CV - Dr. Julia Thorn-Seshold (née Ahlfeld)

*1986 in Langen/Hessen; married; one child (*2021)

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Research Program

I use molecular and chemical biology to develop diagnostics or therapeutics for inflammatory diseases and cancer. I am broadly active in basic molecular and *in vivo* biology and its translation to preclinical proofs of concept. My career path from the Department of Biology to the Department of Pharmacy has also included a clinical study, in a postdoc at the University Hospital.

Focus areas:

(1) Basic research into cellular metabolism and its dysregulation in inflammatory conditions;
(2) Translational applications of chemical prodrugs and imaging agents for redox and metabolism, in predictive preclinical models for cancer and acute or chronic inflammation;
(3) Combination therapies harnessing convergent biomolecular pathways in disease.

Scientific Career

Since 2019	Leader, Biology Subgroup, Thorn-Seshold Group, LMU Munich Dept. Pharmacy
2021 – 2022	Leader, *German Federal Ministry of Education and Research* (BMBF) translational project *NanoCapture*, LMU Munich Dept. Pharmacy
2018 – 2021	Scientific Lead, BMBF project *NanoCapture*, LMU Munich Dept. Pharmacy *Parental leave: 10 months*
2015 – 2018	Postdoc in Clinical Pharmacology (S. Rothenfusser), LMU University Hospital

Education

German grading: 1.0 - 1.5 (*outstanding*); 1.6 - 2.5 *(substantially above average*); 2.6 - 3.5 (*average*)

2011 – 2014	PhD (Biology), LMU Munich, Germany (31.07.2014); *magna cum laude* (1.0) Thesis: *The role of the transcription factor Sox2 during cerebellar development and the formation of medulloblastoma* (Prof. Ulrich Schüller)
2007 – 2010	Diploma (MSc. equivalent, Biology), LMU Munich, Germany; top grade (1.0) Major in Neurobiology. Thesis: *Sources of calretinin inputs to motoneurons of extraocular muscles involved in upgaze* (Prof. Anja Horn-Bochtler)
2005 – 2007	*Vordiplom* (BSc. equivalent, Biology), University of Bonn, Germany (1.3)
2005	High School Certificate, Valentin-Heider-Gymnasium, Lindau, Germany (1.8)
2002	Lewis S. Mills High School, Connecticut, USA (High Honors)

Recent Funding and Awards (selected)

2022	Munich Centre for Nanoscience *Investment Award* (redox and metabolism)
*2021 – 2022	BMBF *GO-Bio* translational grant *NanoCapture* (tumour-targeted therapy) **I took over the leadership of the project for its final two years, after being scientific project leader for 2019-2020.*
2019 – 2023	Joachim Herz *Translational Research Fellowship* (redox and metabolism)
2015 – 2020	Munich Centre for Protein Science CIPSM *Postdoc Support Funds*
2018 – 2019	Friedrich Baur Foundation *Research Award* (immunogenic viral patterns)
2016 – 2023	MD scholarship lab support grants

Teaching and Supervisions (selected)

- **Lecturer, *Methods in the Life Sciences*** seminar series (3rd yr Pharm. Sci., 30 h, 2020)
- **Lecturer / Tutor, *Research Retreat*** (PhDs/postdocs in Chemical Biology, 1 wk, since 2019)
- ***Pädagogik InSeL*** *Habilitation* teaching certificate (LMU Medical Faculty; completed 2018)

- **Current [Co]-Supervisions:** 3 MD/PhD medical students
- **Completed [Co]-Supervisions:** 4 biochemistry / biology postdocs and 2 biology technicians in translational medicine project *NanoCapture*. Co-Advisor for 1 PhD thesis, 1 Dr. med. vet., and 5 MD/PhD theses. Co-Supervisor for BSc/MSc-level internships in biology.

Main Research Collaborations Ongoing

Redox/Metabolism tools: Elias Arnér (Karolinska Institutet, SWE)
Immunotherapy: Lars König (BioNTech / LMU Munich, DE)
Inflammation: Christoph Wilhelm (Uni Bonn, DE)

Institutional Responsibilities

- **Biological safety officer**: responsible for 3 genetic engineering facilities at LMU (since 2019)
- **Biology lab setup**: Built up two mammalian cell culture and wet labs from scratch, secured *BSL-1* certification for S1 work, upkeep and reporting for S1 status (since 2019)
- **Experimental mouse work**: certified as study leader since 2018; wrote, obtained approval for, and led two experimentation protocols (TVAs)
- **Clinical study leader**: yellow fever vaccination study for 250 human participants (2016 – 2018) Leader of study team (2 physicians, 4 technicians, 3 MD/PhD students)
  Responsible for successful approval by ethics committee; collaborations (LMU Institutes of Tropical Medicine and Transfusion Medicine; Helmholtz Infection Centre HZI; Max-Planck Institute for Biochemistry, section Proteomics, Mann lab); cohort management (sampling, preparation, storage, distribution); and independent method development (FluoRNT 2022)

Other Information

- **Teaching in**: German (native speaker), English (full fluency)
- **Other languages**: French (basic)
- **IT**: BD Diva and FlowJo for flow cytometry; SnapGene; Leica, Zeiss and µManager imaging software; FIJI; Affinity Designer/Adobe Illustrator; basic R workflows; admin of group electronic lab journals (Benchling); OS proficiency (Mac/Win); GraphPad Prism
- **Certifications**: Animal experimentation (work since 2012, leader since 2018 according to FELASA guidelines), Biological Safety Officer (BSL-1 since 2018), project management, intersectional and intercultural leadership
- **Other activities**: road biking, hiking and camping

Publication List - Dr. Julia Thorn-Seshold

My research has covered **redox chemical biology** (papers 22, 28, 29, 30); **molecular probes** (11, 13, 14, 17, 20, 23, 24, 27); **inflammation** (16, 18, 21); **cancer immunology** (12, 15); **cancer biology** (1, 3, 4, 5, 6, 7, 9, 10); **virology** (19, 25, 26*); and **neurobiology** (2,8). Key papers are highlighted.

(30) Felber, JG; Kitowski, A; Zeisel, L; Maier, MS; Heise, C; **Thorn-Seshold, J;** Thorn-Seshold, O.
Cyclic dichalcogenides extend the reach of bioreductive prodrugs to harness the thioredoxin system: applications to *seco*-duocarmycins.
***ACS Central Science* 2023**, ASAP (https://doi.org/10.1021/acscentsci.2c01465).
→ key paper for therapeutic redox-triggered prodrugs *in vivo* (mouse cancer models)

(29) Zeisel, L; Felber, J; Scholzen, K; Poczka, L; Cheff, D; Maier, MS; Cheng, Q; Shen, M; Hall, M; Arnér, ESJ; **Thorn-Seshold, J;** Thorn-Seshold, O.
Selective cellular probes for mammalian thioredoxin reductase TrxR1: rational design of RX1, a modular 1,2-thiaselenane redox probe.
• ***Chem* 2022**, 1493-1517. https://doi.org/10.1016/j.chempr.2022.03.010

(28) Felber, JG; Poczka, L; Scholzen, KC; Zeisel, L; Maier, MS; Busker, S; Theisen, U; Brandstädter, C; Becker, K; Arnér, ESJ; **Thorn-Seshold, J;** Thorn-Seshold, O.
Cyclic 5-membered disulfides are not selective substrates of thioredoxin reductase, but are opened nonspecifically.
• ***Nat Commun* 2022**, *13* (1), 1754. https://doi.org/10.1038/s41467-022-29136-4.

(27) Gao, L; Meiring, JCM; Varady, A; Ruider, IE; Heise, C; Wranik, M; Velasco, CD; Taylor, JA; Terni, B; Weinert, T; Standfuss, J; Cabernard, CC; Llobet, A; Steinmetz, MO; Bausch, AR; Distel, M; **Thorn-Seshold, J;** Akhmanova, A; Thorn-Seshold, O.
In vivo photocontrol of microtubule dynamics and integrity, migration and mitosis, by the potent GFP-imaging-compatible photoswitchable reagents SBTubA4P and SBTub2M.
• ***J Am Chem Soc* 2022**, *144* (12), 5614–5628. https://doi.org/10.1021/jacs.2c01020.
→ key paper for molecular probes and cell biology methods

(26*) Scheck, MK; Lehmann, L; Zaucha, M; Schwarzlmueller, P; Huber, K; Pritsch, M; Barba-Spaeth, G; Thorn-Seshold, O; Krug, AB; Endres, S; Rothenfusser, S; **Thorn-Seshold, J.***
FluoRNT: a robust, efficient assay for detection of neutralising antibodies against Yellow Fever Virus 17D.
• ***PLoS One* 2022**, *17* (2), e0262149. https://doi.org/10.1371/journal.pone.0262149.
→ key paper for clinical methods development (senior & corresponding author)

(25) Rasulova, M; Vercruysse, T; Paulissen, J; Coun, C; Suin, V; Heyndrickx, L; Ma, J; Geerts, K; Timmermans, J; Mishra, N; Li, L-H; Kum, DB; Coelmont, L; Van Gucht, S; Karimzadeh, H; **Thorn-Seshold, J;** Rothenfußer, S; Ariën, KK; Neyts, J; Dallmeier, K; Thibaut, HJ.
A high-throughput Yellow Fever neutralization assay.
• ***Microbiol Spectr* 2022**, *10* (3), e0254821. https://doi.org/10.1128/spectrum.02548-21.

(24) Gao, L; Meiring, JCM; Heise, C; Rai, A; Müller-Deku, A; Akhmanova, A; **Thorn-Seshold, J;** Thorn-Seshold, O.
Photoswitchable epothilone-based microtubule stabilisers allow GFP-imaging-compatible, optical control over the microtubule cytoskeleton.
• ***Angew Chem Int Ed* 2021** VIP paper, *61* (10), e202114614. https://doi.org/10.1002/anie.202114614.

(23) Sailer, A; Meiring, JC; Heise, C; Pettersson, L; Akhmanova, A; **Thorn-Seshold, J;** Thorn-Seshold, O.
Pyrrole hemithioindigo antimitotics with near-quantitative bidirectional photoswitching that photocontrol cellular microtubule dynamics with single-cell precision.
• ***Angew Chem Int Ed* 2021**, *60* (44), 23695–23704. https://doi.org/10.1002/anie.202104794.

(22) Felber, JG; Zeisel, L; Poczka, L; Scholzen, K; Busker, S; Maier, MS; Theisen, U; Brandstädter, C; Becker, K; Arnér, ESJ; **Thorn-Seshold, J;** Thorn-Seshold, O.
Selective, modular probes for thioredoxins enabled by rational tuning of a unique disulfide structure motif.
• ***J Am Chem Soc* 2021**, *143* (23), 8791–8803. https://doi.org/10.1021/jacs.1c03234.

(21) Pritsch, M; Ben Khaled, N; Liegl, G; Schubert, S; Hoelscher, M; Woischke, C; Arens, N; **Thorn-Seshold, J;** Kammermeier, S; Wieser, A.
Rapid prototyping vaccine approach in mice against multi-drug resistant gram-negative organisms from clinical isolates based on outer membrane vesicles.
• ***Microbiol Immunol* 2021**, *65* (5), 214–227. https://doi.org/10.1111/1348-0421.12882.

(20) Gao, L; Meiring, JCM; Kraus, Y; Wranik, M; Weinert, T; Pritzl, SD; Bingham, R; Ntouliou, E; Jansen, KI; Olieric, N; Standfuss, J; Kapitein, LC; Lohmüller, T; **Ahlfeld, J;** Akhmanova, A; Steinmetz, MO; Thorn-Seshold, O.
A robust, GFP-orthogonal photoswitchable inhibitor scaffold extends optical control over the microtubule cytoskeleton.
• ***Cell Chem Biol* 2021**, *28* (2), 228-241.e6. https://doi.org/10.1016/j.chembiol.2020.11.007.

(19) Linder, A; Bothe, V; Linder, N; Schwarzlmueller, P; Dahlström, F; Bartenhagen, C; Dugas, M; Pandey, D; **Thorn-Seshold, J;** Boehmer, DFR; Koenig, LM; Kobold, S; Schnurr, M; Raedler, J; Spielmann, G; Karimzadeh, H; Schmidt, A; Endres, S; Rothenfusser, S.
Defective interfering genomes and the full-length viral genome trigger RIG-I after infection with vesicular stomatitis virus in a replication dependent manner.
• ***Front Immunol* 2021**, *12*, 595390. https://doi.org/10.3389/fimmu.2021.595390.

(18) Boehmer, DFR; Koehler, LM; Magg, T; Metzger, P; Rohlfs, M; **Ahlfeld, J;** Rack-Hoch, A; Reiter, K; Albert, MH; Endres, S; Rothenfusser, S; Klein, C; Koenig, LM; Hauck, F.
A novel complete autosomal-recessive STAT1 LOF variant causes immunodeficiency with hemophagocytic lymphohistiocytosis-like hyperinflammation.
• ***J Allergy Clin Immunol Pract* 2020**, *8* (9), 3102–3111. https://doi.org/10.1016/j.jaip.2020.06.034.

(17) Müller-Deku, A; Meiring, JCM; Loy, K; Kraus, Y; Heise, C; Bingham, R; Jansen, KI; Qu, X; Bartolini, F; Kapitein, LC; Akhmanova, A; **Ahlfeld, J;** Trauner, D; Thorn-Seshold, O.
Photoswitchable paclitaxel-based microtubule stabilisers allow optical control over the microtubule cytoskeleton.
• ***Nat Commun* 2020**, *11* (1), 4640. https://doi.org/10.1038/s41467-020-18389-6.

(16[#]) Ahlfeld, J[#]; Huber, JE[#]; Scheck, MK; Zaucha, M; Witter, K; Lehmann, L; Karimzadeh, H; Pritsch, M; Hoelscher, M; von Sonnenburg, F; Dick, A; Barba-Spaeth, G; Krug, AB; Rothenfußer, S; Baumjohann, D.
Dynamic changes in circulating T follicular helper cell composition predict neutralising antibody responses after Yellow Fever vaccination.
• ***Clin Transl Immunology* 2020**, *9* (5), e1129. https://doi.org/10.1002/cti2.1129.
→ key paper for *in vivo* inflammation and immune response (equal first author)

(15) Ruzicka, M; Koenig, LM; Formisano, S; Boehmer, DFR; Vick, B; Heuer, E.-M; Meinl, H; Kocheise, L; Zeitlhöfler, M; **Ahlfeld, J;** Kobold, S; Endres, S; Subklewe, M; Duewell, P; Schnurr, M; Jeremias, I; Lichtenegger, FS; Rothenfusser, S.
RIG-I-based immunotherapy enhances survival in preclinical AML models and sensitizes AML cells to checkpoint blockade.
• ***Leukemia* 2020**, *34* (4), 1017–1026. https://doi.org/10.1038/s41375-019-0639-x.

(14) Kraus, Y; Glas, C; Melzer, B; Gao, L; Heise, C; Preuße, M; **Ahlfeld, J;** Bracher, F; Thorn-Seshold, O.
Isoquinoline-based biaryls as a robust scaffold for microtubule inhibitors.
***Eur J Med Chem* 2020**, *186*, 111865. https://doi.org/10.1016/j.ejmech.2019.111865.

(13) Sailer, A; Ermer, F; Kraus, Y; Bingham, R; Lutter, FH; **Ahlfeld, J;** Thorn-Seshold, O.
Potent hemithioindigo-based antimitotics photocontrol the microtubule cytoskeleton *in cellulo*.
• ***Beilstein J Org Chem* 2020**, *16*, 125–134. https://doi.org/10.3762/bjoc.16.14.

(12) Metzger, P; Kirchleitner, SV; Kluge, M; Koenig, LM; Hörth, C; Rambuscheck, CA; Böhmer, D; **Ahlfeld, J;** Kobold, S; Friedel, CC; Endres, S; Schnurr, M; Duewell, P.
Immunostimulatory RNA leads to functional reprogramming of myeloid-derived suppressor cells in pancreatic cancer.
• ***J Immunother Cancer* 2019**, *7* (1), 288. https://doi.org/10.1186/s40425-019-0778-7.

(11) Sailer, A; Ermer, F; Kraus, Y; Lutter, FH; Donau, C; Bremerich, M; **Ahlfeld, J;** Thorn-Seshold, O.
Hemithioindigos for cellular photopharmacology: desymmetrised molecular switch scaffolds enabling design control over the isomer-dependency of potent antimitotic bioactivity.
• ***ChemBioChem* 2019**, *20* (10), 1305–1314. https://doi.org/10.1002/cbic.201800752.

(10) Hellwig, M; Lauffer, MC; Bockmayr, M; Spohn, M; Merk, DJ; Harrison, L; **Ahlfeld, J;** Kitowski, A; Neumann, JE; Ohli, J; Holdhof, D; Niesen, J; Schoof, M; Kool, M; Kraus, C; Zweier, C; Holmberg, D; Schüller, U.
TCF4 (E2-2) harbors tumor suppressive functions in Shh medulloblastoma.
• ***Acta Neuropathol* 2019**, *137* (4), 657–673. https://doi.org/10.1007/s00401-019-01982-5.

(9) Merk, DJ; Ohli, J; Merk, ND; Thatikonda, V; Morrissy, S; Schoof, M; Schmid, SN; Harrison, L; Filser, S; **Ahlfeld, J;** *et al*.; Taylor, MD; Chavez, L; Kool, M; Schüller, U.
Opposing effects of CREBBP mutations govern the phenotype of Rubinstein-Taybi syndrome and adult Shh medulloblastoma.
• ***Dev Cell* 2018**, *44* (6), 709-724.e6. https://doi.org/10.1016/j.devcel.2018.02.012.

(8[#]) Ahlfeld, J; Filser, S; Schmidt, F; Wefers, AK; Merk, DJ; Glaß, R; Herms, J; Schüller, U.
Neurogenesis from Sox2-expressing cells in the adult cerebellar cortex.
• ***Sci Rep* 2017**, *7* (1), 6137. https://doi.org/10.1038/s41598-017-06150-x.
→ **key paper for *in vivo* cancer biology (first author)**

(7) Engel, NW; Neumann, JE; **Ahlfeld, J;** Wefers, AK; Merk, DJ; Ohli, J; Schüller, U.
Canonical Wnt signaling drives tumor-like lesions from Sox2-positive precursors of the murine olfactory epithelium.
• ***PLoS One* 2016**, *11* (11), e0166690. https://doi.org/10.1371/journal.pone.0166690.

(6) Moreno, N; Schmidt, C; **Ahlfeld, J;** Pöschl, J; Dittmar, S; Pfister, SM; Kool, M; Kerl, K; Schüller, U.
Loss of Smarc proteins impairs cerebellar development.
***J Neurosci* 2014**, *34* (40), 13486–13491. https://doi.org/10.1523/JNEUROSCI.2560-14.2014.

(5) Kerl, K; Moreno, N; Holsten, T; **Ahlfeld, J;** Mertins, J; Hotfilder, M; Kool, M; Bartelheim, K; Schleicher, S; Handgretinger, R; Schüller, U; Meisterernst, M; Frühwald, MC.
Arsenic trioxide inhibits tumor cell growth in malignant rhabdoid tumors *in vitro* and *in vivo* by targeting overexpressed Gli1.
• ***Int J Cancer* 2014**, *135* (4), 989–995. https://doi.org/10.1002/ijc.28719.

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Wnt/β-Catenin signaling inhibits the Shh pathway and impairs tumor growth in Shh-dependent medulloblastoma.
• ***Acta Neuropathol* 2014**, *127* (4), 605–607. https://doi.org/10.1007/s00401-014-1258-2.

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Sox2 Requirement in Sonic Hedgehog-associated medulloblastoma.
***Cancer Res* 2013**, *73* (12), 3796–3807. https://doi.org/10.1158/0008-5472.CAN-13-0238.

(2[#]) Ahlfeld, J; Mustari, M; Horn, AKE.
Sources of calretinin inputs to motoneurons of extraocular muscles involved in upgaze.
• ***Ann N Y Acad Sci* 2011**, *1233*, 91–99. https://doi.org/10.1111/j.1749-6632.2011.06168.x.

(1) Lorenz, A; Deutschmann, M; **Ahlfeld, J;** Prix, C; Koch, A; Smits, R; Fodde, R; Kretzschmar, HA; Schüller, U.
Severe alterations of cerebellar cortical development after constitutive activation of Wnt signaling in granule neuron precursors.
• ***Mol Cell Biol* 2011**, *31* (16), 3326–3338. https://doi.org/10.1128/MCB.05718-11.

Patent

O Thorn-Seshold, J Felber, **J Thorn-Seshold**, L Zeisel.
Disulfide prodrug compounds.
Patent Application WO 2022/200347 (EP21163944.8), **2021** (actively maintained)