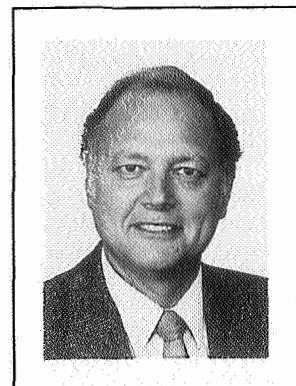


Lathyrism and the half-life of collagen

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ABSTRACT: Maturation of collagen in the periodontal ligament has often been designated as the cause of tooth eruption. The fact that collagen has a high turnover rate provided some sort of proof of this hypothesis. It is well known that lathyrogens decrease eruption rate. Experiments were performed, using Wistar rats, which looked into the relationship between collagen turnover and lathyrism. The collagen turnover was established in teeth not erupting after the administration of lathyrogens. These results were compared to those obtained after having stopped eruption by the placement of a goldcrown on the lower incisors. It was found that lathyrism, and therefore collagen maturation, did not influence turnover rate. Thus the supposition, that collagen is responsible for tooth eruption, becomes doubtful.

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MeSH words: collagen; periodontal ligament

Key words: collagen, lathyrism, tooth eruption, periodontal ligament, turnover rate

INTRODUCTION

The collagen contraction hypothesis - collagen maturation causes collagen contraction which is responsible for tooth eruption - requires a continuous high rate of collagen turnover to maintain continuous eruption.

Stallard in 1963 and later others (e.g. Crumley 1964, Carneiro and Fava de Moreas 1965, Skougaard, Frandsen and Baker 1970, Rippin 1976a, Sodek 1976 1977 and 1978; Sodek and Ferrier 1988) have indicated that collagen metabolism in the periodontal ligament of rodents is extremely rapid. According to Guis (1976) and others (e.g. Beertsen en Everts 1977, Rippin 1976a 1976b, and 1978, Sodek 1978) it is much higher in PDL than in other collagen containing tissues such as skin. For example Guis found that the turnover of collagen in the whole PDL of young guinea pig incisors is four times as high as in guinea pig skin.

The half-life ($T_{1/2}$) of mature collagen in the periodontal ligament of the rat has been reported by Sodek et al. (1977) to be approximately 1 day in the molar and 3 days in the incisor, later Sodek and Ferrier (1988) calculated 'real' half-lives as 3 days for molar PDL and 6 days for incisor PDL, although Orlowski (1978) has suggested up to 9.5 days for the incisor tooth of this animal. Guis (1976) and Sloodweg (1976) found corresponding turnover rates for guinea pig incisor PDL (9.5 days) and Van den Bos and Tonino (1984) found a half-life of 10.5 days for unimpeded rat incisor PDL, and 8.9 days for impeded rat incisor PDL.

All this data indicates a high rate of turnover of collagen in PDL. And although many studies have been performed on the relation between the turnover of collagen in the PDL and the eruption rate of teeth, it seems that there is no simple relation between them as can be deduced from the results of Sodek (1978): his results show that molars with limited eruption show an

incorporation rate of label three times as fast as incisors with continuous eruption. Furthermore Sloodweg (1976) indicated that there was no difference between the $T_{1/2}$ of PDL collagen of impeded and unimpeded guinea pig incisors.

Guis (1976) showed that in the guinea pig incisor PDL the collagen pool contained only a small percentage (about 5%) of salt-soluble collagen i.e. recently synthesised tropocollagen. This will allow a high turnover of fibre collagen only when the use of this pool is highly efficient and consequently the speed by which this newly synthesised collagen (tropocollagen) is changed into crosslinked insoluble collagen is high. This has been demonstrated by Sodek (1978).

Is maturation of collagen in incisor PDL related to incisor eruption? Because relatively little is known about the role of collagen maturation in eruption, it was important to determine both the influence of lathyrism on the eruption rate and on the turnover of PDL collagen. Therefore experiments were devised to investigate the turnover in PDL with and without the presence of lathyrogens by biochemical means.

Because of the variation in radioactivity incorporated in newly synthesised material e.g. difference in blood circulation, it was decided to measure the disintegration of labelled (mature) collagen. In other words the rate by which the once labelled collagen disappeared from the tissue. In this study of metabolism, use is made of the fact that, as long as the newly synthesised collagen (tropocollagen) has not formed any intermolecular crosslinks, it is salt-soluble. As soon as crosslinks start to appear, it becomes salt-insoluble. Therefore the rate of disappearance of radioactivity from the salt-soluble collagen fraction and the rate of appearance and disappearance into/from the salt-insoluble fraction was investigated.

It is relatively simple to study the metabolism of collagen in tissue such as PDL because hydroxyproline is an almost specific amino acid. From the administration of a known quantity of radioactive proline and measuring,

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after some time, the quantity of hydroxyproline present in the tissue, details of the metabolism may be calculated.

The amount of radioactivity found is not only related to the rate of metabolism but is also dependent on the initial uptake of the radioactive proline. With regard to the latter, blood circulatory factors are very important and may vary between tissues. This would mean that the quantity of radioactivity found is not necessarily a measure of the total amount of synthesised collagen. The rate of synthesised collagen can however be calculated from the rate by which the initial labelled collagen disappears from the tissue.

Sodek (1977) and Sodek and Ferrier (1988) state that the plasma proline pool is variable and that re-utilisation occurs (Jackson and Heininger, 1975). He also favours a short-term experiment because in a long-term experiment growth of the animal would influence the value of T¹/₂. However this large variation of the plasma proline pool is easily eliminated by a period of fasting. From experiments carried out by Guis (1976) it is known that the best results may be obtained when the administration of radioactive proline occurs after the experimental animals have fasted for 20 hours. This allows all the radioactive proline — the free proline in plasma to be available for incorporation, as intake of food greatly influenced the concentration of free proline in blood. In order not to influence the specific activity of the plasma proline directly after its intravenous injection, the fasting was continued for another 4 hours.

Guis (1976) also showed that newly-synthesised collagen had negligible specific radioactivity after 3 days, indicating almost a complete absence of proline recycling.

Guis (1976) and Sodek (1976 1977 1978) show that the incisor PDL of guinea pigs and rats respectively, did show a rapid rate of turnover. Not fully agreeing with the method used by Sodek (this will be more fully discussed at the end of this article) collagen turnover in rat PDL under both normal and experimental conditions was investigated. The specific activity of the salt-soluble and the salt-insoluble collagen was measured, at certain intervals after administration of radioactive precursor.

MATERIALS AND METHODS

In all the experiments virgin female Wistar rats were used (stock Cpb:WU). All had an average weight of 180 (±12) grams.

In order not to be influenced by the growth of the animal, the age of the animals was about 12 weeks. At such an age, in contrast to the male rat, the female has reached a point that she will hardly increase in body weight yet blood circulation should be excellent.

The eruption rate of the teeth were measured using the method of Schour and Van Dyke (1931). This method is sufficiently accurate (Taverne 1992, article presented for publication). Data was analysed by Student's t-test and P-values of <0.05 were accepted as statistically significant (two-tailed). For one group of experimental animals, gold crowns were made.

After having shortened the lower incisors, an impression was taken using an acrylic impression tray and a rubber type of impression material frequently used in dentistry. A mould was cast and on it a wax pattern fabricated and the normal procedures for preparing a gold crown was followed. The gold crown was then cemented onto both lower incisors using a dental cement. A small horizontal mark on the buccal surface of the gold crown was used as a marker for eruption rate measurements.

Lathyrigen — 0.25 mg AAN/g body weight/per day — was administrated using a stomach probe. Radioactive precursor was injected into the rats tail, each animal receiving a quantity of 5 Ci per gram body weight.

A modification of the method of Rojkind and

González (1974) was used to establish the specific radioactivity of the tissue.

All biochemical techniques were based on well known methods, modified by Guis (1976) and Sloodweg (1976).

In total 141 animals were used. Of these, 39 animals were used to establish the normal salt-soluble fractions (SAH), 42 animals were used to calculate the normal salt-soluble fractions (SAH) and 21 animals were used to obtain normal specific activity of proline (SAP) at various times. A further 9 animals had gold crowns and 30 animals were used for lathyratic experiments.

RESULTS

Specific radioactivity of hydroxyproline in salt soluble collagen

Animals were sacrificed after 4 hours, 2, 3, 5, 10 and 20 days. The specific activity in the salt soluble fraction of PDL was high during the first few hours after administration, the same fraction from skin of the same animal also showed a high incorporation.

However, the radioactivity in PDL started to disappear at a much faster rate than in skin so that after two days hardly any and after three days no more radioactivity could be measured in the salt-soluble collagen fraction of incisor PDL. Because of the fact that I was more interested in the SAH of the salt-insoluble fraction, I did not pursue this any further. Moreover the results were consistent with the results obtained by Guis (1976) in experiments on guinea pigs. The specific activity of newly synthesised collagen, which is the salt-soluble fraction, started off with a high value for both incisor PDL and skin.

Table 1.

SAH from salt-soluble collagen

	PDL Incisor	SKIN	
4 hours	827 (49)	*	n=6
2 days	340 (61)	564 (23)	n=6
3 days	82 (28)	not done	n=9
5 days	43 (12)	1164 (18)	n=6
10 days	*	681 (29)	n=6
20 days	*	248 (33)	n=6

values given in dpm/mg. hydroxyproline (mean ± s.d.)

* = value too low for measurement

measurement taken at time intervals of 4 hours, 2, 3, 5, 10, 20 days after administration of radioactive precursor.

n = number of animals for every interval, n=6 except for measurement taken after 3 days.

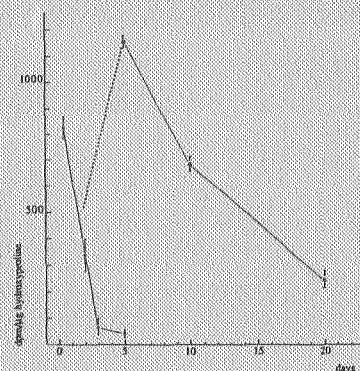


figure 1. SAH from soluble collagen in incisor PDL and skin.

* = normal leical PDL

* = skin

highest value for skin is somewhere between day 2 and day 5. These two points are therefore joined by a dotted line.

As seen from the graph (Figure 1), the fall of PDL radioactivity is rather severe and the value of SAH for salt-soluble fraction of collagen in incisor PDL is almost zero after three days.

When comparing the SAH of salt-soluble collagen in incisor PDL and in skin (Table 1) it is apparent that skin maintains its radioactivity much longer than PDL. From this it may be deduced that the actual rate of disappearance from skin is much slower than from PDL. In other words, the $T^{1/2}$ of the salt-soluble collagen fraction in skin is higher than the $T^{1/2}$ of that in PDL.

Specific radioactivity of hydroxyproline in salt-insoluble collagen

When the disappearance of radioactive material from the soluble collagen fraction is rapid, it means that a very rapid process may be active in converting soluble collagen into salt-insoluble collagen. Study of the salt-insoluble compartment will give an answer as to the speed in which the radioactive material 'travels' from the salt-soluble to the salt-insoluble fraction, as well as the speed by which it disappears from that compartment again.

In order to calculate this speed, or turnover rate, the SAH of the salt-insoluble fraction in relation with certain time intervals was established (Table 2). From the results it was estimated that within a very short time (4 hours) already much of the radioactive material had been incorporated into the salt-insoluble fraction in PDL and that within three days most of radioactive material had progressed from the salt-soluble to the salt-insoluble fraction PDL. With skin this was not the case. It lasted at least 10 days before the salt-insoluble fraction in skin had reached its maximum specific activity. Furthermore, the maximum value was much lower when compared to PDL.

Table 2.

SAH in salt-insoluble collagen in incisor PDL, molar PDL and Skin.

	PDL I	M	SKIN	
4 hours	312 (53)	392 (46)	no measurement possible	n=6
2 days	717 (99)	453 (101)	6.9 (1.6)	n=3
3 days	763 (58)	398 (13)		n=6
5 days	549 (110)	322 (42)	18 (16)	n=3
10 days	409 (61)	318 (39)	45 (15)	n=9
15 days	300 (107)	228 (85)	22 (12)	n=6
20 days	167 (19)	154 (51)	29 (16)	n=6
25 days	129 (26)	145 (17)	37 (6)	n=3

values given in dpm/ug hydroxyproline (mean $\pm$ s.d.)
n = number of animals
no value for skin at interval 3 days was established.

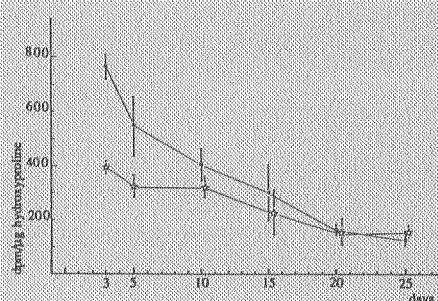


figure 2. SAH from salt-soluble collagen in incisor PDL, and molar PDL.

● = incisor PDL
○ = molar PDL

Setting out the results against a logarithmic time scale the $T^{1/2}$ for incisor PDL was calculated to be 8.8 days ($r=0.99$) and for molar PDL to be 14.6 days ($r=0.97$). The $T^{1/2}$ for skin could not be established. However it was obvious that the value was much higher than PDL.

The specific radioactivity of proline

It must be remembered that the non-collagenous proteins are also radioactivity labelled by the ^3H -proline. They can be found in the water-extracts and the TCA-sediments after collagen extraction. These water-extracts contain blood proteins, water soluble non-collagenous proteins and an insignificant amount of collagen as shown by Paunio (1969) and Guis et al. (1973). As Slootweg (1976), it was found (see Table 3) that the non-collagenous proteins present in TCA-sediment after water and salt extraction showed the highest incorporation of ^3H -proline within 1 day after administration of label. This is in contrast to the salt-insoluble SAH in this tissue, as it reaches its peak value at about 3 days after administration (see Table 3).

Table 3.

Values for SAP (TCA sediments)
from incisor PDL and molar PDL (after water/salt extraction)

Time	INCISOR SAP	MOLARS SAP	
at 4 hours	1235 (80)	1074 (256)	n=3
2 days	922 (116)	686 (223)	n=3
3	832 (52)	704 (72)	n=3
5	678 (135)	422 (53)	n=3
10	274 (48)	265 (31)	n=6
20	74 (13)	186 (53)	n=3

values given in dpm/ug proline (mean $\pm$ s.d.)
n = number of animals

This allowed an other calculation of the $T^{1/2}$ to be made. The $T^{1/2}$ for the incisors was 4.8 days ($r=0.99$) and for molars was the $T^{1/2}$ 8.2 days ($r=0.94$). This value was close to the value ($T^{1/2}$ is 5 days) already established for incisor PDL in guinea pig, as well as skin (Guis 1976). Guis (1976) assumed that the rate of the process of replacing non-collagenous proteins could be distinguished into different groups and that their average $T^{1/2}$ value is approximately 5 days.

LATHYRISM AND $T^{1/2}$

In order to be able to give an answer to the question to what extent the maturation of collagen influence the eruption rate, one first of all must establish whether there is any relationship between them. If the eruption rate is stopped, does maturation of collagen still continue? To be able to answer this, experiments were designed to stop the eruption rate in healthy animals. Such a state was achieved by placing a gold crown on the two mandibular incisor teeth (Figure 4), in such a way that attrition could not take place.

Measurements learned that after 1 week the eruption rate was almost zero (0.4 mm, s.d. 0.3) and after 3 weeks (<0.1 mm, s.d. 0.1) for both upper and lower incisor teeth. Having established the possibility that eruption rate can successfully be reduced by placing crowns on the teeth, another experiment was performed. One week after stopping the eruption ^3H -proline was administered, and animals were sacrificed at regular intervals (5, 10 and 20 days after administration).

Table 4 shows results of SAH of insoluble collagen from incisor PDL. A comparison is made between

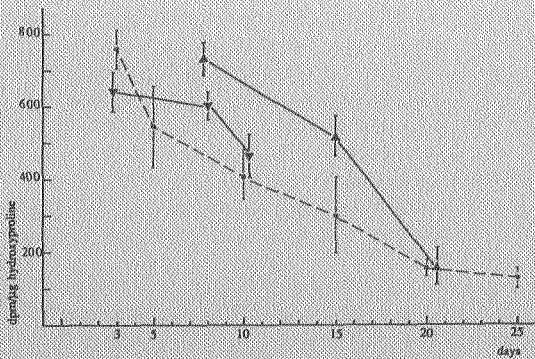


Figure 3. Comparison between SAH and salt-soluble collagen in incisor PDL

▼ A. (first 0.25mg AAN/g body weight/per day than radioactive precursor) (n=15)
 ▲ B. (first radioactive precursor than 0.25mg AAN/g body weight/per day) (n=15)
 n = number of animals

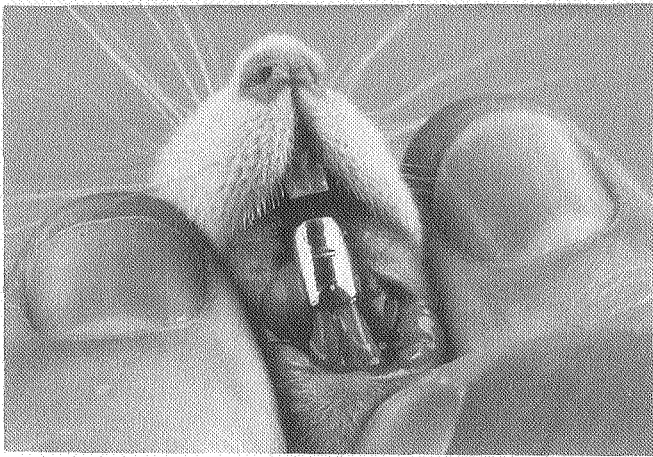


Figure 4. Anaesthetised animal with gold crown in place. Notice the horizontal marking on the gold crown, as well as the small markings on the upper incisor teeth.

the results obtained from the control animals and those from the crowned animals.

The result obtained was close to that obtained for 'normal' animals ($T^{1/2}$ = 8-8 days). In other words in those animals whereby the eruption rate was decreased by mechanical means, in this case the gold crown, the maturation (read turnover) of collagen in the rat PDL was not affected.

Checking the collagen solubility of 'gold crowned' PDL the results (not published in this article) show that at all time intervals (5, 10 and 20 days) the solubility was similar to the values found for 'normal' control groups. In other words there was no difference in collagen maturation whether eruption is normal or vastly decreased by mechanical means.

When taking into account the fact that Sloodweg (1976) for guinea pig and van den Bos and Tonino (1984) for rat did not find any change in turnover rate with respect to unimpeded (increased) eruption incisors, and also considering these results, the existence of a direct relationship between collagen maturation and the eruption process became doubtful.

In the previous experiment the maturation of collagen in incisor PDL has been influenced by directly decreasing the eruption rate. In attempting to do the reverse, that is, interfering with the maturation and thereby possibly decreasing the eruption rate, it could tentatively be possible to establish a direct relationship between collagen maturation and eruption rate. Maybe even going further, possibly discover how interfering with

collagen maturation influences collagen turnover. In order to interfere with collagen maturation, the animals were subjected to daily oral administrations of 0.25 mg AAN/g body weight/per day. The experiments were divided into two groups:

(a) To one group, A (n=15) first the lathyrigen was given and then after 1 week the radioactive precursor was supplied. It was expected that the majority of the radioactive precursor would not be taken up into the mature collagen, and therefore would only be present in the salt-soluble collagen. In this way the efficiency of this lathyrigen in blocking collagen maturation could also be determined. Measurements were taken 3, 8 and 10 days after administration of label.

(b) To the other group, B (n=15) the radioactive precursor was administered and then after 5 days the lathyrigen. The 5 days were required in order to be sure that all the radioactive substance was present in mature (salt-insoluble) collagen of the PDL tissue (see this chapter). By this means the possible influence of lathyrigen on the turnover rate of the existing mature collagen could be studied. Measurements were taken 8, 15 and 20 days after administration of label.

In the experiment with first lathyrigen then radioactive precursor it is noticed that once the maturation of collagen is greatly impaired by the action of the lathyrigen, the radioactive precursor can only reach the salt-insoluble collagen with difficulty and as expected there was a much higher incorporation of radioactive precursor in the salt-soluble collagen (Table 6) — for normal control animals this value is 82, three days after administration of the precursor. However the rate of disintegration (see Table 5) of salt-insoluble collagen did not seem to differ greatly from the normal situation. An actual value for $T^{1/2}$ could not be calculated because numbers of animals were too small and time intervals too few. Eruption rate was influenced as was to be expected. In the experiment with first the radioactive precursor then lathyrigen, the lathyrigen did to a large extent prevent the formation of intermolecular cross links between the polypeptide chains, thus the mature collagen containing the radioactive precursor would almost only be broken down and would hardly be replaced. There was also the expected lowering of eruption rate (results not shown). However there seemed almost a normal rate of disintegration of salt-insoluble collagen, with a higher percentage of salt-soluble collagen (see Table 6). For the same reason as given above, actual values for $T^{1/2}$ could not be calculated.

Further experiments were not instigated because at that time a committee against the use of experimental animals for purely research purposes, became involved and it was decided to cancel *all* further experimentation.

Table 4.

Comparison between
SAH in salt-insoluble collagen in incisor PDL

	SAH incisor normal control	SAH incisor gold crowns	
4 hours	312 (53)	—	control n=6
5 days	549 (110)	527 (30)	control n=3 crown n=3
10 days	409 (61)	429 (53)	control n=9 crown n=3
20 days	167 (19)	159 (23)	control n=6 crown n=3

values given in dpm/g hydroxyproline (mean ± s.d.)
 n = number of animals
 see Table 2 for normal control values

Table 5.

SAH of the salt-insoluble collagen in incisor PDL

days after ³ H-proline administration	CONTROL*	A	B
3 days	(n=6) 763 (58)	(n=5) 648 (46)	
8 days		(n=5) 600 (29)	(n=5) 730 (48)
120 days	(n=9) 409 (61)	(n=5) 465 (53)	
15 days	(n=6) 300 (107)		(n=5) 515 (57)
20 days	(n=6) 167 (19)		(n=5) 169 (51)

values given in dpm/μm hydroxyproline (mean ± s.d.)

* = normal control animals (n=42) — not all values presented (see Table 2)

A = first lathyrogen than radioactive precursor (see figure 2)

B = first radioactive precursor than lathyrogen

n = number of animals

Table 6.

Table depicting the percentage of salt-soluble collagen in incisor PDL as well as specific radioactivity of salt-soluble collagen and salt-insoluble collagen at certain times after the administration of ³H-proline to group A and group B

First lathyrogen, than ³ H-pro					First ³ H-pro, than lathyrogen			
SAH insol.	SAH salt sol.	% salt sol.	AAN days	³ H-pro days	AAN days	% salt sol.	SAH salt sol.	SAH insol.
648 (46)	2611 (211)	27.9 (4.7)	10	3				
600 (53)	856 (35)	30.4 (5.4)	15	8	3	3.2 (1.3)	no value	730 (48)
465 (53)	749 (135)	34.4 (4.3)	17	10				
				15	10	18.1 (5.2)	207 (27)	515 (57)
				20	15	29.6 (2.1)	112 (12)	169 (51)

concentration of AAN used: 0.25mg per gram body weight per day.

If one did make a rough calculation from these values, a T¹/₂ (salt-insoluble incisor PDL collagen) for group 'A' would calculate to be 12.2 days (r = 0.86) and for group 'B' to be 5.1 days (r = 0.92). The T¹/₂ (salt-soluble incisor PDL collagen) for both groups is about 4 to 5 days if calculated from these results.

DISCUSSION

First of all it must be realised that trying to reach a conclusion based on these results, the possible side effects due to the administration of lathyrogens, not directly interfering with collagen maturation of incisor PDL must not be overlooked. After all the animals in group 'A' are almost a week lathyritic before the radioactive precursor is administered. Therefore this type of experiment whereby a reasonably potent concentration is given, cannot be followed for a long time due to the rapidly deterioration of the animal, thus producing unreliable results. It must also be taken into consideration that the general physical deterioration of the experimental AAN animals may have a certain negative influence on the 'normal' processes, such as turnover. It is therefore with dubiety that one should interpret the results. However, it is possible to discuss the results obtained and try to clarify the differences in results if possible. It must be pointed out that the value for T¹/₂ is representative for the whole 'rat incisor' PDL and not, as Sloodweg (1976) who investigated guinea pig incisor PDL, for certain sectors. This means that the value of T¹/₂ found

is the average of these sectors. However Sloodweg (1976) does suggest that possibly the T¹/₂ is similar throughout the entire PDL. He postulated the alveolar PDL fibres to have a T¹/₂ of seven days. A similar value was found — T¹/₂ of about 9 days — for the normal PDL for the entire rat incisor. Furthermore Sloodweg (1976) showed that the T¹/₂ value was not influenced by an increased eruption rate (unimpeded eruption). It therefore does not seem surprising that the T¹/₂ value found in the case of decreased eruption (using gold crowns) was also not different from normal.

The values found in 'B' for the SAH of the salt soluble fraction is higher than found for the normal control group. A possible explanation for this may be, that already degraded pieces of collagen are now present in the salt soluble fraction. The readings of SAH of the salt-insoluble fraction of group 'B' are generally higher than the values found for normal control group as well as those found for group 'A'. This could possibly give support to the suggestion that the lathyrogen AAN influences extra- or intra- cellular degradation of collagen.

The SAH of the salt soluble fraction in group 'A' at day 3 and 10 was higher than the comparable normal values. This means that the lathyrogen is effective even after 10 days, but it also implies that young collagen is not degraded at a 'faster' rate.

The reason for this could be that as AAN there is a lowering of eruption, 'activity' of PDL is not required to conform and maintain this eruptive process. This may decrease the disappearance rate of radioactivity from the salt-soluble collagen fraction. This could possibly be explained by the direct influence of AAN on the breakdown process or even the activity of the fibroblasts, which are for a great deal responsible for this process. Further investigation into the possible effects of lathyrogens on the turnover rate is to be encouraged.

Notably is the fact that values for SAH in the salt-insoluble collagen in incisor PDL are obtained. After all, if lathyrogen was completely effective there would be no radioactivity found in the salt-insoluble fraction. It must therefore be concluded that the influence of lathyrogen is not 100% effective and crosslinking still occurs.

The difference between these results and those published by Sodek may be explained in the way of his unconventional approach to study the half-lives by measuring the rate of the initial incorporation of ³H-proline as hydroxyproline in salt-insoluble collagen. After all, the approach used here, is calculating the decrease in time of specific radioactivity of the incorporated hydroxyproline after having reached maximum incorporation. Van den Bos and Tonino (1984) have stated that in short-term labelling experiments (2 hour incorporation) small specific salt-insoluble fraction of incisor PDL is present which has a much higher turnover rate than the rest of the collagen. Therefore in initial incorporation studies, this specific fraction would be a major contributor to turnover rate measurements. Moreover, according to Bienkowski (1983) 10 to 40 percent of newly-synthesised collagen is degraded intracellularly before being processed to collagen fibrils. Thus in the short term experiments of Sodek, the synthesised and labelled tropocollagen may not have been entirely incorporated into mature fibres and Sodek only investigated the metabolism of non-functional collagen. The data for half-lives of collagen determined by autoradiographic studies may also suffer from this disadvantage (e.g. Rippin 1976a 1976b 1978). It must also be kept in mind that a rat has diurnal patterns of feeding and it is possible that at some stage during the interval between lathyrogen administration, cross links are still formed. Another possible explanation is the presence of two pools of collagen with different turnover rates, as about 70% of the collagen was crosslinked and radioactive, although the rats were severely lathyritic.

CONCLUSION

It has been shown that when the eruption rate is decreased using physical means, the turnover rate is not influenced. Furthermore if the eruption rate is decreased using systemic means which interfere with the 'normal' process of maturation of the tissue which maintains and supports the tooth in the socket, there is also great influence on the system as such. The results obtained are in accordance with previous publications. Levene (1973) states that the synthesis of both collagenous and noncollagenous proteins are unaffected by the use of the lathyrogen beta-APN (Levene 1973). More recently, Nelson, Diegelman and Cohen stipulated that beta-APN did not inhibit collagen or non collagen protein synthesis (Nelson et al. 1988). This also seemed to be true for DPA, (Tanzer 1965). The results show that the rate of collagen breakdown in lathyritic animals did not differ greatly from normal.

This would mean that, although the maturation of collagen is influenced by lathyrism, the synthesis is not. There is however, a decrease in eruption rate. If related, then the demand for collagen maturation would be lowered due to less eruption as seen in lathyritic animals. But synthesis does not seem to be effected.

The question still remains: is maturation of collagen in incisor PDL related to incisor eruption?

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