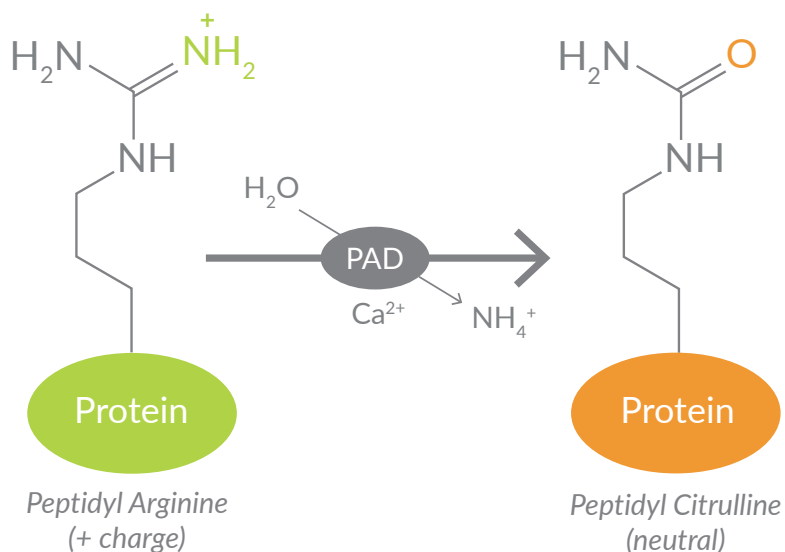


# Citrullination Research Tools



Cayman offers a full set of research tools to study citrullination, the post-translational protein modification linked to numerous inflammatory and autoimmune disorders. While citrullination is most known for its contribution to these pathological processes, it also plays an important role in several physiological functions, including gene regulation and the formation of neutrophil extracellular traps (NETs) in response to immune challenge. We offer a diverse portfolio of research tools for the detection of citrullination and to explore the function of peptidylarginine deiminases (PADs), the catalysts of citrullination, which may hold promise as a therapeutic target.



## Citrullination Targets

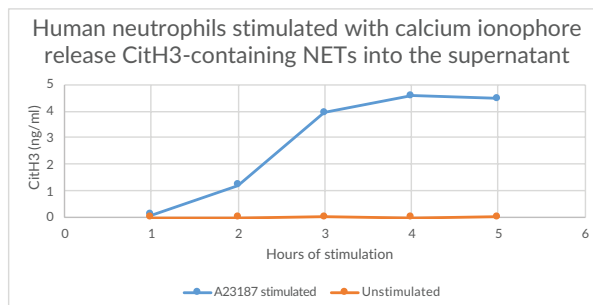
- $\beta$ -Catenin
- Cytokeratin
- $\alpha$ -Enolase
- Fibrinogen
- Filaggrin
- Heat shock proteins
- Histones
- Vimentin
- and more!

## Quantify NET Formation Using a CitH3-Specific ELISA

### Citrullinated Histone H3 (Clone 11D3) ELISA Kit

Item No. 501620

- Detect CitH3 in cell culture supernatants and cell lysates
- Detect CitH3 from as few as 1,000 neutrophils in human and mouse
- Assay 24 samples in triplicate or 36 samples in duplicate
- Measure CitH3 levels down to 0.15 ng/ml
- Rapid assay; get results in under 4 hours



## CitH3 ELISA Validation

Download the scientific poster *Quantification of NET Formation Using an ELISA Specific for CitH3* at [www.caymanchem.com/CitH3kit](http://www.caymanchem.com/CitH3kit) to view the methods and data used to develop this kit.

Additional Assays for Studying PADs and Their Substrates

Item No.	Product Name	Description
501270	Anti-Citrullinated Human Fibrinogen Assay Kit (mouse)	Measure antibodies specific for citrullinated human fibrinogen in mouse plasma or serum
501450	PAD2 (human) ELISA Kit	Detect human PAD2 in cell culture supernatants, cell lysates, plasma, and serum
500930	PAD4 Autoantibody ELISA Kit	Measure anti-PAD4 autoantibodies of any isotype (IgM, IgG, IgA)
501460	PAD4 (human) ELISA Kit	Detect human PAD4 in tissue culture medium, cell lysates, plasma, and serum

Screening Assays for Identifying Inhibitors of PAD Activity

Cayman has developed a set of orthogonal assays to screen large libraries of compounds for next-generation PAD inhibitors. These fluorescence-based assays monitor PAD activity by ammonia detection or by using AMC-tagged arginine as a trypsin substrate.

Ammonia Detection

Item No.	Product Name
701450	PAD1 Inhibitor Screening Assay Kit (Ammonia)
701400	PAD2 Inhibitor Screening Assay Kit (Ammonia)
701470	PAD3 Inhibitor Screening Assay Kit (Ammonia)
700560	PAD4 Inhibitor Screening Assay Kit (Ammonia)

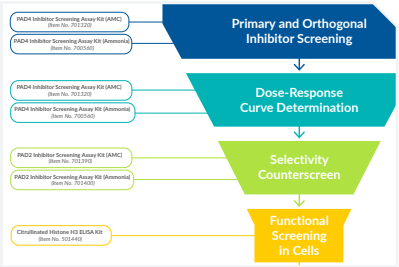
AMC-tagged Arginine as a Trypsin Substrate

Item No.	Product Name
701440	PAD1 Inhibitor Screening Assay Kit (AMC)
701390	PAD2 Inhibitor Screening Assay Kit (AMC)
701320	PAD4 Inhibitor Screening Assay Kit (AMC)

Access the PAD screening workflow!

Our citrullination tools can be used to develop a pre-clinical screening funnel to identify selective PAD4 inhibitors

Learn more at [www.caymanchem.com/PADscreening](http://www.caymanchem.com/PADscreening)



Proteins and Purified Enzymes

Item No.	Product Name	Description
24560	Alpha-1 Antitrypsin	Purified protein isolated from human plasma
20582	Citrullinated Core Histones (bovine)	Mixture of H1, H2A, H2B, H3, and H4 histones isolated from calf thymus and modified by PAD4
21585	Citrullinated $\alpha$ -Enolase (human recombinant)	Purified enzyme from <i>E. coli</i> , citrullinated by PAD4
25107	Citrullinated GRP78 (human recombinant)	N-terminal His-tagged protein purified from <i>E. coli</i> , citrullinated by PAD2
17926	Citrullinated Histone H3 (human recombinant)	Purified protein expressed in <i>E. coli</i> , citrullinated by PAD4
17927	Citrullinated Histone H4 (human recombinant)	Purified protein expressed in <i>E. coli</i> , citrullinated by PAD4
25108	Citrullinated Hsp70 (human recombinant)	N-terminal His-tagged protein expressed in <i>E. coli</i> , citrullinated by PAD2
21942	Citrullinated Vimentin (human recombinant)	Purified protein expressed in <i>E. coli</i>
18473	Human Fibrinogen (PAD2 Citrullinated)	Native protein purified from human plasma and citrullinated with human recombinant PAD2
400076	Human Fibrinogen (PAD4 Citrullinated)	Native protein purified from human plasma and citrullinated with human recombinant PAD4
10784	PAD1 (human recombinant)	Active N-terminal His-tagged enzyme expressed in <i>E. coli</i>
10785	PAD2 (human recombinant)	Active N-terminal His-tagged enzyme expressed in insect cells
10786	PAD3 (human recombinant)	Active N-terminal His-tagged enzyme expressed in <i>E. coli</i>
10500	PAD4 (human recombinant)	Active N-terminal His-tagged enzyme expressed in <i>E. coli</i>
25915	PAD4 (human recombinant; His- and GST-tagged)	Active recombinant N-terminal His- and GST-tagged protein expressed in <i>E. coli</i>
24615	PAD6 (human recombinant)	N-terminal His-tagged enzyme expressed in insect cells

## Antibodies to PADs and Their Common Substrates

Item No.	Product Name	Species Reactivity	Application(s)
23000	Citrullinated $\alpha$ -Enolase Monoclonal Antibody (Clone 8D3)	(+) Human	ELISA, WB
17088	Citrullinated Fibrinogen Monoclonal Antibody (Clone 10E9.3)	(+) Human	ELISA, WB
24497	Citrullinated Hsp70 (R155) Polyclonal Antibody	(+) Human	ELISA, WB
23916	Citrullinated Hsp70 (R357) Polyclonal Antibody	(+) Human	ELISA, WB
26742	Citrullinated Myelin Basic Protein Polyclonal Antibody	(+) Human	ELISA, WB
22054	Citrullinated Vimentin Monoclonal Antibody (Clone 12G11)	(+) Human	ELISA, WB
10478	Cytokeratin Monoclonal PE Antibody (Clone C-11)	(+) Human	FC, IF
20491	$\alpha$ -Enolase Polyclonal Antibody	(+) Human	ELISA, IHC, WB
18793	Fibrinogen ( $\alpha$ chain) Monoclonal Antibody (Clone 6D6)	(+) Human	WB
18033	Fibrinogen ( $\alpha$ chain) Polyclonal Antibody	(+) Human	WB
18073	Histone H1.4 (Citrullinated R53) Polyclonal Antibody	(+) Human	WB
17939	Histone H3 (Citrullinated R2 + R8 + R17) Monoclonal Antibody	(+) Human	ELISA, WB
13781	Histone H3 Polyclonal Antibody	(+) Human	ELISA, FC, IP, WB
17855	Histone H3 (Citrullinated R2 + R8 + R17) Polyclonal Antibody	(+) Human	ELISA, WB
22997	PAD1 Monoclonal Antibody (Clone 6B4)	(+) Human	ELISA, WB
19822	PAD2 Monoclonal Antibody (Clone 9F7)	(+) Human	ELISA, IHC, WB
24377	PAD3 Monoclonal Antibody (Clone 4E5)	(+) Human	ELISA, WB
19669	PAD4 Monoclonal Antibody (Clone 6D8)	(+) Human	ELISA, WB
19671	PAD4 Monoclonal Antibody (Clone 11F9)	(+) Human	ELISA, WB
25965	PAD6 Monoclonal Antibody (Clone 4B7)	(+) Human	ELISA, WB
20197	Vimentin Monoclonal Antibody (Clone 12E4)	(+) Human	ELISA, WB

## Bulk Orders and Custom Formulations Available

Email [sales@caymanchem.com](mailto:sales@caymanchem.com) to discuss your specific project needs

## Reagents for Studying Citrullinated Proteins

Item No.	Product Name	Description
17079	BB-Cl-Amidine	Potent, stable pan-PAD inhibitor with increased cellular potency ( $EC_{50}$ = 8.8 $\mu$ M in cells for PAD4 versus >200 $\mu$ M for Cl-amidine)
10599	Cl-Amidine (hydrochloride)*	Irreversible inhibitor of PAD1, PAD3, and PAD4 ( $IC_{50}$ s = 0.8, 6.2, and 5.9 $\mu$ M, respectively)
19933	AP-III-a4	Inhibits enolase ( $IC_{50}$ = 0.576 $\mu$ M); inhibits cancer cell migration and invasion processes
17450	Citrulline-specific Probe-biotin	Affinity probe for citrullinated protein detection through interaction with the biotin ligand
16172	Citrulline-specific Probe-rhodamine	Fluorescent probe for citrulline-containing protein detection
17488	GSK484 (hydrochloride)	Selective inhibitor of PAD4 ( $IC_{50}$ = 50 nM)
401272	Human Fibrinogen Affinity Sorbent	Immobilized human fibrinogen for the removal of antibodies that bind unmodified fibrinogen
28104	Photoswitchable PAD Inhibitor (technical grade)	A photoactivated PAD inhibitor that contains an azobenzene photoswitch allowing optical control of PAD activity
11352	Withaferin A	Targets metastatic cells that upregulate vimentin expression
17731	YW3-56 (hydrochloride, technical grade)	Inhibitor of PAD2 and PAD4 ( $IC_{50}$ s = 0.5-1 and 1-5 $\mu$ M, respectively)

\*Sold under license from the University of South Carolina under U.S. Patent No. 7,964,636

# Related NETosis and Carbamylation Products

## Tools to Investigate NETosis

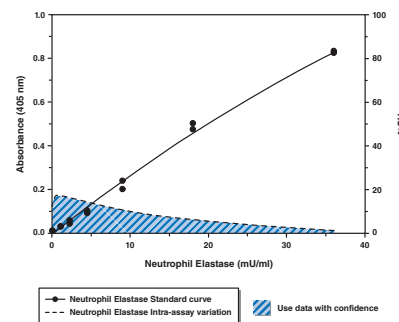
PADs have been linked to inflammation through their role in catalyzing histone H3 hypercitrullination during NET formation. Cayman has developed a collection of tools to study this form of pathogen-induced cell death.

Item No.	Product Name	Description
11189	N-acetyl-Pro-Gly-Pro Peptide	A neutrophil chemoattractant
501410	Myeloperoxidase (human) ELISA Kit	Detect human MPO in cell culture supernatants, plasma, and serum
601750	NETosis Imaging Assay Kit	Visualize and quantify NET formation kinetically <i>ex vivo</i> and <i>in vitro</i>
14922	Neutrophil Elastase Inhibitor	Selectively targets the binding domain of neutrophil elastase ( $IC_{50} = 7$ nM)
601070	Neutrophil (mouse) Isolation Kit	Isolate mouse neutrophils from peritoneal lavage or bone marrow

## Measure NET-Derived Neutrophil Elastase

### NETosis Assay Kit - Item No. 601010

- Induce and detect NET formation *in vitro*
- Elastase-based readout
- Non-dsDNA readout eliminates false positives from DNA
- Adaptable to multiple species



## Carbamylated Antibody and Proteins

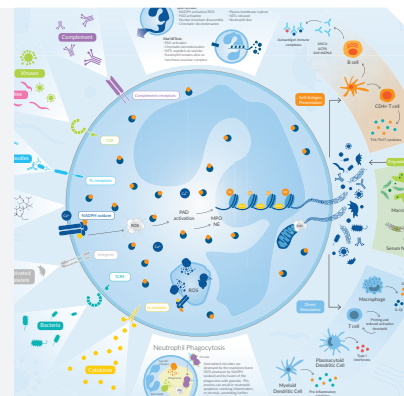
Carbamylation is a post-translational modification that results in the generation of homocitrulline *via* the non-enzymatic reaction of cyanate with lysine. Cayman developed a polyclonal antibody to detect carbamylated proteins and recombinant versions of key carbamylated proteins.

Item No.	Product Name	Description
22428	Anti-Carbamylation (Homocitrulline) Polyclonal Antibody	Detect carbamylated proteins of any type and from any species
21798	Carbamylated Alpha-1 Antitrypsin	Alpha-1 antitrypsin modified with potassium cyanate
21075	Carbamylated Bovine Serum Albumin	Albumin isolated from bovine plasma and modified with potassium cyanate
21076	Carbamylated Core Histones (bovine)	A carbamylated mixture of H1, H2A, H2B, H3, and H4 histones isolated from calf thymus
21097	Carbamylated Fetal Calf Serum	Fetal calf serum modified with potassium cyanate
21370	Carbamylated Human Fibrinogen	Fibrinogen purified from human plasma and modified with potassium cyanate

## NEW: Neutrophil Biology Wall Poster

Explore the events of NETosis and other biological aspects of the neutrophil in this new poster. Developed in collaboration with a neutrophil extracellular traps (NETs) expert, this poster presents the actions of PAD, a depiction of lytic *versus* vital NETosis, and the relationship to the onset of disease as is currently represented in peer-reviewed literature.

Request a copy for your lab at [www.caymanchem.com/literature](http://www.caymanchem.com/literature)



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