



# Thomas Tuschl, Ph.D.

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**RNA functions not only as a carrier of genetic information, but also as a catalyst and guide for the processing or regulation of other RNA molecules. Cells have evolved mechanisms to sense aberrant sequence, structure, and chemical modification of nucleic acids by a process known as innate immunity. Tuschl is investigating these mechanisms in human cells with the goal of developing treatments for genetic and inflammatory diseases.**

Eukaryotic cells express a variety of classes of small RNA molecules. The Tuschl lab has identified these classes and their many members using various RNA-sequencing (RNA-seq) techniques. Their discoveries include the molecular characterization of small interfering RNAs (siRNAs), a class of double-stranded, 21-nucleotide-long molecules that guide sequence-specific gene silencing. Tuschl was the first to demonstrate their utility for knocking down human gene expression, leading to the development of a new class of therapeutics.

Two additional RNA classes uncovered by his lab, called microRNAs (miRNAs) and piwi-interacting RNAs (piRNAs), have great importance to human biology.

Involved in many biological processes, miRNAs act by controlling messenger RNA (mRNA) stability in hundreds of targets. Because they are present in biofluids such as plasma and urine, miRNAs may serve as biomarkers of disease. The Tuschl laboratory developed automated processes to isolate and characterize extracellular small RNAs, and discovered remarkable changes in extracellular miRNA composition in normal and disease states.

piRNAs are specifically expressed in male and female germ line cells and are required for normal germ cell development. Knocking out the piwi protein-coding genes in mice causes male infertility, but the targets and molecular function of piRNAs remain unknown. Efforts to characterize their biogenesis and targets are ongoing.

During its life cycle, mRNA interacts in a sequence-specific manner with many ribonucleoprotein complexes (RNPs) and RNA-binding proteins (RBPs). The Tuschl lab has developed approaches to precisely define the binding sites of RNPs and RBPs on RNA and its precursors. Past studies focused on characterizing RBPs implicated in genetic diseases such as fragile X syndrome as well as those with unknown functions. Current studies identify RBPs and the enzymes required for ribosome-associated quality control (RQC), a process critical for eliminating aberrant mRNAs and nascent polypeptides. The identification of RNA interaction networks sheds light on the biological function of RNPs and RBPs and may contribute to the design of new therapeutic agents for controlling gene expression.

The Tuschl lab catalogs and annotates all cellular coding and non-coding RNAs in a global effort to clarify their roles in human development and various diseases. The ultimate goal is to host and mine all existing RNA-seq information in a database searchable by read, and to establish a well-curated non-redundant human reference transcriptome. Residual unmapped reads hold promise for the discovery of new pathogens or rare genetic aberrations contributing to disease.

Single-cell RNA-seq methods have revolutionized the characterization of cell types and regulatory states in normal and diseased tissues. Tuschl's lab adapted these approaches to characterize human tissue biopsies across various disease conditions, and study the interplay of inflammation and organ fibrosis. This work will help researchers to better understand the roles of secreted ligands and cell surface receptors in health and disease.

## EDUCATION

Maîtrise in chemistry, 1989  
Université Joseph Fourier

Diploma in chemistry, 1992  
University of Regensburg

Ph.D. in chemistry, 1995  
Max Planck Institute for Experimental Medicine and  
University of Regensburg

## POSTDOC

Massachusetts Institute of Technology and Whitehead Institute  
for Biomedical Research, 1995–1999

## POSITIONS

Group Leader, 1999–2002  
Max Planck Institute for Biophysical Chemistry

Associate Professor, 2003–2009  
Professor, 2009–  
The Rockefeller University

Investigator, 2005–2018  
Howard Hughes Medical Institute

## AWARDS

EMBO Young Investigator Award, 2001

AAAS Newcomb Cleveland Prize, 2003

New York City Mayor's Award for Excellence in Science and  
Technology, 2003

Wiley Prize, 2003

Ernst Schering Award, 2005

Irma T. Hirschl/Monique Weill-Caulier Trust Research Award, 2005

Meyenburg Prize, 2005

Molecular Bioanalytics Prize, Roche Diagnostics, 2006

Karl Heinz Beckurtz Award, 2007

Max Delbrück Medal, 2007

Ernst Jung Prize, 2008

NIH Director's Transformative Research Project Award, 2012

European Inventor Award Finalist, European Patent Office, 2014

## HONORARY SOCIETIES

German National Academy of Sciences Leopoldina

National Academy of Sciences

## SELECTED PUBLICATIONS

Meyer, C. et al. Small-molecule inhibition of SARS-CoV-2 NSP14 RNA cap methyltransferase. *Nature* 637, 1178–1185 (2025).

Meyer, C. et al. The G3BP1-family-USP10 deubiquitinase complex rescues ubiquitinated 40S subunits of ribosomes stalled in translation from lysosomal degradation. *Mol. Cell* 77, 1193–1205. e5 (2020).

Lama, L. et al. Development of human cGAS-specific small-molecule inhibitors for repression of dsDNA-triggered interferon expression. *Nat Commun* 10, 2261 (2019).

Mukherjee, N. Deciphering human ribonucleoprotein regulatory networks. *Nucleic Acids Res.* 47, 570–581 (2019).

Suryawanshi, H. A single-cell survey of the human first-trimester placenta and decidua. *Sci Adv* 4, eaau4788 (2018).