Correlations of Normality and Nervousness with Cardiovascular Functions in Pointer Dogs

JOSEPH E. O. NEWTON, M.D., JOHN L. CHAPIN, M.D., AND ODDST D. MURPHEE, PH.D.

Neuropsychiatric Research Laboratory, Veterans Administration Hospital, North Little Rock, Arkansas, and the University of Arkansas Medical Center, Little Rock, Arkansas

Abstract—Methylphenidate, 0.5 mg/kg, injected intravenously, was used in 10 normal (A line) and 10 genetically nervous (E line) dogs in a blind-design experiment to aid in prediction, from cardiovascular recordings alone, of behavioral normality versus nervousness. The prediction was 75 per cent correct, based on heart rate (HR), form of the electrocardiogram (EKG), pattern of sinus arrhythmia, and pattern of HR response to methylphenidate. Nervous dogs were found to have slower baseline HR's, delayed return of HR to baseline after methylphenidate, greater occurrence of baseline EKG abnormalities and much greater frequency of these after methylphenidate. Degree of nervousness was found to correlate rather highly (1) negatively with baseline HR level, (2) negatively with speed of BP response, and (3) positively with frequency of some of the EKG manifestations. These data, indicative of a relative inertness of physiological functions of nervous pointer dogs compared with normal pointers, are consistent with the behavioral and some of the biochemical findings previously reported.

Our two distinct lines of purebred pointer dogs, now well-known in the literature, have been studied for about 14 years (Murphree, et al., 1967). The normal A line consists of behaviorally stable, friendly pointers, while the nervous E line dogs tend to be fearful and avoid humans, are hypervigilant and almost catatonic at times. Many litters of approximately 7 generations have now been raised in the laboratory, starting with a pair of stable pointers as the ancestors of the A line and a pair of “spooky,” apprehensive,
withdrawn pointers as the ancestors of the E line. We have con-
sidered the nervous dogs to be a partial research model for psychi-
atric illness and have undertaken many studies—behavioral, physio-
logical and biochemical—to attempt to understand the processes
underlying their abnormal behavior.

Quantification of behavior was undertaken from the very start
of this project, in the form of standardized behavior tests. Behavior
testing is carried out on all dogs at 3, 6, 9 and 12 months of age.
The behavior tests and their scoring have been refined over the
years, such that the present system involves the following tests: (1)
Amount of exploratory activity for a standard time in a standard
room; (2) Approach to or avoidance of a friendly, coaxing human;
(3) Whether or not the dog urinates or defecates in the room; and
(4) Duration of immobility in another room where a loud Klaxon
horn is sounded. The dog achieves a score on each of these tests
and after proper weighting of scores they are summed to give a
morbidity score. Recently the scoring system has been revised to
give a greater possible range of scores, from 2 to 15. In general,
normal A dogs achieve scores ranging from about 3 to 7, while
nervous E dogs' scores range from about 9 to 14. Because of the
recent revision of scoring, the morbidity scores used in the present
paper tend to be about 1.5 times those denoted in the recently pub-
lished study of rehabilitation of some of the nervous dogs (McBryde
and Murphree, 1974).

The present studies were undertaken with a threefold purpose
in mind: (1) to try to replicate in the normal and nervous dogs the
human study of Janowsky and colleagues (1973), who showed that
intravenously injected methylphenidate potentiated psychotic signs
and symptoms in schizophrenic patients and caused prolonged HR
and BP increases in the schizophrenics as compared to normal sub-
jects; (2) to attempt to predict blindly from the various cardiovascu-
lar findings and responses whether a cardiovascular record belonged
to a normal A or nervous E dog, knowing only that there were 10
dogs of each line; and (3) to determine other derived data and
correlations among the data, including morbidity scores. For de-
scriptive purposes the procedure is divided into three experiments.

**Experiment I**

**Subjects**

Twenty dogs, 10 normal A's and 10 nervous E's, were selected,
matched as nearly as possible for age and sex. There were 6 male
and 4 female A dogs, 5 male and 5 female E dogs. The range of