

Momordin II, a ribosome inactivating protein from *Momordica balsamina*, is homologous to other plant proteins

Marcelo Ortigao and Marc Better
XOMA Corporation, 1545 17th Street, Santa Monica, CA 90404, USA

Submitted June 29, 1992 EMBL accession no. Z12175

Many plants produce ribosome inactivating proteins (RIP) which are potent inhibitors of eukaryotic protein synthesis. RIPs hydrolytically cleave the N-glycosidic bond of a specific adenine in a highly conserved region of the 28s rRNA. Plants of the genus *Momordica* produce a number of related Type I ribosome inactivating proteins known as momordins or momorcharins. The gene encoding one member of this family, momordin I, has previously been cloned (1), and the N-terminal protein sequence of three *Momordica* RIPs have been described (2–3).

Momordins are homologous to other plant RIPS, including the trichosanthins, a multigene family of RIPs produced by the related plant *Trichosanthis kirilowii* (4–5). Trichosanthin is an abortifacient agent and is also capable of inhibiting the growth of viruses such as HIV (6).

We have cloned momordin II from a cDNA library constructed from the mRNA of *M.balsamina* seeds (EMBL Accession number Z12175). The predicted amino acid sequence reveals a putative 23 amino acid leader sequence followed by a 263 amino acid protein. The first 27 amino acids of the putative mature protein match the determined amino acid sequence of momordin II. The amino acid sequence of momordin II, after likely leader processing, is homologous with trichosanthin (57%) and momordin I (51%). The C-terminal 19 amino acids of some RIPs such as trichosanthin is processed, and by analogy processing may occur for both momordin I and II.

REFERENCES

1. Ho,W.K.K, Liu,S.C., Shaw,P.C, Yeung,H.W., Ng.T.B. and Chan,W.Y. (1991) *Biochem. Biophys. Acta* **1088**, 311–314.
2. Li,S.S.-L. (1986) *Experientia* **36**, 524–527.
3. Bolognesi,A., Barbieri,L., Carnicelli,D., Abbondanza,A., Cenini,P., Falasca,A.I., Dinota,A. and Stirpe,F. (1989) *Biochem. Biophys. Acta* **993**, 287–292.
4. Chow,T.P, Feldman,R.A., Lovett,M. and Piatak,M.J. (1990) *Biol. Chem.* **265**, 8670–8674.
5. Shaw,P.-C., Yung,M.-H., Zhu,R.H., Ho,W.K.-K., Ng,T.-B. and Yeung,H.-W. (1991) *Gene* **97**, 267–272.
6. McGrath,M.S., Hwang,K.M., Caldwell,S.E., Gaston.I., Luk,K.-C., Wu,P., Ng,V.L., Crowe,S., Daniels,J., Marsh,J., Deinhart,T., Lekas,P.V., Vennari,J.C., Yeung,H.-W. and Lifson,J.D. (1989) *Proc. Natl. Acad. Sci. USA* **86**, 2844–2848.

```
                -23                    +1
Momordin II       MVKCLLLSFLIIAIFIGVPTAKG DVNFDLSTATAKTYTKFIEDFRATLPFSHKVYDIPLLYSTIS
Momordin I        MSRFSVLSFLILAIFLGGSIVKG DVSFRLSGADPRSYGMFIKDLRNALPFREKVYNIPLLLPSVS
Trichosanthin     MIRFLVLSLLILTLFLTTPAVEG DVSFRLSGATSSSYGVFISNLRKALPNERKLYDIPLLRSSLP
                  * .  .**.**...*.. . ..* **.* **.*....*  **...* .**   *.*.**** ....
                        50                                                  100
Momordin II       DSRRFILLDLTSYAYETISVAIDVTNVYVVAYRTRDVSYFFKESPPE-AYNILFKGT-RKITLPYT
Momordin I        GAGRYLLMHLFNYDGKTITVAVDVTNVYIMGYLADTTSYFFNEPAAELASQYVFRDARRKITLPYS
Trichosanthin     GSQRYALIHLTNYADETISVAIDVTNVYIMGYRAGDTSYFFNEASATEAAKYVFKDAMRKVTLPYS
                  .. *. *..* .*. .**.**.********...* . ..****.*.... * . .*... **.****.
                                                    150
Momordin II       GNYENLQTAAHKIRENIDLGLPALSSAITTLFYYNAQSAPSALLVLIQTTAEAARFKYIERHVAKY
Momordin I        GNYERLQIAAGKPREKIPIGLPALDSAISTLLHYDSTAAAGALLVLIQTTAEAARFKYIEQQIQER
Trichosanthin     GNYERLQTAAGKIRENIPLGLPALDSAITTLFYYNANSAASALMVLIQSTSEAARYKFIEQQIGKR
                  ****.**.** * **.* .*****.***.**..*.. .*..**.****.*.****.*.**... .

                                    200
Momordin II       VATNFKPNLAIISLENQWSALSKQIFLAQNQGGKFRNPVDLIKPTGERFQVTNVDSDVVKGNIKLL
Momordin I        AYRDEVPSLATISLENSWSGLSKQIQLAQGNNGIFRTPIVLVDNKGNRVQITNVTSKVVTSNIQLL
Trichosanthin     VDKTFLPSLAIISLENSWSALSKQIQIASTNNGQFESPVVLINAQNQRVTITNVDAGVVTSNIALL
                  .  .  *.**.***** **.***** .* ...* * .*. *..  ..*  .***.. **..** **
                        250
Momordin II       LNSR--ASTADENFITTMTLLGESVVN
Momordin I        LNTRNIAEGDNGDVSTTHGFS--SY--
Trichosanthin     LNRNNMAAMDD-DVPMTQSFGCGSYAI
                  ** .  *. .. .   * ..   *
                        ↑
```

Figure 1. Comparison of the predicted momordin II amino acid sequence to those of momordin I (1) and trichosanthin (5). Residues that are well conserved are indicated with · while perfectly conserved residues are indicated with *. The arrow indicates the position of the last residue of mature trichosanthin after C-terminal processing.