In our dog studies, we amputated the coronal pulp tissue and treated the radicular pulp tissue with dressings of calcium hydroxide in aqueous methylcellulose, calcium hydroxide in water, and zinc oxide-eugenol. We were surprised to learn that we achieved superior results with calcium hydroxide in aqueous methylcellulose.

Histological evaluation after two months indicated that this new formulation, which is now called Pulpdent Paste, stimulated more rapid healing with the formation of regular tubular dentin (PS1). Calcium hydroxide in water produced a new dentin bridge, but without the maturity seen in the histological section with methylcellulose (PS2). Zinc oxide and eugenol, which was used as a control, produced inflammatory tissue without dentin bridge formation (PS3).
After these initial pulp studies, we proceeded with comprehensive studies on dentin bridge formation in human teeth that were scheduled for extraction, and we compared them with our findings in dogs. Teeth were sectioned at various intervals and the healing process was carefully observed.

Figures PS4 and PS5 are histological sections of a dog’s tooth and a human tooth 24 hours after pulpal amputation and treatment with Pulpdent Paste. A dense line of demarcation can be seen in both sections. The line of demarcation is where the new dentin bridge begins to form.
Figures PS6 - PS10 are histological sections showing the healing process from two weeks to five months. After two weeks, we can see the irregular dentin and the beginning formation of the odontoblastic layer (PS6). After three weeks we see the organization of the odontoblastic layer and the beginning formation of regular tubular dentin (PS7). Our four-week section shows regular tubular dentin forming (PS8), and after two months, Korpfs fibers have formed (PS9). Our histological section after five months shows a complete new dentin bridge (PS10).

It is interesting to note that the formation of the new dentin bridge can also be seen radiographically as early as two weeks after amputation. Figures PS11 and PS12 show a new dentin bridge forming two and four weeks, respectively, following pulpotomy and treatment with Pulpdent Paste.
Our histological section of a human tooth two months following pulpotomy, stained with silver after two months, shows in great detail new dentin formation with odontoblasts and Korpfs fibers (PS13 & PS14). In the organization of the blood clot, the undifferentiated mesenchymal cells organized and acted as odontoblasts, laying down normal tubular dentin. It was fascinating to see that the new tubular dentin was formed in the exact same way that dentin is initially formed in the embryonic stage of tooth development.

The enhanced healing with Pulpdent Paste is most likely attributable to several factors:

- **Calcium hydroxide is not soluble in water, and it is difficult to handle and apply evenly.** The addition of an aqueous solution of methylcellulose creates a homogeneous and cohesive paste that has the added advantage of adhering to the pulp tissue and the remaining dentin.

- **The methylcellulose holds the calcium hydroxide in suspension and keeps it from drifting into the stroma of the pulp, thus preventing unwanted stalactite and stalagmite calcifications that have been shown to result in pulpal necrosis and internal resorption.**

- **The methylcellulose acts as a buffer, thus creating a mild irritation rather than a harsh insult, such as that which occurs when calcium hydroxide powder is placed directly on the pulp. Furthermore, methylcellulose is basically inert and does not affect the pH of the calcium hydroxide.**