
Berthelsen, L. B., Pedersen, C. C., Kofod-Olsen, E., Oster, B., Höllsberg, P., Agger, R. & Hokland, M., 2010, In: Scandinavian Journal of Immunology. 71, 6, p. 431-439 9 p.

Osteopontin enhances phagocytosis through a novel osteopontin receptor, the alphaXbeta2 integrin  
Schack, L., Stapulionis, R., Christensen, B., Kofod-Olsen, E., Skov Sørensen, U. B., Vorup-Jensen, T., Sørensen, E. S. & Höllsberg, P., 1 Jun 2009, In: Journal of Immunology. 182, 11, p. 6943-50 8 p.

Direct Repeat 6 from human herpesvirus-6B encodes a nuclear protein that forms a complex with the viral DNA processivity factor p41  
Schleimann, M. H., Møller, J. M. L., Kofod-Olsen, E. & Höllsberg, P., 2009, In: PLOS ONE. 4, 10, p. e7457

Human herpesvirus 6B U19 protein is a PML-regulated transcriptional activator that localizes to nuclear foci in a PML-independent manner  
Kofod-Olsen, E., Ross-Hansen, K., Mikkelsen, J. G. & Höllsberg, P., Jan 2008, In: Journal of General Virology. 89, Pt 1, p. 106-16 11 p.

Characterization of the IE4 protein encoded by the human herpesvirus 6B *U19* ORF  
Kofod-Olsen, E., Ross-Hansen, K., Mikkelsen, J. G. & Höllsberg, P., 2008.

Restriction of human herpesvirus 6B replication by p53  
Oster, B., Kofod-Olsen, E., Bundgaard, B. & Höllsberg, P., 2008, In: Journal of General Virology. 89, Pt 5, p. 1106-13 8 p.

Human herpesvirus 6B inhibits cell proliferation by a p53-independent pathway  
Øster, B., Kaspersen, M. D., Kofod-Olsen, E., Bundgaard, B. & Höllsberg, P., Dec 2006, In: Journal of Clinical Virology. 37 Suppl 1, p. S63-8

## Activities

### **Aarhus University (External organisation)**

Kofod-Olsen, E. (Member)  
18 Nov 2022

### **Aarhus University (External organisation)**

Kofod-Olsen, E. (Member)  
17 Nov 2022

### **Aarhus University (External organisation)**

Kofod-Olsen, E. (Member)  
1 Oct 2022

### **Technical University of Denmark (External organisation)**

Kofod-Olsen, E. (Member)  
1 Sept 2022

### **Aarhus University (External organisation)**

Kofod-Olsen, E. (Member)  
30 May 2022

**Department of Health Science and Technology (Organisational unit)**

Kofod-Olsen, E. (Chairperson)

1 Jun 2021

**Technical University of Denmark (External organisation)**

Kofod-Olsen, E. (Member)

31 Jan 2021

**European Macrophage and Dendritic cell Society (External organisation)**

Kofod-Olsen, E. (Member)

2021

**Technical University of Denmark (External organisation)**

Kofod-Olsen, E. (Member)

4 Feb 2020

**Danish Society of Immunology (External organisation)**

Kofod-Olsen, E. (Member)

2017

**Scandinavian Society of Immunology (External organisation)**

Kofod-Olsen, E. (Member)

2017

**Danish Society for Flow cytometry (External organisation)**

Kofod-Olsen, E. (Member)

2016

**Press/Media****Knæk Cancer på tur til fire danske byer**

Kofod-Olsen, E.

11/10/2017

4 items of Media coverage

**Regulating cholesterol levels might be the key to improving cancer treatment**

Kofod-Olsen, E.

30/04/2024 → 05/05/2024

9 items of Media coverage

**Regulering af kolesterolniveauer kan være nøglen til bedre kræftbehandling**

Kofod-Olsen, E.

30/04/2024

1 item of Media coverage

**Projects****EPIC-1: A phase II Study of Electroporation Potentiated Immunotherapy in Liver Metastatic Pancreatic Cancer**

Flak, R. V. (Project Coordinator), Ladekarl, M. (PI), Poulsen, L. Ø. (Project Coordinator), Thorlacius-Ussing, O. (Other), Stender, M. (Other), Detlefsen, S. (Col), Agger, R. (Col), Kofod-Olsen, E. (Col) &amp; Wanders, A. (Col)

01/01/2021 → 31/12/2025

**Dendritic cell-targeted vaccination**

Kofod-Olsen, E. (PI) &amp; Agger, R. (PI)

01/09/2016 → ...

**Inflammatory cell death and dendritic cell activation in the tumor microenvironment**

Kofod-Olsen, E. (PI) & Jensen, T. S. (PI)

01/09/2017 → ...

**STING-targeted immunotherapy**

Kofod-Olsen, E. (PI) & Jensen, T. S. (PI)

01/05/2018 → ...