Results
4. RESULTS

In the present experiments, after the surgery which was carried out to insert the thread in the cervical canal, a few animals died due to post operatory infection. No significant difference was noticed in the gain of body weight profile of the animals which received modulators in diet as compared to control groups except with the modulators *Brassica* sp. and *Piper longum* which showed a lower increase in body weight.

The tumor incidence and histopathology obtained in each group were as described below.

4.1 *Trigonella foenum-graecum* (fenugreek, methi)

The chemomodulatory effect of *Trigonella foenum-graecum* in cervical carcinogenesis is shown in the Table 4.1.

Group I (n =10): The animals were fed with normal food and no carcinogen was introduced in the intracervical canal. At the age of twenty weeks none of these animals developed neither invasive carcinoma nor carcinoma *in situ*; only one of them showed mild dysplasia. In this group five animals developed hyperplasia, and four had normal cervical histology.

Group II (n =15): The animals were fed with normal standardised food, and at eight weeks of age a thread impregnated with 600 μg of the carcinogen MCA was introduced and left in the intracervical canal for twelve weeks, and then the animals were sacrificed. Eleven animals developed carcinoma (73.33%). Among these, nine developed invasive carcinoma, some of them with formation of “pearls”, and two developed carcinoma *in situ*. Mild dysplastic tissue was found only in one mouse, mild hyperplastic tissue in two, and normal tissue in one.

Group III (n =8): This group of animals were provided a diet with 5% of *Trigonella foenum-graecum* from the moment of the MCA-impregnated thread insertion. Only one
mouse was found with invasive carcinoma and with “pearls” structures, none with dysplastic tissue, three with hyperplasia and four with normal tissue.

Group IV (n =13): The animals from this group received a diet with 7.5% of *Trigonella foenum-graecum* also from the time of the insertion of the MCA. Invasive carcinoma developed in five animals (38.46%), none of the animals developed dysplasia, three animals had hyperplastic tissue, and five had normal tissue.

Group V (n =7): The aim of this experiment was to check the possible toxicity effect of *Trigonella foenum-graecum*. No MCA was inserted in the intracervical canal of mice of this group. They were fed with a diet 7.5% rich in *Trigonella foenum-graecum*. Neither tumors nor dysplasia was found in this group. Five animals had hyperplastic tissue and two had normal cervical tissue.

Group VI (n =6): The animals of this group were fed with standarised normal food. A thread impregnated only with wax (the vehicle used for carcinogen MCA in the other groups) was introduced and left in the intracervical canal. None of the mice showed neither tumors nor dysplasia. Three mice had hyperplastic conditions and three showed normal condition of the tissue.

There was a significant reduction (p<0.05) in the incidence of cervical carcinogenesis (12.5%) with 5% of fenugreek in diet. The 7.5% fenugreek in diet was not as effective as 5% of fenugreek. It showed 38.46% reduction in tumor incidence.
Table 4.1: Chemopreventive action of *Trigonella foenum-graecum* (fenugreek) on MCA-induced cervical carcinogenesis in murine model system

<table>
<thead>
<tr>
<th>Group no.</th>
<th>Treatment</th>
<th>Effective</th>
<th>No. of mice</th>
<th>N</th>
<th>H*</th>
<th>H**</th>
<th>H***</th>
<th>D*</th>
<th>D**</th>
<th>D***</th>
<th>CIS</th>
<th>InvC</th>
<th>% dysplasia</th>
<th>Tumor incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Nil</td>
<td>ND</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10.00%</td>
<td>0%</td>
</tr>
<tr>
<td>II</td>
<td>MCA-wax</td>
<td>ND</td>
<td>15</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>9</td>
<td>6.66%</td>
<td>73.33%</td>
</tr>
<tr>
<td>III</td>
<td>MCA-wax</td>
<td>5.00%</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0%</td>
<td>12.5% a</td>
</tr>
<tr>
<td>IV</td>
<td>MCA-wax</td>
<td>7.50%</td>
<td>13</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0%</td>
<td>38.46%</td>
</tr>
<tr>
<td>V</td>
<td>Nil</td>
<td>7.50%</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>VI</td>
<td>wax</td>
<td>ND</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

H: Hyperplasia  *: mild
D: Dysplasia    **: moderate
CIS: Carcinoma In Situ  ***: severe
InvC: Invasive Carcinoma
ND: Normal Diet

a (p<0.05) represent significant changes against control
4.2 *Brassica* sp. (mustard seeds)

The chemomodulatory effect of *Brassica* sp. in cervical carcinogenesis is depicted in the Table 4.2.

Group I (n =10): The animals were fed with normal food and no carcinogen was introduced in the intracervical canal. At the age of twenty weeks none of these animals developed neither invasive carcinoma nor carcinoma *in situ*; only one of them showed mild dysplasia. In this group five animals developed hyperplasia, and four had normal cervical histology.

Group II (n =15): The animals were fed with normal standarised food, and at eight weeks of age a thread impregnated with 600 μg of the carcinogen MCA was introduced and left in the intracervical canal for twelve weeks, and then the animals were sacrificed. Eleven animals developed carcinoma (73.33%). Among these, nine developed invasive carcinoma, some of them with formation of “pearls”, and two developed carcinoma *in situ*. Mild dysplastic tissue was found only in one mouse, mild hyperplastic tissue in two, and normal tissue in one.

Group III (n =7): The animals were fed with 5% of *Brassica* sp. in diet and a MCA-impregnated thread was inserted in the cervical canal. None of the mice developed cervical cancer. Three animals showed dysplastic conditions. Four out of seven animals remained completely normal.

Group IV (n =15): These animals in this group were fed with a diet rich in mustard seeds content (7.5%) and a MCA-impregnated thread was inserted in the cervical canal. Two mice showed invasive carcinoma (13.33%). Five of them developed dysplasia and four hyperplasia. Four had normal tissue.
Group V (n =6): The mice were given diet 7.5% of *Brassica* sp. No thread was inserted in the cervical canal. In three animals the tissue was found to be normal. Three showed hyperplastic conditions.

Group VI (n =6): The animals of this group were fed with standardised normal food. A thread impregnated only with wax (the vehicle used for carcinogen MCA in the other groups) was introduced and left in the intracervical canal. None of the mice showed neither tumors nor dysplasia. Three mice had hyperplastic conditions and three showed normal condition of the tissue.

It was quite clear from the above that there was a significant reduction of cancer incidence (p< 0.005) in the animals which received diet rich in *Brassica* sp. 5% as well as 7.5% (Groups III and IV respectively). There was an increase of dysplasia incidence with the reduction of the tumor incidence.
Table 4.2: Chemopreventive action of *Brassica* sp. (mustard seeds) on MCA-induced cervical carcinogenesis in murine model system

<table>
<thead>
<tr>
<th>Group no.</th>
<th>Treatment</th>
<th>Effective</th>
<th>No. of mice</th>
<th>H: Hyperplasia</th>
<th>D: Dysplasia</th>
<th>CIS</th>
<th>InvC</th>
<th>% dysplasia</th>
<th>Tumor incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Nil</td>
<td>ND</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>II</td>
<td>MCA-wax</td>
<td>ND</td>
<td>15</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>III</td>
<td>MCA-wax</td>
<td>5.00%</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>IV</td>
<td>MCA-wax</td>
<td>7.50%</td>
<td>15</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>V</td>
<td>Nil</td>
<td>7.50%</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VI</td>
<td>wax</td>
<td>ND</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

H: Hyperplasia  
D: Dysplasia  
CIS: Carcinoma In Situ  
InvC: Invasive Carcinoma  
ND: Normal Diet

*: mild  
**: moderate  
***: severe

c (p<0.005) represent significant changes against control
4.3 *Cuminum cyminum* (cumin, geera)

The results related to the chemomodulatory effect of *Cuminum cyminum* on cervical carcinogenesis are presented in the Table 4.3.

Group I (n =10): The animals were fed with normal food and no carcinogen was introduced in the intracervical canal. At the age of twenty weeks none of these animals developed neither invasive carcinoma nor carcinoma *in situ*; only one of them showed mild dysplasia. In this group five animals developed hyperplasia, and four had normal cervical histology.

Group II (n =15): The animals were fed with normal standarised food, and at eight weeks of age a thread impregnated with 600 μg of the carcinogen MCA was introduced and left in the intracervical canal for twelve weeks, and then the animals were sacrificed. Eleven animals developed carcinoma (73.33%). Among these, nine developed invasive carcinoma, some of them with formation of “pearls”, and two developed carcinoma *in situ*. Mild dysplastic tissue was found only in one mouse, mild hyperplastic tissue in two, and normal tissue in one.

Group III (n =11): The mice were given a diet 5% rich of cumin. MCA was introduced in the cervix with the help of a thread. Three mice developed invasive carcinoma, two of them showing “pearl” formation. Three mice were found to have dysplastic conditions. Three animals had hyperplasia and two had normal conditions.

Group IV (n =16): The diet 7.5% rich in cumin was provided to this group of animals. An MCA-impregnated thread was introduced in the cervix. Two animals developed tumors (12.5%). One showed characteristics of carcinoma *in situ* and the other showed to have invasive carcinoma with formation of “pearls”. Five mice had dysplastic tissue. Two had hyperplasia and seven normal conditions.
Group V (n =7): The animals were fed with diet 7.5% rich in cumin and no thread was inserted in the cervical canal. None of them developed neither tumors nor dysplasia. Two of them showed hyperplasia and five remained with normal tissue.

Group VI (n =6): The animals of this group were fed with standardised normal food. A thread impregnated only with wax (the vehicle used for carcinogen MCA in the other groups) was introduced and left in the intracervical canal. None of the mice showed neither tumors nor dysplasia. Three mice had hyperplastic conditions and three showed normal condition of the tissue.

The reduction of tumor incidence in the groups using diet with high content in cumin (p< 0.005 Group IV vs II), correlates with the increase of dysplasia in those groups.
Table 4.3: Chemopreventive action of *Cuminum cyminum* (cumin) on MCA-induced cervical carcinogenesis in murine model system

<table>
<thead>
<tr>
<th>Group no.</th>
<th>Treatment</th>
<th>Effective</th>
<th>No. of mice</th>
<th>N</th>
<th>H*</th>
<th>H**</th>
<th>H***</th>
<th>D*</th>
<th>D**</th>
<th>D***</th>
<th>CIS</th>
<th>InvC</th>
<th>% dysplasia</th>
<th>tumor incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Nil</td>
<td>ND</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10.00%</td>
<td>0%</td>
</tr>
<tr>
<td>II</td>
<td>MCA-wax</td>
<td>ND</td>
<td>15</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>9</td>
<td>6.66%</td>
<td>73.33%</td>
</tr>
<tr>
<td>III</td>
<td>MCA-wax</td>
<td>5.00%</td>
<td>11</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>27.27%</td>
<td>27.27%</td>
</tr>
<tr>
<td>IV</td>
<td>MCA-wax</td>
<td>7.50%</td>
<td>16</td>
<td>7</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>31.25%</td>
<td>12.5% c</td>
</tr>
<tr>
<td>V</td>
<td>Nil</td>
<td>7.50%</td>
<td>7</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>VI</td>
<td>wax</td>
<td>ND</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

H: Hyperplasia  
D: Dysplasia  
CIS: Carcinoma In Situ  
InvC: Invasive Carcinoma  
ND: Normal Diet  

*: mild  
**: moderate  
***: severe  

\( c (p<0.005) \) represent significant changes against control.
4.4 *Piper longum* (pipli)

The results of the present investigation in the chemomodulatory effect of *Piper longum* on the cervical carcinogenesis are shown in the Table 4.4.

Group I (n =10): The animals were fed with normal food and no carcinogen was introduced in the intracervical canal. At the age of twenty weeks none of these animals developed neither invasive carcinoma nor carcinoma *in situ*; only one of them showed mild dysplasia. In this group five animals developed hyperplasia, and four had normal cervical histology.

Group II (n =15): The animals were fed with normal standardised food, and at eight weeks of age a thread impregnated with 600 μg of the carcinogen MCA was introduced and left in the intracervical canal for twelve weeks, and then the animals were sacrificed. Eleven animals developed carcinoma (73.33%). Among these, nine developed invasive carcinoma, some of them with formation of "pearls", and two developed carcinoma *in situ*. Mild dysplastic tissue was found only in one mouse, mild hyperplastic tissue in two, and normal tissue in one.

Group III (n =13): MCA-impregnated thread was introduced in the cervical canal of each animal and they were given a diet 1% rich in *Piper longum*. Two animals were found with invasive carcinoma and four with dysplasia. Two mice showed hyperplasia and five had normal tissue.

Group IV (n =12): Insertion of MCA-impregnated thread in the cervical canal was carried out in this group of animals. These animals were fed with a diet rich 2% with *Piper longum*. At the time of sacrifice, two mice had developed invasive carcinoma and six dysplasia. No hyperplastic tissues were observed in any animal. Four mice had normal conditions.
Group V (n =8): The mice were fed with 2% *Piper longum* rich diet and no thread with carcinogen was inserted in the cervical canal. Only one animal showed hyperplasia, the rest remained with normal cervical epithelium.

Group VI (n =6): The animals of this group were fed with standardised normal food. A thread impregnated only with wax (the vehicle used for carcinogen MCA in the other groups) was introduced and left in the intracervical canal. None of the mice showed neither tumors nor dysplasia. Three mice had hyperplastic conditions and three showed normal condition of the tissue.

There was a significant reduction of cervical carcinogenesis development (p<0.01) in the group fed with 1% *Piper longum* rich diet as well as with the group IV fed with 2% of the modulator studied (p<0.05). Dysplasia occurrence also increased in these groups.
Table 4.4: Chemopreventive action of *Piper longum* (pipli) on MCA-induced cervical carcinogenesis in murine model system

<table>
<thead>
<tr>
<th>Group no.</th>
<th>Treatment</th>
<th>Effective</th>
<th>No. of mice</th>
<th>Normal or with cervical lesions</th>
<th>% dysplasia</th>
<th>Tumor incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intracerv. route</td>
<td>Diet</td>
<td>No. of mice</td>
<td>N</td>
<td>H*</td>
<td>H**</td>
</tr>
<tr>
<td>I</td>
<td>Nil</td>
<td>ND</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>II</td>
<td>MCA-wax</td>
<td>ND</td>
<td>15</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>III</td>
<td>MCA-wax</td>
<td>1.00%</td>
<td>13</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>IV</td>
<td>MCA-wax</td>
<td>2.00%</td>
<td>12</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>V</td>
<td>Nil</td>
<td>2.00%</td>
<td>8</td>
<td>7</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>VI</td>
<td>wax</td>
<td>ND</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

H: Hyperplasia  
D: Dysplasia  
CIS: Carcinoma In Situ  
InvC: Invasive Carcinoma  
ND: Normal Diet  

*: mild  
**: moderate  
***: severe  

*(p<0.05), **(p<0.01) represent significant changes against control
4.5 *Camellia sinensis* (green tea)

The results of the present work on the chemomodulatory effect of *Camellia sinensis* in cervical carcinogenesis are depicted in the Table 4.5.

Group I (n =10): The animals were fed with normal food and no carcinogen was introduced in the intracervical canal. At the age of twenty weeks none of these animals developed neither invasive carcinoma nor carcinoma *in situ*; only one of them showed mild dysplasia. In this group five animals developed hyperplasia, and four had normal cervical histology.

Group II (n =15): The animals were fed with normal standarised food, and at eight weeks of age a thread impregnated with 600 μg of the carcinogen MCA was introduced and left in the intracervical canal for twelve weeks, and then the animals were sacrificed. Eleven animals developed carcinoma (73.33%). Among these, nine developed invasive carcinoma, some of them with formation of “pearls”, and two developed carcinoma *in situ*. Mild dysplastic tissue was found only in one mouse, mild hyperplastic tissue in two, and normal tissue in one.

Group III (n =8): This group of animals were fed with standarised normal food. They were provided 1.25% w/v green tea beverage from one week before the insertion of the MCA-impregnated thread in the cervix. Two out of eight developed carcinomas (one carcinoma *in situ*, one invasive carcinoma), only one developed dysplasia and five had normal histology.

Group IV (n =13): Here the animals were given a higher dose of green tea (2.5% w/v), and the MCA-impregnated thread was inserted in the cervical canal. None of them developed tumors. Dysplasia developed only in one animal, in another mouse hyperplasia was observed and eleven mice had normal tissue conditions.
Group V (n =8): To check the possible toxicity of *Camellia sinensis*, the animals of this group were given 2.5% w/v of green tea as the only source to drink. No MCA was introduced in the cervix. 100% of the animals showed normal cervical epithelium.

Group VI (n =6): The animals of this group were fed with standarised normal food. A thread impregnated only with wax (the vehicle used for carcinogen MCA in the other groups) was introduced and left in the intracervical canal. None of the mice showed neither tumors nor dysplasia. Three mice had hyperplastic conditions and three showed normal condition of the tissue.

The incidence of cervical carcinogenesis was drastically reduced (p<0.001) in the group III versus the control (group II), and it was also significantly reduced (p<0.05) in the group IV.
**Table 4.5: Chemopreventive action of *Camellia sinensis* (green tea) on MCA-induced cervical carcinogenesis in murine model system**

<table>
<thead>
<tr>
<th>Group no.</th>
<th>Treatment</th>
<th>Drink source</th>
<th>Intracerv. route</th>
<th>Effective</th>
<th>No. of mice normal or with cervical lesions</th>
<th>No. of mice</th>
<th>% dysplasia</th>
<th>tumor incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Nil</td>
<td>Water</td>
<td></td>
<td>10</td>
<td>N 4 H* H** H*** D* D** D*** CIS InvC</td>
<td></td>
<td>10.00%</td>
<td>0%</td>
</tr>
<tr>
<td>II</td>
<td>MCA-wax</td>
<td>Water</td>
<td></td>
<td>15</td>
<td>1 2 0 0 1 0 0 2 9</td>
<td></td>
<td>6.66%</td>
<td>73.33%</td>
</tr>
<tr>
<td>III</td>
<td>MCA-wax</td>
<td>D1</td>
<td></td>
<td>8</td>
<td>5 0 0 0 0 1 0 1 1</td>
<td></td>
<td>12.50%</td>
<td>25.00% a</td>
</tr>
<tr>
<td>IV</td>
<td>MCA-wax</td>
<td>D2</td>
<td></td>
<td>13</td>
<td>11 1 0 0 1 0 0 0 0</td>
<td></td>
<td>7.69%</td>
<td>0% d</td>
</tr>
<tr>
<td>V</td>
<td>Nil</td>
<td>D2</td>
<td></td>
<td>8</td>
<td>8 0 0 0 0 0 0 0 0</td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>VI</td>
<td>wax</td>
<td>Water</td>
<td></td>
<td>6</td>
<td>3 0 2 1 0 0 0 0 0</td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

- H: Hyperplasia
- D: Dysplasia
- CIS: Carcinoma In Situ
- InvC: Invasive Carcinoma
- N: Normal
- H*: Mild
- H**: Moderate
- H***: Severe

1: infusion obtained by adding 1.25 gm of green tea in 100 ml of water
2: infusion obtained by adding 2.5 gm of green tea in 100 ml of water.

*(p<0.05), **(p<0.001) represent significant changes against control.
4.6 *Glycine max* (soyabean seeds)

The chemomodulatory effect of *Glycine max* on cervical carcinogenesis is shown in the Table 4.6.

Group I (n =10): The animals in this group were fed with normal standardised food and no thread was inserted in the cervix. None of these mice showed neither tumours nor dysplasia. Four of them showed hyperplasia and six had normal histology.

Group II (n =23): This group was given normal standardised food and an impregnated thread with 600μg of MCA was introduced in the cervical canal. Seventeen out of twenty three (73.91%) developed tumors (six carcinoma *in situ*, eleven invasive carcinoma). Four mice of this group showed dysplasia (17.39%). Two mice showed hyperplasia. None of the animals had normal tissue.

Group III (n =21): A thread with MCA was inserted in the cervix of mice. They were fed with a diet 2.5% rich in soybean seeds. Fifteen of them (71.42%) had tumors (five carcinoma *in situ*, ten invasive carcinoma). Four mice developed dysplasia (19.04%), one animal had hyperplasia and one remained with normal histology.

Group IV (n =22): In this group the animals were fed with a diet 5% rich in soybean seeds. An MCA-impregnated thread was introduced in the cervical canal. The histology of the cervixes was: nine (40.90%) developed cervical carcinogenesis (three carcinoma *in situ*, six invasive carcinoma), five animals (22.72%) developed dysplasia, four mice showed hyperplasia, one moderate and three severe hyperplasia. Four mice had normal tissue.

Group V (n =20): The animals were fed with 7.5% dose of soybean in food. Only six developed tumors (30.00%). Out of these six animals, three had carcinoma *in situ* and
three invasive carcinoma. Eight mice developed dysplasia, three showed hyperplasia and three mice had normal tissue.

Group VI (n =9): The animals were fed with diet 7.5% rich in soybean, no thread was inserted in the cervix. None of them developed neither carcinogenesis nor dysplasia, showing a non-toxicity effect of soybean at this concentration; four showed hyperplasia and five remained with normal tissue.

Group VII (n =10): In this group the animals were fed with normal standarised food throughout the whole experiment. A thread impregnated with wax only was introduced in the cervical canals. No tumors were developed which shows a non-toxicity of the vehicle used for the carcinogen. One animal showed mild dysplasia, two had hyperplasia and seven remained with normal histology.

The reduction of tumor incidence increased with the increase in the soybean dose, being the group V (7.5% dose of soybean) significantly different versus the control (p<0.05).
Table 4.6: Chemopreventive action of *Glycine max* (soya bean) on MCA-induced cervical carcinogenesis in murine model system

<table>
<thead>
<tr>
<th>Group no.</th>
<th>Treatment</th>
<th>Effective</th>
<th>No. of mice</th>
<th>N</th>
<th>H*</th>
<th>H**</th>
<th>H***</th>
<th>D*</th>
<th>D**</th>
<th>D***</th>
<th>CIS</th>
<th>InvC</th>
<th>% dysplasia</th>
<th>Tumor incidence</th>
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<tbody>
<tr>
<td>I</td>
<td>Nil</td>
<td>ND</td>
<td>10</td>
<td>6</td>
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<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>II</td>
<td>MCA-wax</td>
<td>ND</td>
<td>23</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>17.39%</td>
<td>73.91%</td>
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<tr>
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<td>21</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<td>3</td>
<td>5</td>
<td>10</td>
<td>19.04%</td>
<td>71.42%</td>
</tr>
<tr>
<td>IV</td>
<td>MCA-wax</td>
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<td>22</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>3</td>
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<td>2</td>
<td>3</td>
<td>6</td>
<td>22.72%</td>
<td>40.90%</td>
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<tr>
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<td>20</td>
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<tr>
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<tr>
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</tbody>
</table>

- H: Hyperplasia
- D: Dysplasia
- CIS: Carcinoma In Situ
- InvC: Invasive Carcinoma
- ND: Normal Diet

*a* (p<0.05) represent significant changes against control
Plate 1: Histology of the normal squamous cell epithelium lining of the cervix (HE x 100).

The basal layer is continuous. The polarity is maintained. The rounded and big cells of the basal layer become flattered when they arrive at the superficial layer of the epithelium. The most superficial layer of the epithelium sometimes, as in this photomicrograph, is covered with a layer of keratin which is stained dark pink.

Plate 2: Histology of the normal squamous cell epithelium lining of the cervix (HE x 200).

The basal layer is darkly stained and continuous. The polarity in the squamous cell epithelium is clearly observed. The cells of the lower layers have a higher nuclear cytoplasmic ratio than the ones in the most superficial layers.
Plate 1: Histology of the normal squamous cell epithelium lining of the cervix (HE x 100)

Plate 2: Histology of the normal squamous cell epithelium lining of the cervix (HE x 200)
Plate 3: Histology of a mild hyperplastic squamous cell epithelium lining of the cervical canal (HE x 100).

The basal layer is darkly stained and continuous, but it is formed by more than one layer of dividing cells. The polarity throughout the epithelium is maintained. Note the epithelium is irregularly thickened (in the form of “waves”) and the thickness of the epithelium is represented by an increased number of cells.

Plate 4: Histology of a squamous cell epithelium lining of the cervical canal with moderate dysplasia (HE x 200).

The basement membrane is intact. Note the loss of the polarity of the epithelium: big cells with large nuclei are present in the middle third of the epithelium, without much order in their arrangement.
Plate 3: Histology of a mild hyperplastic squamous cell epithelium lining of the cervical canal (HE x 100)

Plate 4: Histology of a squamous cell epithelium lining of the cervical canal with moderate dysplasia (HE x 200)
Plate 5: Histology of a squamous cell epithelium lining of the cervical canal with moderate dysplasia (HE x 400).

The basement membrane is intact. The polarity in the epithelium is lost. An occasional cell shows mitosis.

Plate 6: Panoramic section of a cervix with invasive carcinoma (HE x 12.5).

Within the organ of the cervix we can observe a “V” like structure: the uterus in two-horns shape that continues with the unique canal of the cervix. Note that the cancer cells have invaded the stroma of the lower part of the cervix at both sides of the cervical canal.
Plate 5: Histology of a squamous cell epithelium lining of the cervical canal with moderate dysplasia (HE x 400)

Plate 6: Panoramic section of a cervix with invasive carcinosa (HE x 12.5)
Plate 7: Histology of a squamous cell carcinoma of the cervix (HE x 100)

There is a bridge in the basement membrane and the cancer cells are invading the surrounding tissues.

Plate 8: Histology of a squamous cell carcinoma of the cervix with “pearls” formation (HE x 100).

There is an abundant “pearls” formation. Each “pearl” is formed by cancer cells which, produce keratin that form the “pearl”. The keratin of each “pearl” takes an intense red color on Haematoxylin and eosin stain.
Plate 7: Histology of a squamous cell carcinoma of the cervix (HE x 100)

Plate 8: Histology of a squamous cell carcinoma of the cervix with “pearls” formation (HE x 100)