**CLINICAL EXPERIENCE WITH A NEW THERAPEUTIC PRINCIPLE IN PIGS:**

**THE β-RECEPTOR BLOCKER CARAZOL®**

N. Bartisch, K. Vollmar, G. Sporer, R. Müller-Steinhagen and K. Streit
Med. Forschung, Boehringer Mannheim GmbH and Pharmacia Wirkstoff GmbH
Sandhofer Straße 116, D-6800 Mannheim 31, Federal Republic of Germany

β-receptor blocking agents (synonym: β-sympatholitics) are drugs which have been tested since the 60s for therapeutic and prophylactic use in various cardiovascular diseases in man (e.g. angina pectoris, arrhythmias, and myocardial infarction).

The effective cardioprotective properties of β-blocking agents in experimental models [4] and in man [10] inspired us in 1977 to use these drugs for the prophylaxis and therapy of various disorders characterized by cardiac overload and metabolic rearrangement in animals [3]. These disorders are caused by high epinephrine levels in stress situations. This is more pronounced - mainly by binding to β-receptors - rapid glycoconalysis, increased heart and respiratory rates. These stress reactions are extremely critical in pigs. Due to the large muscle volume, the production of lactic acid by glycoconalysis is very fast and leads to a decrease of blood pH and to an increase in body temperature. The results are weight-loss and poor meat quality (PMQ).

The ratio of systole to diastole in the cardiac cycle in pigs is nearly 1. Increased heart frequencies reduce the duration of diastole, the relaxation phase of the heart muscle. Sudden death is a frequent consequence. Conversely, a reduction of heart rate prolongs diastole resulting in improved cardiac metabolism. Thus the prophylactic administration of a β-blocking agent is able to diminish considerably the economic losses caused by stress reactions. First investigations in dogs [7], horses [8], and exotic species (not yet published) confirmed the beneficial effects of reduction of cardiac overload.

Carazol® is a β-blocking agent with an extremely high potency [2, 9 etc.]. The dosage in pigs is 1 mg/100 kg b.w. The metabolism is very rapid and the potency on oral administration only 10-15%. Investigations on residues in pigs of the 10 µg/kg b.w. have been published [5].

Carazol® (Guascor®) has been used in pigs for the following indications:

1. **Transport of pigs to the slaughter house in the Netherlands and Belgium**

<table>
<thead>
<tr>
<th></th>
<th>Number of animals</th>
<th>Dead animals</th>
<th>Rejected</th>
<th>Poor meat quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls</td>
<td>4,849</td>
<td>0.62</td>
<td>1.22</td>
<td>0.91</td>
</tr>
<tr>
<td>Carazol</td>
<td>5,816</td>
<td>0.05</td>
<td>0.67</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Significance: * p < 0.05  ** p < 0.001

2. **Improvement of meat quality**

In separate investigations in Italy [2] and in England, specific studies on meat quality showed that carazol considerably improved the meat quality of stress-sensitive pigs and reduced the occurrence of PMQ [Markus et al., not yet published].

![Tradiem ket of PHARMEX Wirkstoff GmbH (Germany)](image)

The drug is available in Belgium, France, Germany, Netherlands, Philippines and Spain.

1. Transport of weaned pigs in Germany

<table>
<thead>
<tr>
<th></th>
<th>Number of animals</th>
<th>Death rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls</td>
<td>1,631</td>
<td>2.2</td>
</tr>
<tr>
<td>Carazol</td>
<td>2,079</td>
<td>0.05</td>
</tr>
</tbody>
</table>

4. **Boars and sows during mating**

Increased heart rates of breeding boars occasionally lead to death during or shortly after mating. In untreated boars (n = 9) the heart rate rose from 118 ± 2 to 180 ± 9 beats/min. Carazol®-treated boars (n = 9) showed only an acceleration from 118 ± 2 to 135 ± 2 beats/min.

5. **Sows during farrowing**

In sows with overtaxed circulation during farrowing with tachycardia and tachyppnea, carazol® produced a reliable reduction of the cardiac and respiratory rates [6].

<table>
<thead>
<tr>
<th></th>
<th>Heart rate</th>
<th>Respiratory rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial values</td>
<td>122 ± 7</td>
<td>77 ± 4</td>
</tr>
<tr>
<td>After carazol®</td>
<td>78 ± 4</td>
<td>46 ± 3</td>
</tr>
</tbody>
</table>

Particularly striking is the fact that out of 23 almost moribund sows 20 survived. Measurements were not possible in 2 animals, so the results of 21 sows are given in the table.

**ACKNOWLEDGEMENTS:**

We should like to thank the following Doctors for their assistance, or for providing us with their results: R.Schou; P.Lecas; D.Dietz; M.Behrens; W.J.Herbstes; D.Mengert; W.Kornern

**REFERENCES:**

1. BALLAMER, G.; F. GUSSARDT

2. BARTCH, W.; K. OTTO; B. LEMPERT; G. SCHRÖER

3. BARTCH, W.;
Verlag Baden-Württembergischer Tierärzteschaft
Esslingen, 07.06.1977

4. BARTCH, W.; G. SCHRÖER; K. OTTO; M. BAUR

5. BARTCH, W.; K. OTTO; M. BAUR; E. BÖTTNER
Elsevier Scientific Publishing Company

6. FIESCHER, B.K.; K. OTTO; M. BAUR; W.BARTCH
Tierärztl. Onkolog. 33,10,531-536 (1981)

7. GARTNER, B.

8. BOHNE, W.

9. MITZ, D.R.; F. HAHN; R. KISZEL

10. The Norwegian Multicentre Study Group

For further references or test samples contact
Dr. W. Bartisch, Sandhofer Strasse 116, Postfach 10 20 00
D-6800 Mannheim 31, Germany