CURRENT RESEARCH IN MUSCULAR DYSTROPHY, JAPAN

(CLINICAL RESEARCHES)

The Proceedings of the
Annual Meeting of Muscular
Dystrophy Research Group,
1980, Tokyo

PREFACE

Following the last Proceedings of the Annual Meeting of Muscular Dystrophy Research Group, 1978, 1979, "Current Research in Muscular Dystrophy, 1980" is published.

This volume contains not only the abstracts of the papers presented at the Annual Meeting of the Clinical Research Group of Muscular Dystrophy in 1980, but also some of the research works performed during past three years.

Meanwhile, a real progress has been made in the fields of the genetic, clinical, morphological and metabolic aspects of the disease and this may lead to the understanding of the fundamental defects. Still, we have to emphasize that these and other discoveries, while they are significantly advanced and certainly very encouraging, are by no means final.

Lastly, I as the chairman of this Research Group, would like to express my sincere appreciation to the Ministry of Health and Welfare, National Center for Nervous, Mental and Muscular Disorders, and Muscular Dystrophy Association of Japan for persistent financial support to this Research Group for three years.

My thanks are also due to Dr. H. Sugita, the co-editor, who has made it possible to publish this report.

Kazuo Miyoshi

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CONTENTS

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EARLY MORPHOLOGICAL CHANGES IN DYSTROPHIC CHICKEN MUSCLES

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We previously reported[1] that early morphological changes appeared in PLD muscles at 1 week after hatching and these changes became more prominent at 3 weeks after hatching. This time, we studied the caveolae on the plasma membrane surface of the superficial pectoral muscles at various stages after hatching in control and dystrophic chickens.

Materials and methods

We used the superficial pectoral muscles, white fibers, of control (line 412) and dystrophic chickens (line 413) at 1 day, 1 week and 3 weeks after hatching. For the freeze-fracture EM study, the muscle specimens were routinely fixed in 2.5% glutaraldehyde and cut into 1-mm cubes following fixation. Then, the blocks were immersed in 25% glycerol. These specimens were frozen by immersion in liquid nitrogen. They were fractured and shadowed with platinum and carbon in a freeze-fracture device operated at $-115°C$ and beneath 1×10^{-6} Torr. Replicas were cleaned in bleach and washed with distilled water and examined with an electron microscope. 200-micron square areas representing a total sampling area were counted in order to determine average caveolar density.

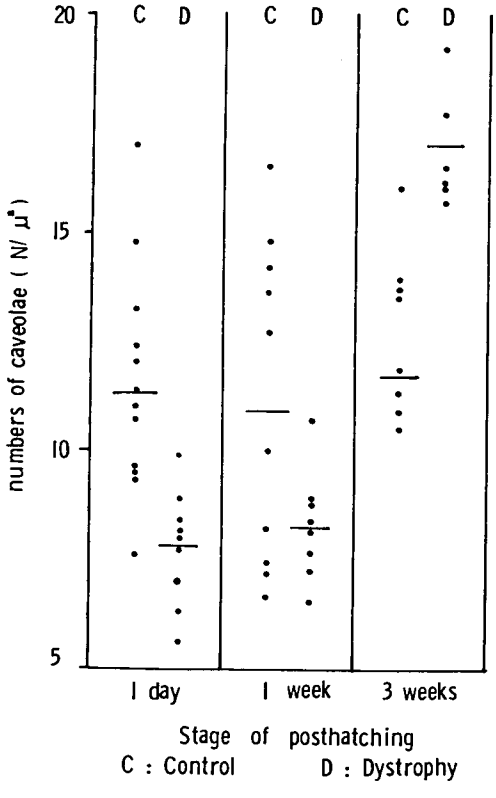

Fig. 1 CHANGES OF CAVEOLAR DENSITY
(total sampling areas: 200 μm^2)

Results (Fig. 1)

At 1 day and 1 week after hatching, there was a difference in caveolar density between control and dystrophic muscles. The distribution, shape and size of caveolae were more irregular in dystrophic chickens (Fig. 2).There were no remarkable differences in caveolar density between 1 day and 1 week after hatching. However, the caveolar distribution showed more random arrangement in dystrophic muscles. At 3 weeks after hatching, there was an increase of caveolar density in dystrophic muscles as compared with control muscles and the caveolar distribution was more irregular and random in dystrophic muscles. In control muscles, the caveolae were arranged in a regular pattern. There were no remarkable changes in caveolar density of control muscles at 1 day, 1 week or 3 weeks after hatching.

Discussion

The caveolae are considered to be either pinocytotic vesicles or T-system openings. There were no obvious changes in dystrophic

muscles at 1 day after hatching in our previous study, while the changes of caveolar density, distribution and size were already seen at 1 day after hatching in dystrophic muscles. This study of caveolae is considered to be more useful for detecting the early morphological changes of the dystrophic process.

References

1) Kuroiwa, Y., Ishimoto, S., Goto, I. and Ohta, M.: Early morphological changes in dystrophic chicken muscle. Proceedings of Ann. Meet. of Muscular Dystrophy Res. Group., p. 12, 1978 and 1979.

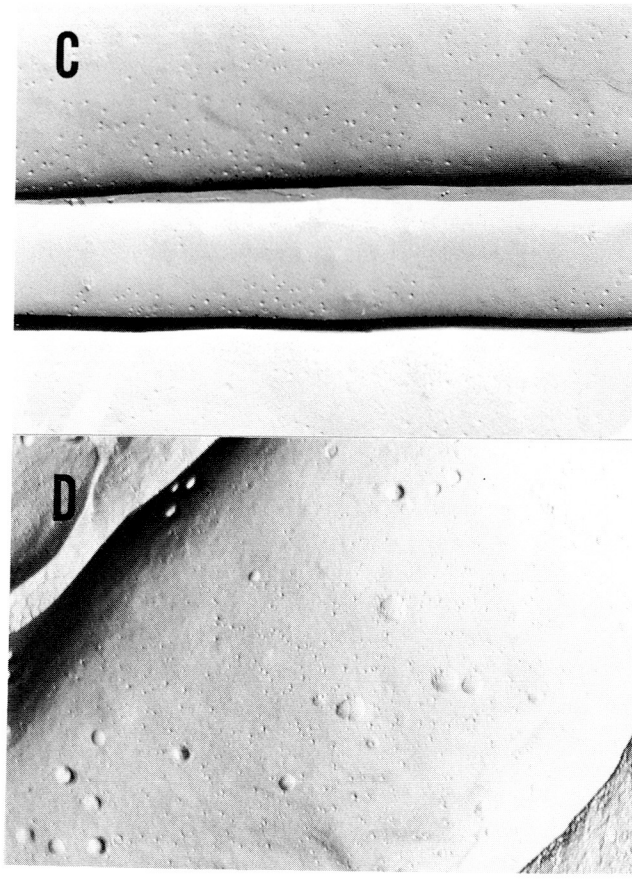

Fig. 2
(C) P face of muscle plasmalemma from a 1 day old normal chicken. The caveolar distribution has a regular pattern. × 21.000
(D) E face of muscle plasmalemma from a 1 day old dystrophic chicken. The caveolar distribution is more random and the distribution and size are more variable than in control chickens. × 40.000