



Cardiac troponin T (cTnT)



The cardiac isoform of TnT is, similarly to cTnI, widely used as a marker of myocardial cell injury. cTnT has the same release kinetics into the bloodstream and the same sensitivity for minor myocardial injury as cTnI.

In human beings, cardiac troponin T is encoded by the TNNT2 gene. The major isoform found in normal adult human heart tissue (isoform 6 or TnT3) is 287 amino acids long with a calculated molecular weight of 34.6 kDa.

Reagents for immunoassay development

We provide MABs that are suitable for the development of immunoassays for diagnostic purposes as well as several MABs that are recommended for research use (see Figure 1). We also provide polyclonal anti-cTnT antibodies as well as purified native and recombinant human cTnT and recombinant human slow and fast skeletal TnT proteins. The skeletal proteins are ideal for studying immunoassay cross-reactivity to these isoforms.



CLINICAL UTILITY

✓ Early marker of acute myocardial infarction

Monoclonal antibodies for high-sensitivity cTnT assays

We have developed three anti-cTnT MABs (300cc, 329cc and 406cc; Cat.# 4T19cc) that can be used for the development of an immunoassay with superior sensitivity (limit of detection better than 0.3 ng/l) and high specificity (no cross-reaction to cTnI or to skeletal isoforms of TnT up to 30 µg/l). MAB 406cc is also available as a recombinant chimeric construct in which the original wild type variable domains of the antibody and human IgG1 constant domains are combined (Cat.#RC4T19, MAB RecChim406). RecChim406 has the similar limit of detection as the native antibody and like the latter could be used for the development of an immunoassay with superior sensitivity. In our preliminary tests, the RecChim406 is slightly more sensitive than the 406cc both as a capture and detection antibody (see Figure 2).

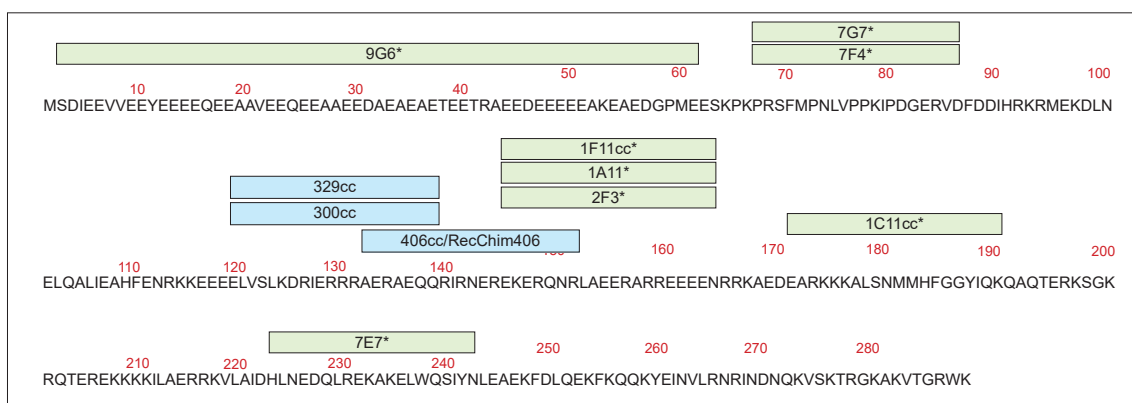


Figure 1. Epitope mapping of HyTest anti-cTnT monoclonal antibodies. We offer antibodies for the development of high-sensitivity cTnT assays (blue) as well as for research purposes (green, marked with *).

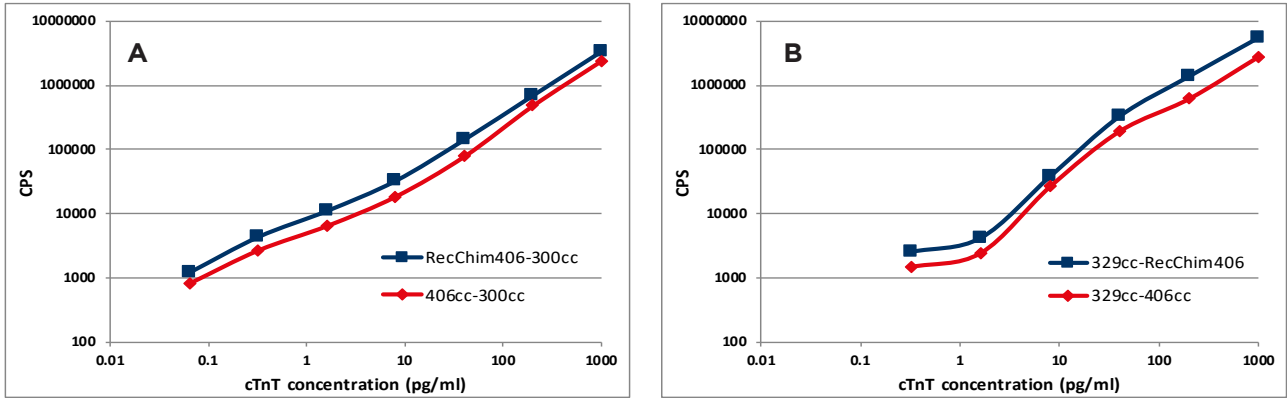


Figure 2. Comparing the performance of MAb 406cc and RecChim406 using a CLIA assay. In both assays 406cc or RecChim406 was used both as coating MABs (in pair with 300cc), and as biotin-labelled detection MABs (in pair with 329cc).

The ability of the antibody pairs 329cc-406cc and 406cc-300cc to recognize cTnT in the blood of AMI patients has been studied with over 80 serum and plasma samples. The antibody pairs demonstrate a good correlation with a commercially available hs-cTnT assay. Results of the analysis of 38 serum samples are provided in Figure 3.

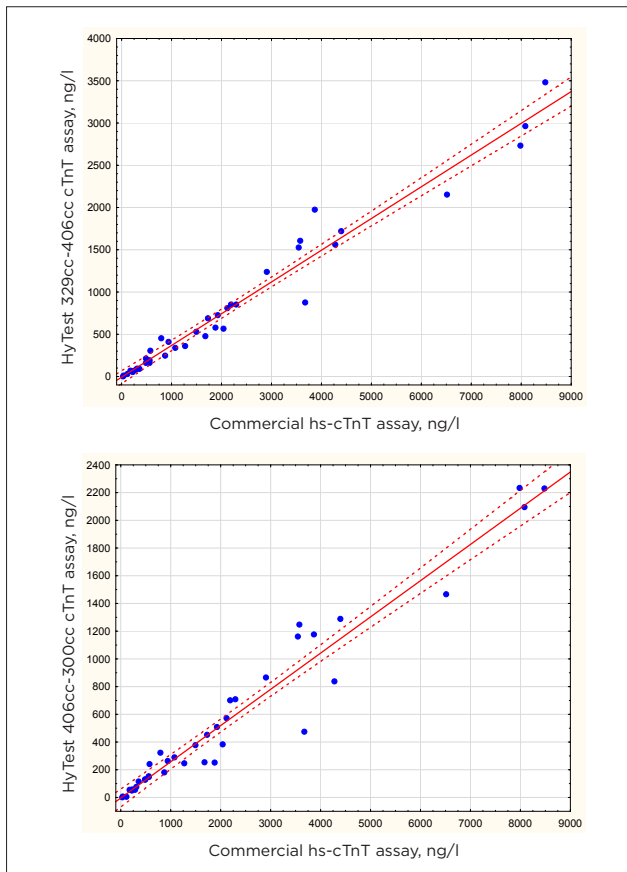


Figure 3. HyTest immunoassays show good correlation to a commercially available hs-cTnT assay. The concentration of cTnT in 38 serum samples obtained from AMI patients was determined by using two immunoassays that utilized HyTest antibodies (capture-detection pairs 329cc-406cc and 406cc-300cc) and a commercially available hs-cTnT assay.

Negligible cross-reactivity to skTnT

In high-sensitivity troponin assays, the specificity of the antibodies utilized is of utmost importance as even minor cross-reactivities could result in false positives.

We investigated the cross-reactivity of MABs 300cc, 329cc and 406cc to skeletal isoforms of troponin T. First, individual MABs were incubated with purified native cTnT and a mixture of recombinant slow and fast skTnT. All MABs recognized only cTnT (see Figure 4). Second, we tested the cross-reactivity of the two prototype assays to purified native skTnT, recombinant fast skTnT and recombinant slow skTnT. IGFBP-4 and MPO antigens were used as negative controls. Also in this case the cross-reactivity was well below 0.1% (see Figure 5).

Antibodies for research purposes

We offer several MABs that are recommended for research purposes. They also cross-react with cTnT proteins from different animal species (see Table 1).

TABLE 1. Cross-reactivity of anti-cTnT MABs with antigens from different animal species in Western blotting.

| MAB | Human | Bovine | Porcine | Goat | Canine | Rabbit | Cat | Rat | Mouse | Fish |
|------|-------|--------|---------|------|--------|--------|-----|-----|-------|------|
| 7F4 | ++ | N/A | ++ | N/A | - | - | - | N/A | N/A | - |
| 7G7 | + | + | - | - | - | - | - | - | - | - |
| 2F3 | ++ | + | ++ | ++ | + | + | + | + | + | + |
| 1A11 | ++ | ++ | ++ | ++ | + | + | + | + | ++ | + |
| 1F11 | ++ | ++ | ++ | ++ | + | + | + | + | + | + |

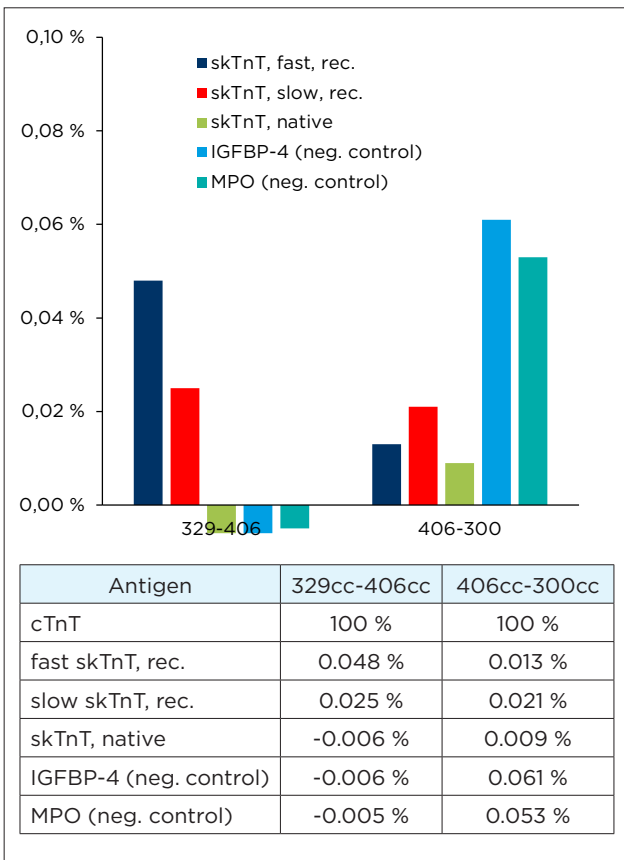
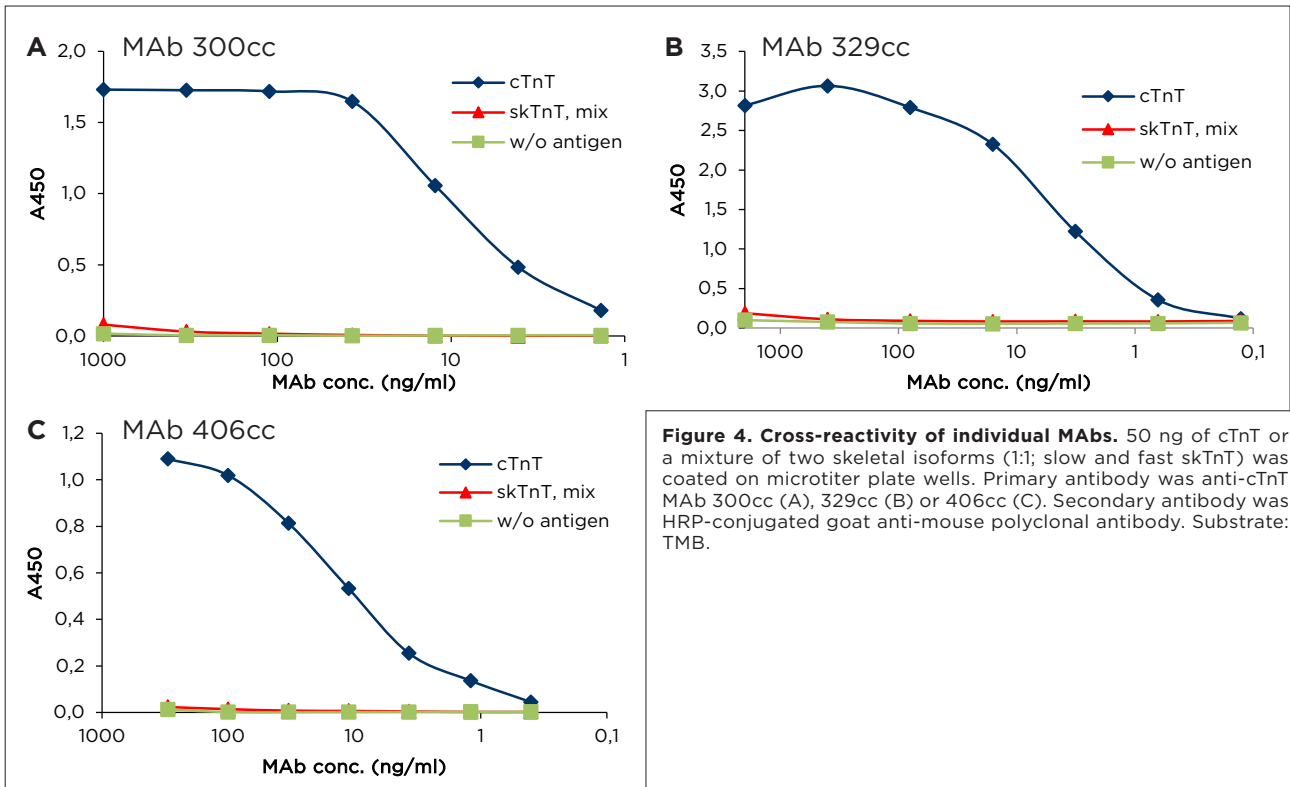


Figure 5. Cross-reactivity of prototype assays 329cc-406cc and 406cc-300cc. Reactivity to various antigens (100 ng/ml) was investigated in sandwich immunoassays. Both assays demonstrated negligible cross-reactivity to all markers tested. In hs-cTnT immunoassays the cross-reactivity should be < 0.10 % and preferably < 0.05-0.03 %.

Chimeric antibodies prevent the HAMA effect

The performance of different combination of chimeric and original mouse antibodies have been tested using human anti-mouse antibody (HAMA) containing serum samples obtained from different individual HAMA-positive donors in order to verify the sensitivity of original mouse and chimeric antibodies to the HAMA effect. All combined mouse-and-chimeric pairs showed either no or just a negligible background signal with all tested HAMA samples (see Figure 5).

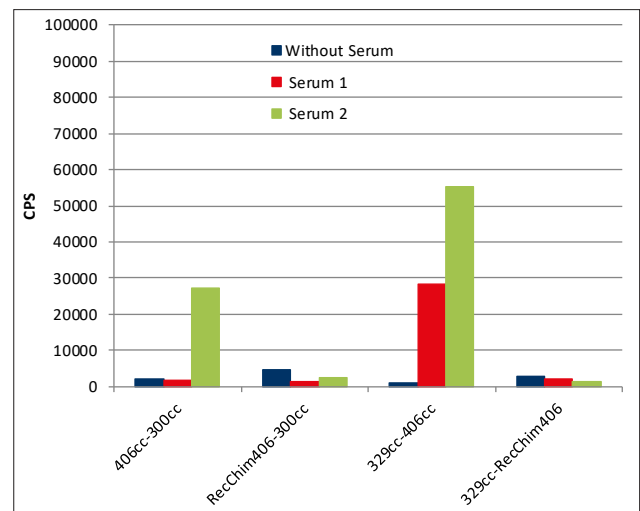


Figure 5. Chimeric antibodies eliminate the HAMA effect. The performance of chimeric and native 406 in the presence of HAMA was tested in CLIA assay with two serum samples with the following HAMA concentrations: 807 ng/ml in sample 1; and 1,388 ng/ml in sample 2. As a control, buffer without serum was used.

Purified antigens

Native human cTnT

HyTest cTnT (Cat.# 8T13) is purified from human cardiac muscle tissue by immunoaffinity chromatography followed by an additional ion exchange chromatography step.

Recombinant human slow and fast skTnT

The recombinant slow skeletal TnT (Cat.# 8RST2) and fast skeletal TnT (Cat.# 8RFT4) are ideal for studying immunoassay cross-reactivity to these isoforms.

Recombinant human cTnT

Isoform 6 (which is also known in the literature as TnT3) is the major isoform of troponin T that is presented in normal adult human heart tissue.

Our recombinant human cTnT (Cat.# 8RTT5) is produced in *E. coli* by expressing a gene encoding for the 288 amino acid long isoform 6 (TnT3) of cTnT. This isoform is the main isoform of cTnT in normal adult human heart tissue. The protein has an additional Met residue at its N-terminus.

Ordering information

MONOCLONAL ANTIBODIES

| Product name | Cat. # | MAb | Subclass | Remarks |
|--------------------|--------|------------|----------|-------------------------------------------|
| Troponin T cardiac | 4T19 | 9G6 | IgG1 | EIA, WB, a.a.r. 2-61 |
| | | 7F4 | IgG2b | EIA, WB, a.a.r. 67-86 |
| | | 7G7 | IgG1 | EIA, WB, a.a.r. 67-86 |
| | | 2F3 | IgG2b | EIA, WB, a.a.r. 145-164 |
| | | 1A11 | IgG2b | EIA, WB, a.a.r. 145-164 |
| | | 7E7 | IgG1 | EIA, WB, a.a.r. 223-242 |
| | 4T19cc | 300cc | IgG1 | <i>In vitro</i> , EIA, a.a.r. 119-138 |
| | | 329cc | IgG1 | <i>In vitro</i> , EIA, a.a.r. 119-138 |
| | | 406cc | IgG2a | <i>In vitro</i> , EIA, a.a.r. 132-151 |
| | | 1F11cc | IgG2b | <i>In vitro</i> , EIA, WB, a.a.r. 145-164 |
| | | 1C11cc | IgG1 | <i>In vitro</i> , EIA, WB, a.a.r. 171-190 |
| | RC4T19 | RecChim406 | IgG1 | EIA, recombinant chimeric antibody |

HUMAN ANTIGENS

| Product name | Cat. # | Purity | Source |
|----------------------------------------------|--------|--------|-----------------------|
| Troponin T cardiac, human | 8T13 | >98% | Human cardiac muscle |
| Troponin T cardiac, human, recombinant | 8RTT5 | >95% | Recombinant |
| Troponin T skeletal muscle, human | 8T24 | >95% | Human skeletal muscle |
| Troponin T fast skeletal, human, recombinant | 8RFT4 | >95% | Recombinant |
| Troponin T slow skeletal, human, recombinant | 8RST2 | >95% | Recombinant |
| Troponin complex (I-T-C), human | 8T62 | N/A | Human cardiac muscle |
| Troponin complex (I-T-C), artificial | 8T62a | N/A | Human cardiac muscle |

ANIMAL ANTIGENS

| Product name | Cat. # | Purity | Source |
|-------------------------------------|--------|--------|-------------------------|
| Troponin T cardiac, bovine | 8T13b | >98% | Bovine cardiac muscle |
| Troponin T cardiac, canine | 8T13c | >98% | Canine cardiac muscle |
| Troponin T cardiac, mouse | 8T13m | >98% | Mouse cardiac muscle |
| Troponin T cardiac, porcine | 8T13p | >98% | Porcine cardiac muscle |
| Troponin T cardiac, rat | 8T13r | >98% | Rat cardiac muscle |
| Troponin T skeletal muscle, bovine | 8T24b | >95% | Bovine skeletal muscle |
| Troponin T skeletal muscle, canine | 8T24c | >95% | Canine skeletal muscle |
| Troponin T skeletal muscle, mouse | 8T24m | >95% | Mouse skeletal muscle |
| Troponin T skeletal muscle, porcine | 8T24p | >95% | Porcine skeletal muscle |
| Troponin T skeletal muscle, rat | 8T24r | >95% | Rat skeletal muscle |